Exhibit 1

Hearing Order OH-001-2014
File No. OF-Fac-Oil-T260-2013-03 02

IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT

DECLARATION OF LORRAINE LOOMIS

LORRAINE LOOMIS makes this declaration on behalf of the Swinomish Indian Tribal Community, an intervenor in the above proceedings, and declares as follows:

Background and Qualifications

1. I am Lorraine Loomis. I am a Native American and a member of the Swinomish Indian Tribal Community (hereafter, "Swinomish"), an Indian tribe recognized under the laws of the United States government. My tribal name is Itakbix. I was born and raised on the Swinomish Reservation, currently reside on the Reservation, and have lived on the Reservation for almost all of my life.

2. The Swinomish Reservation is located on Fidalgo Island in Puget Sound, in Skagit County, Washington. The Reservation is just north of the mouth of the Skagit River, the only river in Washington that still supports runs of all six species of salmon. Swinomish has just over 1,000 tribal members, most of whom live on or near the Reservation. In the past I served as a member of the Swinomish Senate, the governing body of the tribe, for 15 years.

3. I am currently employed by Swinomish as the Fisheries Manager, a position I have held for 40 years, since 1975. In that capacity I am responsible for the overall management and regulation of the Swinomish fisheries, including the off-reservation treaty rights fishery. As Fisheries Manager I oversee a staff of fisheries biologists and technicians, manage all of the tribal fisheries, participate in preseason planning and develop management plans for all fisheries, establish regulations for and open and close fisheries, issue various permits and licenses to tribal fishers, register fishing vessels, and the like.

4. In addition, a large part of my job involves discussions and negotiations with other tribes, the State of Washington, the United States government, and international organizations regarding the regulation and conduct of the various fisheries. My work with four of these organizations is described in the following four paragraphs. A number of others could be listed as well.

5. At the local level is the Skagit River System Cooperative (SRSC), a consortium formed in 1975 by Swinomish and the Sauk-Suiattle Tribe that is dedicated to the health of the salmon fisheries and habitat on the Skagit River, which is crucial to our fishing activities. SRSC

employs about two dozen fisheries scientists and technicians who work on research, habitat restoration, improvement of water quality, and the like. I oversee the work of this staff.

6. At the intertribal level, the Northwest Indian Fisheries Commission (NWIFC) is an entity formed by all twenty of the tribes in the State of Washington that have treaty fishing rights. The primary mission of NWIFC is to assist and support its member tribes in their role as co-managers (with the State of Washington) in managing the fisheries of the State. NWIFC's staff of 65 performs a wide variety of functions in research, modeling, policy formulation, environmental and habitat protection, and just about anything else related to the tribes' treaty fisheries. Each tribe has a representative on the NWIFC Board. I have served on the Board since 1978, was Vice Chair of the Board for 30 years, and since last year have served as its Chair.

7. At the statewide level, the primary salmon process is the "North of Falcon" process, in which the Washington Department of Fish and Wildlife and the tribes come together annually to decide on the harvest quotas and regulations for all of the salmon fisheries within the State of Washington, from the offshore limit of the State's jurisdiction to the terminus of each stream's salmon run. Each of the 20 tribal fisheries and all of the various state sport and commercial fisheries is included. The process results in a large List of Agreed Fisheries (LOAF) that provides for the tribes and the State to each achieve the harvest of its 50% share of the harvestable surplus of each species of salmon. Other co-management processes result in agreed fisheries in the various species of shellfish in the various management regions.

8. The Pacific Salmon Commission is an important international body that affects treaty fishing in the State of Washington. The Fraser River Panel of that Commission oversees the harvest in the U.S. and Canada of Fraser River salmon, which run through U.S. waters on their way back to the Fraser. I have served on the Fraser River panel since 1988, at times in the capacity of chair of the U.S. section of the panel.

9. In my capacity as Fisheries Manager for Swinomish for four decades, and in light of my service with various intergovernmental fisheries management agencies, including the four described in paragraphs 5 through 8, above, I have become familiar with Swinomish fishers, Swinomish fishing practices, Swinomish history regarding the fishery, the role of fishing in the tribal economy, the regulation and management of the Swinomish fishery, the legal and governmental framework in which the fishery operates, and the environmental and habitat threats to the health of the fishery.

Swinomish Treaty Fishing Rights

10. In a series of treaties with the U.S. government in 1854 and 1855, The Indian tribes of Puget Sound and the Washington coast from Gray's Harbor north ceded their aboriginal lands to the U.S. and retained reservations of land along with hunting, fishing and gathering rights. These treaties are commonly referred to as "Stevens treaties" because the U.S. negotiator was Washington Territorial Governor and Indian Agent Isaac Stevens. Each of the treaties reserved to each tribe the right to fish in its "usual and accustomed grounds and stations,"

commonly referred to as "U&As." The term "fish" is broad and includes both finfish and shellfish and other aquatic invertebrates.

11. The treaty fishing rights of the tribes were comprehensively interpreted and decreed in a U.S. federal district court decision in 1974 commonly called the "Boldt decision," named after the judge who rendered it. This case laid down the basic framework for conduct of the treaty fishery that have applied ever since. The court retained continuing jurisdiction which it exercised to this day, and the parties are constantly availing themselves of the court to resolve disputes. It is no small part of a tribal fisheries manager's tasks to appear in court or attend court-supervised mediations on fishing matters.

12. From a fisheries manager's perspective, the main rules pertaining to treaty fishing rights that affect the fishery relate to U&As, conservation, allocation, tribal self-regulation, and co-management. These principles will aid in understanding the tribal harvest data that comes later.

a) U&As. Each tribe has a court-defined area of U&As in which it can exercise treaty fishing rights. These areas are different for each tribe and overlap, making regulation a challenge. As many as seven or eight tribes may have U&As in a given area; some tribes are alone with U&As in other areas.

b) Conservation. The treaty tribes are not allowed to take as much as they want. Managers must ensure that the needs of conservation—the propagation of fish for the future—are met, and only the harvestable surplus after conservation needs are met may be harvested.

c) Allocation. The treaty tribes are allowed to take up to 50% of the harvestable surplus, and the rest is available for non-treaty fishers. Basically, state and tribal fishers each get half the harvest in treaty waters.

d) Tribal Self-Regulation. The courts have ruled that if a tribe is capable of regulating its own fishery to protect conservation, it must be allowed to do so. The state can regulate tribal harvest only if the tribe is incapable of regulating its own fishers. For decades now all of the treaty tribes in Washington have been regulating their own fisheries.

e) Co-management. The 50-50 allocation and tribal right to self-regulation led to the evolution of a co-management process under which the tribes and state reach agreement on harvestable surplus and on how each side should regulate the fishery. The North of Falcon process described in paragraph 7 is the co-management process for salmon, and there are other joint management efforts in place for other species as well.

13. Swinomish traces its treaty fishing right to a particular Stevens Treaty, the Treaty of Point Elliott, Jan. 22, 1855, 12 Stat. 927. That treaty also established the Swinomish Reservation, which has been home to the Swinomish ever since. I am a direct descendant of two of the chiefs who signed the treaty for the Swinomish tribes and bands, Kwallattum and Goliah.

The marine fishing U&As established for Swinomish in the Treaty of Point Elliott extend from the Canadian border south to a few miles beyond the southern tip of Whidbey Island. They border the Kinder Morgan shipping route from the U.S./Canada border until ships have passed well to the west of Victoria B.C.

Swinomish Treaty Fishing—Commercial

14. Swinomish has recently gathered information on its treaty fishery based on a questionnaire that was developed for use in a recent report on vessel traffic impacts on Lummi fishing done by Glosten and Associates. The Swinomish response played no part in that study but was prepared and presented to the U.S. Army Corps of Engineers for consideration in connection with the approval process for the Gateway Pacific coal dock at Cherry Point, Washington. I have attached that questionnaire and the Swinomish responses as Exhibit A to my Declaration. The responses were prepared by the fisheries staff at my direction based upon Swinomish fishing data contained in the NWIFC tribal treaty fishing database, TOCAS. **Please note the exhibit does not include data for the entire Swinomish treaty fishery in most responses.** For most responses, it only includes the areas shown and named on the map on page 1 of Exhibit A. This area includes the northern and western portions of Swinomish U&As that are likely to be directly affected by TransMountain pipeline expansion vessel traffic, including associated anchoring and bunkering. I will refer to this portion of Swinomish U&As, shown on the map attached to Exhibit A, as the "Affected Area" in the remainder of this Declaration. Swinomish has not recently fished in the Strait of Juan de Fuca West area, so that area is not included in the Affected Area. Swinomish treaty fishing in the Skagit River and the more southern and eastern part of its marine U&As are not included. I will compare some features of this Affected Area to the Swinomish treaty fishery as a whole later in this Declaration.

15. Swinomish is today, and always has been, very much a fishing community. Table 7 of Exhibit A shows that a large portion of the tribe engages in some form of commercial fishing. In 2013, 162 members registered for salmon fishing and 200 for Dungeness crab in the Affected Area. That is around 20% of the Swinomish membership, one in five of every Swinomish man, woman and child. Some of the fishers are engaged full time in the various tribal fisheries, while others fish part time during certain seasons to supplement their income. Most hire deckhands, who must be Swinomish members.

16. The Swinomish fishing fleet is locally based; 95% moored their boats on the Reservation (LaConner) and the rest at nearby Anacortes. Exhibit A, #16. The harvest is much more widely marketed, however, with some of it delivered to Vancouver, B.C. Exhibit A, Table 11.

17. Swinomish commercial fishers pursue every available commercial harvest in the Affected Area: sockeye, pink, coho, chum, chinook, steelhead, crab, shrimp, halibut, clams, oysters, sea cucumber, sea urchin, and geoduck. Exhibit A, #1. The species of primary importance in the Affected Area are salmon, followed by crab. Exhibit A, Table 2.

18. Swinomish fishes throughout the Swinomish U&As in the Affected Area for all the species it pursues (except for geoduck, clams and oysters in the Haro Strait-Boundary Pass

area). Exhibit A, Table 1. The fishing is particularly heavy in the areas Strait of Juan de Fuca East and Haro Strait/Boundary Pass, areas directly affected by shipping traffic from Canada traveling to the ocean through the Strait of Juan de Fuca. Exhibit A, Table 4.

19. The Swinomish fishery is dominated by small boats, in the Affected Area and throughout its fishery. In 2013, 87% of the tribally registered vessels in the Swinomish fleet (all tribal fishing vessels must be registered) were under 30 feet in length. Of those, a third were under 20 feet in length. Only three of the 113 boats were 50 feet or longer. Exhibit A, Table 6. This affects the inclusion of our fleet in vessel traffic studies, because most of the vessels are too small to have automatic locator devices. Our fleet is invisible to such systems and thus excluded from some vessel traffic studies that rely on the automated system information.

20. Swinomish fishing methods vary with the fishing location and species being harvested. Fishers use pots for crab and shrimp, set-lines for halibut, seines for all species of salmon, and drift gillnets for chinook and chum salmon. Exhibit A, #7, 8, Table 5. In addition, fishers dive for geoduck, sea cucumbers, and sea urchins and dig for clams and oysters.

21. Swinomish fishing effort is spread throughout the year. In every year since 1997, Swinomish fishers had at least one landing of catch in each of the months of the year. Exhibit A, Table 9. The largest concentration of fishing is in July through September, but fisheries are also quite active in March through May and in November. *Id.* In 2013, Swinomish fishers made 1,785 harvest landings, most of which were for crab, though the fewer landings for salmon and halibut involve larger catches per landing. Exhibit A, Table 8.

22. Many fishing openers during the year, especially for crab, shrimp, salmon, and halibut, are of short duration—a few days or even hours. These openers are spread throughout the year. Swinomish commercial fishing boats are on the water about half the days of the year, and land a harvest on about 40% of the days of the year (146 days). Exhibit A, Table 10.

23. Swinomish engages in a considerable part of its fishing activity and gains a considerable part of its harvest from the Affected Area. In 2013 Swinomish fishers harvested almost 3 million pounds of fish from the Affected Area. Exhibit A, Table 2. That is 9,000 pounds per fisher or 1½ tons per tribal member. The major portion of the harvest was salmon, which accounted for over half the harvest by weight. Crab accounted for about 15% of the total. Exhibit A, Table 2.

24. Attached as Exhibit B is a table showing 2013 numbers for the revenue generated by the Swinomish fishers from harvest in the Affected Area, along with the total Swinomish harvest and revenue in its entire fishery. This table was generated by my staff under my direction from Swinomish fishing data available on NWIFC's treaty database, TOCAS. The revenue generated from the sale of harvest by Swinomish fishers in the Affected Area was $3,625,500. This was just about half of the revenue from all Swinomish commercial fisheries (49%). This accords with the share of harvest from the Affected Area, which is just over half on the Swinomish harvest (52%). The harvest numbers and values reveal a difference between the fisheries in the Affected Area and the other Swinomish waters south and east of the Affected Area. The Affected Area produces relatively more of the salmon harvest (57%) and all of the

lucrative halibut harvest by Swinomish. Conversely, the Affected Area produced only 37% of the total crab harvest. The two areas thus complement each other in seasons and fisheries resources available.

25. The Swinomish community also benefits from the tribal commercial fishery in another way. Since 1968 a fish processing plant has been operating on the Swinomish Reservation. The plant began as a tribal operation, but after a few years was leased out to a private operator. In 2009, Swinomish formed the Swinomish Fish Company and took over operation of the plant. The plant has a number of product lines, primarily involving the processing of salmon, and has launched the Native Catch® line of seafood products, mostly salmon. Swinomish Fish Co. is also major producer of salmon roe caviar primarily for export to Europe and Asia. The plant purchases crab and other local harvests as well. It is a major purchaser of tribal member harvest, and its wholesale purchasing activities help to support the price fishers obtain for their fish. The plant also purchases fish from other sources, tribal and non-tribal alike, including fish from British Columbia. Swinomish Fish Company generated several million dollars in sales last year. The plant would likely close if there were no tribal treaty harvest to process.

26. In summary, the Swinomish treaty fishery in the Affected Area is a crucial component of the overall tribal fishery that generates significant income. Since almost every Swinomish household includes a fisher (one of every 5 tribal members), that income is diffused through the whole tribal community. A decline in tribal fishing would seriously affect the tribal economy.

Swinomish Tribal Fishing—Subsistence and Ceremonial

27. The economic impact of tribal treaty commercial fishing is very important to the tribes, including Swinomish, but it is not the only value of the fishery nor, in the end, is it the most important one. The court decisions following the Boldt decision have drawn the contours of the tribal treaty fishing right have identified four basic values associated with the treaty right: 1) conservation value of the resource, 2) ceremonial, religious and spiritual values; 3) subsistence; and 4) commercial value. As a fisheries manager I address the conservation value every day, and the tribes have invested much in the conservation of the resource and the protection of habitat. The previous section dealt with the commercial value of the right. I now want to take up the subsistence and ceremonial aspects of the Swinomish treaty fishery.

28. The tribes have a right to engage in subsistence fishing, meaning fishing for personal or household consumption and not for sale. Commercial fishing has a subsistence component, since all commercial fishers reserve from their catches fish for their families and to distribute to extended family, elders and others in need in the community. Sharing of the bounty of the sea is a deeply engrained cultural tradition of the Coast Salish tribes. It is particularly strong at Swinomish, where the bounty of the Skagit River, the adjacent tidelands, and the strong marine fisheries close to the Swinomish Reservation presented an abundance of fisheries riches. The people thrive as a community around the sharing of fish.

29. Like all of the other treaty tribes, Swinomish has a system of issuing permits for subsistence harvest of fish. These harvests are by nature small and make up a small portion of the tribe's overall fishery, Exhibit A, Table 3. But the subsistence fishery is important to sustaining the circulation of fish throughout the community. Subsistence fisheries may be open when commercial fisheries are not, making fresh seafood products more readily available.

30. Subsistence on fish is much more important to Swinomish and other treaty tribes than it is to the general population. Fish and shellfish are a major part of the Swinomish diet. Swinomish conducted a scientific survey of its fish consumption. The summary of the results of that survey, *Swinomish Seafood Diet Survey 2004–2006*, are attached as Exhibit C. The survey showed that the Swinomish people eat significantly more fish and shellfish—over twice as much than does the general population. In addition, it revealed that tribal members would like to eat even more, but are unable to do so for various reasons, including lack of access, abundance, fear of pollution, and harvest time restraints. That subsistence and dietary relationship between the people and the treaty fishing harvest is a strong strand of the tribal culture. Swinomish would not be Swinomish without this marine diet.

31. The treaty fishing right also includes the right to take fish for ceremonial purposes. This harvest directly addresses the ceremonial, religious and spiritual values of the treaty fishing right. As the Fisheries Manager I manage these fisheries too. They take place under permit and the catch counts toward our allocation share. But it is as a community member and leader that I most appreciate the significance of the ceremonial fishery.

32. Feasting on the bounty of sea and river, and particularly on salmon, is a central feature of almost every Swinomish ceremony or gathering, as is true throughout the whole Coast Salish culture. Some of the ceremonies mark important events for an individual or family—birth, death, naming, marriage, and the like. They also feature prominently as the core of community events, such as the Coast Salish Gatherings, the Canoe Journey, and the First Salmon Ceremony. For example, at the first Salmon Ceremony recently held at Swinomish on May 14, the whole community, staff and invited guests feasted on salmon, clams, mussels, shrimp, crab, and other fruits of the sea. The ceremonies are an integral part of our culture, and the ceremonial food is essential to the ceremonies.

33. The act of fishing, the circulation of harvest within the community, the dietary reliance upon the harvest, and the importance of salmon and other species to the Swinomish culture and spiritual life, give treaty fishing rights a value that far transcends the economic value as a commodity. The treaty fishing right was meant to preserve our culture and way of life revolving around fishing and the fish harvest. As a fisheries manager, I am mindful of the need to preserve the fishery in order to preserve our identity as a tribe.

Impact of Proposed Pipeline Expansion on Swinomish Treaty Rights

34. I am aware that the proposed expansion of the TransMountain pipeline in Canada by building a second pipeline next to the existing one would lead to at least a five-fold increase in the amount of crude oil shipped by tanker along the shipping route in the Salish Sea. These tankers would follow the U.S./Canada border through Boundary Pass and Haro Strait, then west

through the Strait of Juan de Fuca, travelling right along Swinomish U&As and the area where our fleet fishes, until the tankers pass Victoria on their way to sea. I am also aware that it is likely that some, and perhaps many, of these tankers will anchor and bunker in U.S. waters near Vendovi Island, in the Saddlebag, Guemes, and Rosario Strait areas, an important part of our northern fishery. This increase in large vessel shipping will hurt our treaty fishing, further degrade the fishery habitat, and create an undue risk of catastrophic oil spill that could destroy vast areas of the fishery in our U&As for a generation or more.

35. The increase in vessel traffic in the area in which Swinomish fishes will increase the vessel traffic interference with the exercise of treaty fishing rights. Such studies were recently completed or are underway in the U.S., however. The recently released study of vessel traffic interference with the exercise of treaty fishing rights in the Affected Area, by Glosten and Associates, is limited to the Lummi Tribe. This report is attached to the Written Evidence submitted by the four U.S. tribes as Appendix B. Recently Swinomish, along with the Suquamish and Tulalip Tribes, commissioned a study, *Tribal Fishing Navigation Risk Assessment*, by Marico Marine Risk Consultants Ltd., which should be completed this summer. The study will include the Affected Area.

36. Swinomish tribal fishers already suffer from interference with their treaty rights due to shipping. Fishers must generally avoid shipping lanes, and the busier the traffic the more this is so. Ships frequently travel outside the traffic lanes, making matters worse. Vessels at anchor or bunkering create additional interference with areas of productive tribal fisheries. Fuel barges and tug escorts further reduce the space available to tribal fishers. Kinder Morgan's increase in traffic will only make matters worse.

37. Gear loss is of particular concern, because it harms the fisher directly and deprives the fisher of present and future fishing. Gear loss due to vessel traffic occurs throughout the fishery. The worst places, however, include locations near the shipping lanes in Haro Strait and the high traffic vessel anchoring and bunkering areas in the vicinity of Vendovi Island, areas that will be affected by traffic increase due to the pipeline expansion. Exhibit A, #9 a and b.

38. The increase in shipping traffic will also cause environmental damage that will further degrade fisheries habitat in the Salish Sea. The degradation of fisheries habitat was documented in *Treaty Rights at Risk: Ongoing Habitat Loss, the Decline of the Salmon Resource and Recommendations for Change*, July 14, 2011, a report from the treaty tribes of Western Washington. The portion dealing with the statement of the problem is attached to this Declaration as Exhibit D. The study identifies protecting existing salmon habitat as the most important action needed to protect salmon stocks.

39. In addition to the sorts of air and water pollution and disturbance of seabed that come with shipping and anchorages of large vessels, the five-fold increase in oil shipments creates an equally large increase in the risk of a catastrophic oil spill. Kinder Morgan's application did not address the effect of a catastrophic event in U.S. waters on tribal fishing protected by U.S. treaties, but it is obvious that a spill does not respect international boundaries and will go where the winds, tides and currents take it. Such an event will very likely affect

treaty fishing; how much will depend on the dispersion of the oil. Kinder Morgan's own dispersion models for a catastrophic spill at Arachne Reef in Volume 8 of its submittal demonstrate adverse impacts on our shellfish gathering and fishing, because they predict dispersion of oil onto beaches and into fishing grounds, within Swinomish U&As and those of other U.S. treaty tribes. The four U.S. Tribes commissioned a review of the Kinder Morgan submission as it relates to U.S. tribal treaty fishing. The review, by Marico Marine Risk Consultants, Ltd., is attached to the fpur U.S. tribes' Written Testimony as Appendix A. It concludes that TransMountain did not adequately address impacts on U.S. tribes' treaty fishing rights, but there is a demonstrable impact that will interfere with the exercise of those rights. App. A, 2.8.

40. The odds of such a spill arising from an increase in shipping due to Kinder Morgan's pipeline expansion and other causes was recently calculated in a study under a U.S. Environmental Protection Agency grant to Puget Sound Partnership, the Vessel Traffic Risk Assessment 2010 (Mar. 31, 2014) (VTRA), which I am informed is being submitted as part of the written testimony of the Washington Department of Ecology. Swinomish believes that VTRA is a flawed study that understates the risk; Swinomish submitted a peer review of the study to the study authors, that was not incorporated into VTRA's final publication. But even the VTRA's understated original estimate of potential oil spill releases showed a dramatic increase in risk of 375%, compared to the average increase of risk across the whole study area above 2010 baseline levels, due to the increase of 696 Kinder Morgan tanker trips (and 42 bunkering trips in support) annually. VTRA 2010 at 11, 12, 18, 91, Table 11. Earlier, in a presentation by the study-author to a steering committee on February 13, 2014 that Swinomish staff attended, the risk of oil spill at Haro Strait from Kinder Morgan traffic was shown to be increased six times above 2010 levels. In both cases, these substantial increases in oil spill risk were attributed directly to the interactions of Kinder Morgan's increased tanker and barge traffic with other vessels in the already risky areas along the oil tanker route at Boundary Bay, Turn Point, and Haro Pass within the Affected Area.

41. Swinomish commissioned review of the VTRA study which pointed out its flaws. Attached as Exhibit E is the VTRA critique, *Peer Review: Vessel Traffic Risk Assessment 2010*, Marico Marine Risk Consultants, Ltd., Mar. 7, 2014. The Peer Review identifies a number of shortcomings, but an important one I want to emphasize is that VTRA studies only groundings, allisions and collisions, which can result in catastrophic spills but do not account for 70% of spills, which are much more common but not as large. The frequency of these spills in U.S. waters alone indicates that the increase in vessel traffic due to the pipeline expansion will almost certainly increase the number of smaller incidents, particularly because there will be an increase in bunkering and tug activity, both of which are frequent sources of spills. Whether the treaty fishery will be harmed by a catastrophic spill or by as thousand cuts from smaller spills, the treaty fishery is likely to be damaged by spills stemming from the pipeline's increased traffic.

Treaty Fishing Rights on the Brink

42. In my 40 years as the Swinomish Fisheries Manager, I have seen the promise of treaty fishing rights energize the tribal community and bring it new prosperity, only to preside over the gradual practical diminishment of the right as the habitat upon which our primary

species, salmon, depends steadily erode the salmon harvest. In 1975, the year after the Boldt decision, the treaty tribes collectively took just a few percent of the Washington salmon harvest. Now they regularly take their treaty entitlement of 50%—but the amount of salmon harvested is almost the same as it was in 1975! My fellow managers and I have presided over the drastic decline of salmon harvest, and it was not due to harvest itself, which is better managed than it has ever been. Today my salmon management worries as co-chair of North of Falcon center on how to maintain mixed stock harvests when there are stocks of endangered salmon runs in the mix.

43. I'll share just one other observation of the decline from a manager's perspective. As far back as the collective memory serves, and in my early days as a fish manager, it was easy to obtain salmon and other species for ceremonies, and the harvest was done by volunteer fishers who rotated the chore through the community. Today, with all of the harvest restrictions on seasons and the pressures of making a living, this is less true, though we have volunteers when time and season allows. I have taken to freezing the harvest from test fisheries (which cannot be sold) for ceremonial purposes, but sometimes we don't have enough and there isn't a season open or the quota is already harvested. Our culture suffers a little whenever this happens.

44. The decline of fisheries is a problem across almost all of our harvests, and does not just include salmon. But salmon is the bellwether species, and the health of the Swinomish community is linked to the health of the salmon in so many ways. I think we may be reaching a tipping point, and the rush of new projects like the TransMountain pipeline expansion is pushing against our treaty rights, taking away the areas where we fish and killing the fish by destroying the habitat. I fear I will end my lifelong stewardship of the Swinomish fisheries resources by presiding over the dim and fading twilight for our fishing right and our culture.

Signed this 26 day of May, 2015, at LaConner, Washington.

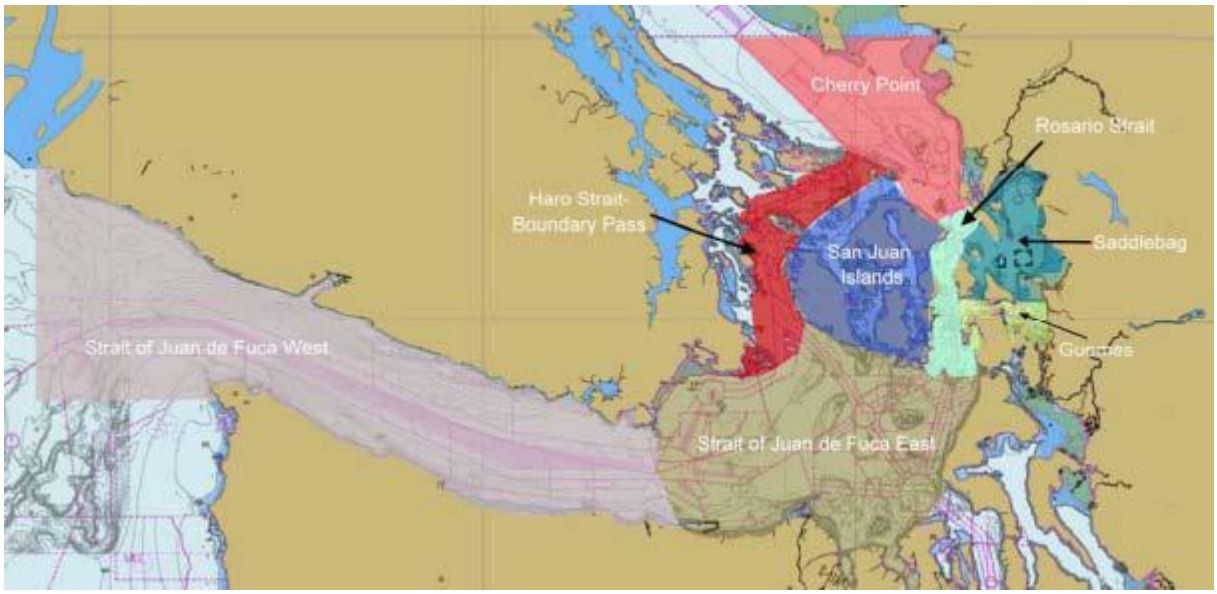
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Lorraine Loomis

ATTACHMENTS
TO DECLARATION OF
LORRAINE LOOMIS

(Exhibits A-C)

Questionnaire



Fisheries

1. What fisheries do the Swinomish fishermen participate in?
Sockeye, pink, Chinook, Coho, chum, steelhead, crab, shrimp, halibut, clams, oysters, sea cucumber, sea urchin, geoduck.

2. Referring to the map above, please identify what types of fish that Swinomish generally fish for in each area and check the corresponding boxes in Table 1, below. Also, please use a star to indicate the area where the most fishing takes place within each fishery.

Table 1. Swinomish fishing locations.

Fishery	Strait of Juan de Fuca West	Strait of Juan de Fuca East	Haro Strait-Boundary Pass	Rosario Strait	Saddlebag	Guemes Channel	Cherry Point	San Juan Islands
Salmon		X	X	X	X	X	X	X
Halibut		X	X	X	X	X	X	X
Dungeness Crab		X	X	X	X	X	X	X
Geoduck, Clams, and Oysters		X		X	X	X	X	X
Sea Urchins and Sea Cucumbers		X	X	X	X	X	X	X
Shrimp		X	X	X	X	X	X	X
Other								
Total		**X**	**X**	**X**	**X**	**X**	**X**	**X**

Note: If the "Other" row is filled out, please include the list of species that would apply to this group.

3. Please complete Table 2 with the volume in pounds of the annual Swinomish fishery harvest for *each* fishery in each of the last three years (2011, 2012, 2013).

Table 2. Swinomish harvest volumes in the questionnaire catch areas.

Fishery	2011	2012	2013
Salmon	1,959,948	204,816	2,417,076
Halibut	23,662	17,781	34,441
Dungeness Crab	454,096	384,457	428,590
Geoduck, Clams, and Oysters	36,079	29,510	10,221
Sea Urchins and Sea Cucumbers	19,427	46,997	52,814
Shrimp	24,909	30,385	51,049
Other			
Total	**2,518,121**	**713,945**	**2,994,192**

The catch numbers in this table and associated values in all following tables are only for the catch areas in the questionnaire map above. They do not include Skagit Bay/River, for example.

4. Please fill out the cells in Table 3 to indicate what portion (percent of total pounds) of each fishery is commercial versus subsistence or ceremonial.

Table 3. Swinomish Commercial, Subsistence, and Ceremonial Volumes, 2013

Fishery	Commercial	Subsistence/Ceremonial	Total Harvest
Salmon	98.2%	1.8%	100%
Halibut	95.8%	4.2%	100%
Dungeness Crab	99.9%	0.1%	100%
Geoduck, Clams, and Oysters	100.0%	0.0%	100%
Sea Urchins and Sea Cucumbers	100.0%	0.0%	100%
Shrimp	99.8%	0.2%	100%
Other			
Total			**100%**

Note: The sum of the two center columns should total 100 percent

5. Using the map on page 2, please estimate the percentage of time spent in each area during these fishing trips in the following table.

Table 4. *Swinomish Fishing Time Estimates.*

Fishery	Strait of Juan de Fuca West	Strait of Juan de Fuca East	Haro Strait-Boundary Pass	Rosario Strait	Saddlebag	Guemes Channel	Cherry Point	San Juan Islands
Salmon		10	20	15	20	5	5	25
Halibut		60	20	3		2	5	10
Dungeness Crab		10	5	5	40	5	15	20
Geoduck, Clams, and		50	5	5	5	5	5	25

Oysters								
Sea Urchins and Sea Cucumbers		30	5	5	5	5	5	45
Shrimp		45	15	5	5	5	5	20
Other								

Note: If the "Other" row is filled out, please include the list of species that would apply to this group.

Gear

6. We would like to learn more about reef net fisheries. Generally speaking, in which areas (as identified by the map on page 2) are the Swinomish reef net sites that are used today?
Swinomish does not fish any reef nets.

a. How many vessels are typically at a reef net site?
N/A

b. What is the level of activity at these sites, as measured in days per year?
N/A

7. What is the primary gear used by tribal fishermen for halibut fishing?
Set-lines.

8. What portion of the total annual Swinomish salmon harvests are caught using each gear type? Please fill out the shaded areas of Table 5 (the total column should equal 100 percent).

Table 5. Swinomish Harvest Data by Gear Type in the Questionnaire Catch Areas, 2013.

Fishery	**Percent of Total Harvest**					
	Drift Gillnet	**Set Gillnet**	**Seine**	**Reef Net**	**Other**	**Total**
Chinook	11.5	0	88.5	0	0	**100**
Chum	1.4	0	98.6	0	0	**100**
Coho	0	0	100	0	0	**100**
Pink	0	0	100	0	0	**100**
Sockeye	0	0	100	0	0	**100**

9. Please provide any data that the tribe has on volume of gear lost by type, location, and year.
The Swinomish Tribe does not have long-term data on gear loss. However, gear is susceptible to loss from damage to buoys or nets by recreational, commercial, ferry, shipping, and other vessel traffic, as well as theft.

a. Is gear loss due to vessel traffic more common in some areas over others? Please explain in detail.
Crab pots commonly placed near Lopez Island are particularly vulnerable to vessel traffic, as they are in or near shipping lanes and ferry routes. Other locations near shipping lanes in Haro Strait and Rosario Strait are also particularly susceptible to gear loss, as are locations near the

high traffic vessel/barge anchoring and bunkering areas in the vicinity of Vendovi Island, and near the Anacortes and Cherry Point refineries and their associated oil tanker traffic.

b. Are certain types of gear more likely to be interfered with by vessel traffic than others? Please explain in detail.
Crab and shrimp pots are likely to be interfered with by vessel traffic because of the proximity of fishing locations to shipping lanes, and because the gear is unattended for periods of time. Some halibut fishing grounds (such as Smith Island) are in or near shipping lanes, making halibut gear vulnerable in these locations. Salmon gear placed in locations with heavy vessel traffic or near shipping lanes, such as Haro Strait, Rosario Strait, and Boundary Pass, are also vulnerable.

Vessel Activity

10. What is the breakdown of Swinomish fishing vessels (seiners, gill netters, skiffs) by vessel type and size (length overall)? Please fill out the shaded areas of Table 6.

Table 6. Swinomish Fishing Vessels by Size, 2013.

Vessel Type	**5-20 ft**	**20-30 ft**	**30-40 ft**	**40-50 ft**	**50-60 ft**	**60+ ft**	**Total**
Seiners							
Gillnetters							
Skiffs							
Total	**34**	**64**	**12**		**1**	**2**	**113**

Swinomish doesn't register boats by vessel type, so only the total number of boats in each size class are reported here. The 3 boats 50+ feet in length are all purse seiners.

11. What is the total number of Swinomish tribal vessels in each fishery, and how many actually participated in each fishery in 2013? Please fill out the shaded areas of Table 7.

Table 7. Number of Swinomish fishers and boats by species, 2013.

Fishery	**Registered Fishers**	**Active Boats**
Salmon	162	15
Halibut	77	29
Dungeness Crab	200	89
Geoduck, Clams, and Oysters	17 (+70 diggers)	8 (+10 clams)
Sea Urchins and Sea Cucumbers	17	8
Shrimp	52	26
Other	0	0
Total	**525**	**177**

Swinomish does not keep track of vessel type and participation in most fisheries. Instead, I've listed the number of individual fishers that sold catch in each of the fisheries during 2013, as a rough estimate of the number of active boats. However, in some cases multiple fishers on a single boat may report their catch separately. Individual fishers/boats may participate in more than one fishery type.

12. Is the number of participants in 2014 expected to be higher or lower than in 2013?
The number of participants varies year to year depending on the harvestable number of fish available and the number of days a fishery is open. Because 2014 is expected to have a very strong Fraser sockeye return, the number of participants in the salmon fishery may be greater than that in 2013.

13. What is the estimated number of vessel traffic days that Swinomish vessels are fishing in Puget Sound waters? Please estimate the average numbers of trips that Swinomish vessels made by type and fishery in 2013, as well as the typical duration of each trip (one trip equals two transits). This estimate may be expressed in a range; for example, 20-25 trips, 8-12 hours each.

Table 8. Swinomish Vessel Trips, 2013.

Fishery	**Total Landings**		**Gillnetters**		**Skiffs**	
	Annual Trips	**Length of Trips**	**Annual Trips**	**Length of Trips**	**Annual Trips**	**Length of Trips**
Salmon	284					
Halibut	141					
Dungeness Crab	1,121					
Geoduck, Clams, and Oysters	41					
Sea Urchins and Sea Cucumbers	83					
Shrimp	115					
Other	0					
Total	**1,785**					

Swinomish does not track the participation of vessels in individual fisheries or trip lengths. Instead, I have reported the number of landings, by species, for 2013. The number of landings can reasonably be considered a proxy for the number of vessel trips. The length of trips is highly variable depending on the location fished, launch point, delivery point, and duration of the fishery.

14. Please estimate the average annual (by month), number of Swinomish fishing vessel trips (one trip equals two transits) for 1997 through 2013.

Table 9. Number of landings by year and month, 1997-2013.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Jan	15	14	5	19	18	20	78	22	13	15	16	7	129	68	44	41	73
Feb	8	5	21	20	69	24	46	41	31	6	43	22	107	94	61	41	70
Mar	2	31	38	28	78	24	30	48	33	26	51	112	90	127	83	107	105
Apr	18	58	14	32	10	7	11	42	30	51	88	92	122	51	63	73	58
May	13	167	12	8	8	15	3	5	17	18	31	29	23	27	37	56	230
Jun	2	9	36	126	84	16	60	47	86	96	33	4	2	147	1	33	31
Jul	47	218	209	406	350	413	339	215	499	352	385	288	448	256	304	372	381
Aug	579	340	200	291	405	196	318	235	197	306	362	332	108	325	419	250	277
Sep	379	192	70	107	78	146	228	323	225	285	171	156	206	269	120	169	275
Oct	109	109	210	21	140	111	56	214	235	227	263	200	298	188	160	168	84
Nov	48	32	74	11	75	74	25	55	16	23	32	32	116	189	198	81	120
Dec	25	14	30	14	13	144	22	34	11	13	21	32	72	85	97	75	81

As in # 13 above, the number of landings roughly equals the number of vessel trips, so are used as a proxy.

Table 10. Number of days that a landing occurred by year and month 1997-2013.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Jan	5	11	1	13	7	12	17	16	3	8	8	4	5	13	13	12	22
Feb		2	6	13	9	5	16	3	1	4	14	10	19	12	14	9	13
Mar	1	12	9	14	13	3	8	11	4	16	13	9	25	7	2	16	14
Apr	3	21	2	16	2	2	1	16	2	20	6	12	20	5	9	14	7
May	4	22	6	6	1	2	1	2	1	8	3	12	5	2	7	7	10
Jun	1	5	6	8	3	2	2	2	1	7	2	4	1	1	1	2	1
Jul	3	20	8	19	2	5	7	11	12	21	12	14	12	6	12	9	9
Aug	14	25	20	20	13	12	7	23	15	14	13	14	9	8	11	10	16
Sep	12	14	21	12	13	13	8	14	23	18	8	5	15	7	7	5	4
Oct	12	23	19	7	22	12	8	16	17	16	13	6	9	13	22	20	5
Nov	19	7	25	2	24	13	9	3	3	6	14	2	26	20	22	12	20
Dec	12	3	15	6	5	24	9	5		6	10	2	16	22	15	27	25

15. Do shellfish harvesters typically travel to and from their harvesting areas using vessels? If so, please describe.
Vessel trips are required for crab, shrimp, and geoduck fisheries, but not as frequently for clam fisheries.

16. Where are most Swinomish fishing vessels moored?
95% in La Conner, 5% Anacortes

17. Where are Swinomish fish delivered? Please fill out the shaded areas of Table 11. If more than one location applies, specify the percentages delivered to each.

Table 11. Swinomish Delivery Locations, 2013

Fishery	Delivery Location
Salmon	La Conner (89%), Bellingham (8%), San Juans (2%), Blaine (1%)
Halibut	La Conner (84%), Bellingham (6%), San Juans (7%), Anacortes (4%)
Dungeness Crab	La Conner (80%), Mt. Vernon (7%), Bellingham (6%), Blaine (2%), Ferndale (2%), Anacortes (1%), San Juans (1%), Other (<1%)
Geoduck, Clams, and Oysters	La Conner (81%), Kent (9%), Bellingham (5%), Seattle (2%), Anacortes (1%), Vancouver B.C (1%), Other (<1%)
Sea Urchins and Sea Cucumbers	Marysville (59%), La Conner (23%), Bellingham (14%), Port Townsend (2%), San Juans (1%)
Shrimp	La Conner (49%), Anacortes (27%), Vancouver B.C. (12%), San Juans (4%), Mt. Vernon (5%), Bellingham (3%)
Other	

Percentages are based on the total number of landings for each fishery and may not add up exactly to 100% because of rounding.

Fishery Management

18. Are tribal fisheries managed in terms of access days and times? If so, how?
Yes. Fisheries are opened during specific days, times and areas. The fishing schedules for some fisheries are set preseason, while other fisheries are planned only days ahead of time via conference call with other tribal and co-managers.

19. Are the tribe's scheduled opening and closure days the same as those for non-tribal fishermen?
Not typically.

20. How are Swinomish (and other Indian) fishing vessels identified so that they can be distinguished from non-Indian fishing vessels?
Swinomish vessels are identified with their ID number WN - _ _ _ - SWN. The three spaces between the WN and the SWN are filled by numbers.

Swinomish 2013 Harvest

Fishery	Harvest Volumes in ALL Swinomish Catch Areas	Total Value in ALL Swinomish Catch Areas	Total Value in Affected Swinomish Catch Areas
Salmon	4,233,109	$1,985,115	$1,047,423
Halibut	34,441	$186,987	$186,987
Dungeness Crab	1,265,154	$4,271,054	$1,782,207
Geoduck, Clams, and Oysters	90,308	$249, 093	$62, 845
Sea Urchins and Sea Cucumbers	54,617	$116, 942	$114,272
Shrimp	69,652	$550,263	$431,765
Other	0	$0	$0
Total	5,747,282	$7,359,452	$3,625,500

Results for the Swinomish Seafood Diet Survey

Summary:
The results are based on interviews with 72 adult Swinomish tribal members in 2004-2006. The data show that the Swinomish people eat significantly more finfish and shellfish than the general population, recreational fishers and even some other area Tribes.

These rates are *suppressed*, meaning that Swinomish people, in general, would like to eat more seafood than they do, but cannot for a variety of reasons (lack of access, abundance, fear of pollution, harvest time constraints). Using suppressed rates with out a disclaimer in environmental standards and regulations could lock the Tribe into creating a false baseline of fish consumption, and thus environmental health, by saying that the waters do not need to be cleaned up more than can support the current fish consumption rates (if the Tribe seeks to increase fish consumption in the future, it may not be "safe" to do so due to contamination).

Table 3. Summary of consumption rates for the consumers of the 72 adult respondents.

Consumption Variable	Number of Consumers	Mean ± SD	Min	25% Quantile	Median	75% Quantile	80% Quantile	85% Quantile	90% Quantile	95% Quantile	Max
Total Seafood, g/day	72	118 ± 136	8	40	80	133	152	186	259	384	674
Fin Fish, g/day	71	49 ± 63	2	15	26	51	62	89	113	156	388
Shellfish, g/day	71	72 ± 113	1	15	34	75	80	100	144	272	587

Table 4. Other WA area Fish Consumption Rate Survey Results (in grams per day, g/day)

Population	Number of Adult Surveys	Mean	50th percentile	90th percentile	95th percentile
General Population (consumers only)	2,853	56	38	128	168
CRITFC Tribes	464	63	41	130	194
Tulalip Tribes	73	82	45	193	268
Squaxin Island Tribe	117	84	45	206	280
Suquamish Tribe	92	214	132	489	797
Recreational Fishers –marine waters (multiple studies)	NA	11-53	1.0-21	13-246	

Exhibit 2

Hearing Order OH-001-2014
File No. OF-Fac-Oil-T260-2013-03 02

IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT

DECLARATION OF ROBERT PURSER, JR.

I, ROBERT PURSER, JR., state and declare as follows:

1. I am an enrolled member of the Suquamish Tribe, a federally recognized Indian tribe. The Suquamish Tribe is a signatory to the 1855 Treaty of Point Elliot, one of the Stevens Treaties.

2. The Suquamish Tribe is located on the Port Madison Indian Reservation in Suquamish, Washington and is in Kitsap County. There are approximately 1,100 enrolled Suquamish Tribal members.

3. I am a descendant of seven treaty chiefs, including but limited to Chief Kitsap and Chief Chico. I have lived within Suquamish's territory for my entire life and have served as an elected official on the Suquamish Tribal Council.

4. Because there are no large rivers in Suquamish's territory, the Suquamish Tribe is one of the few Coastal Salish Tribes who historically and currently covered a vast territory—by fishing all areas within Puget Sound and well documented to the Frasier River in Canada.

5. I am currently employed by the Suquamish Tribe as the Director of the Fisheries Department. I have served as the Tribe's Director of Fisheries since 2000. Since 1979 I have also served on the Tribe's Fish Committee helping to set policies for Suquamish fisheries. I oversee the Tribe's finfish and shellfish resources and program management throughout the Tribe's adjudicated usual and accustomed fishing area that extends from the northern tip of Vashon Island, Washington to the Fraser River and west through the Straits of Juan de Fuca. See Figures 1 (Puget Sound Salmon Management) and 2 (Shellfish Harvest Management Areas) attached to my declaration.

6. I am involved in intergovernmental fisheries management organizations. I am a Commissioner in the Northwest Indian Fish Commission. I represent the Suquamish Tribe for the Pacific Salmon Commission Fraser River Panel (US—Canada) and the North of Falcon Process (preseason planning and management process for annual harvesting fin fish).

7. I am a licensed tribal fisherman and fish commercially and exercise my treaty fishing rights all year round when our fisheries department opens areas to treaty fishing. I began

fishing in 1974 and am a third generation subsistence and commercial tribal fisherman within the Suquamish Tribe's usual and accustomed fishing area (U&A). I have also commercially fished from Alaska to California.

8. Based on my experience as the Tribe's Fisheries Director and my years of experience as a fisherman, I am familiar with fishery management issues at tribal, intertribal, state, federal and international levels between Canada and the United States.

9. Like other Coast Salish Tribes, Suquamish relies on salmon as a food staple. Suquamish tribal fishers harvest all species throughout its U&As, including but not limited to steelhead, cod, flounder, perch, trout, herring, rock cod, Ling cod, black cod, sturgeon, skate, dogfish. The Tribe harvests shellfish, including but not limited to crabs, clams, cockels, mussels, barnacles, geoduck, oysters, scallops, shrimp, red and green sea urchins, sea cucumbers. Historically tribal fishers also harvested dahl porpoise, seals and sea lions, octopus, china slippers, marine and freshwater birds (ducks), and other marine mammals. These resources are harvested for subsistence, ceremonial, and commercial purposes.

10. Tribal fishers harvest finfish using purse seines, drift gillnets, and set gillnets that are approximately 1800 feet. Shellfish are harvested by diving (geoducks, sea cucumber and sea urchins), pots and dragging (crab, shrimp), and digging (clams and other bivalves).

11. The Suquamish fishing fleet has maintained an average of 50 boats that includes an average length under 30 feet. A few boats are over 50 feet.

12. Fishing is spread throughout the year, with the largest concentration occurring in July through September. There are other winter fisheries that occur such as crab, shrimp, steelhead, geoduck, and blackmouth salmon.

13. A large portion of the fishery occurs in the area affected by the international shipping lane from Canada through the Strait of Juan de Fuca. The gillnet fishery occurs within the shipping lanes using 1800 foot long nets. When the nets are loaded with fish, it can take on average 10 hours and up to 20 hours to pull in the drift net and retrieve fish, depending on the circumstances. During that time, fishing boats drift in and out of the shipping lane while the web of the fishing net is still in the water. You cannot maneuver the net with any speed due to the volume of the loaded net. Fishing occurs at all hours of the day and night. The number of sets performed by a fisher depends on volume of fish intercepted. In other words, it could be that one set meets the fleet's target or it may require a number of sets by each fisher.

14. When there is a tribal fishery in the area, like the affected area from the Kinder Morgan Pipeline, that includes shipping traffic, in addition to the Suquamish Tribe, there are at least six other tribes who have overlapping U&A. Large bodies of water are used by all tribal fishers to catch migrating salmon and to avoid drifting into shorelines or other obstacles like buoys.

15. Existing inbound and outbound shipping traffic (non-tribal) already causes interference with tribal fishing activities. The types of interferences with shipping traffic and

tribal fishers occur when ship traffic pass through the Tribe's fishing grounds and damage tribal gill nets. This causes net damage and/or net loss and loss of fish, along with creating serious safety and health hazards on the water. I have first-hand experience of this increase in shipping traffic and its interference with tribal fishing fleet in the Tribe's U&A. These interferences cause economic hardship to tribal fishers due to loss of gear and loss of fish. This further impacts the Tribe's ability to carry on its time immemorial ceremonial, subsistence, and commercial practices.

16. I understand that the Kinder Morgan Pipeline will provide a five-fold increase in oil transport, plus it will cause an increase in the amount of bunkering at Vendovi Island, a location in the heart of tribal fishing grounds. This increased vessel traffic will have long lasting impacts to Suquamish by interfering with the ability to harvest fish and shellfish as reserved under the 1855 Treaty of Point Elliot for ceremonial, subsistence, and commercial uses. The Tribe's treaty reserved right to access fishing grounds and harvest natural resources is central to the Tribe's way of life.

17. Marine shipping tied to the Kinder Morgan Pipeline can only increase the risk of catastrophic oil spills and smaller spills—in other words, death by a thousand small spills. Suquamish has first-hand experience of the range of impacts to its tribal members, the environment, natural resources, and fish, shellfish, marine mammals, and other wildlife from an oil spill that originated at the Point Wells and landed on Doe-Keg-Wats—a salt water marsh, estuarine, tidal, sub-tidal and beach property of cultural importance to the Tribe. In fact, Doe-Keg-Wats was the largest pristine saltwater marsh in the State of Washington.

18. There simply can be no guarantee that a devastating catastrophic oil spill and/or cuts by a thousand smaller spills will not negatively affect the health of the Salish Sea and in turn negatively affect the traditions and customs of aboriginal Coast Salish Nations throughout the Salish Sea that have existed since time immemorial.

19. There was no outreach by Kinder Morgan to the Tribe to determine impacts to the Tribe fishing rights and other treaty reserved rights from increased vessel traffic and the risk of catastrophic oil spills and smaller spills—death by a thousand small spills. The Kinder Morgan shipping traffic can only make things worse.

20. The international border provides no protection from the risk of oil spill and devastation to the Tribe's fishing grounds and treaty reserved resources.

21. The Tribe reserved its treaty rights when we signed the Treaty of Point Elliot in 1855. That is the Tribe's right, our heritage, our culture, and our identity. The Kinder Morgan Pipeline project creates unacceptable risk that cannot be mitigated.

I declare under the penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

Signed this 22 day of May, 2015, at Suquamish, Washington.

<Original signed by>

Robert Purser, Jr.

ATTACHMENTS
TO DECLARATION OF ROBERT PURSER, JR.

(Figures 1 and 2)

Figure 1. Puget Sound Salmon Management Areas

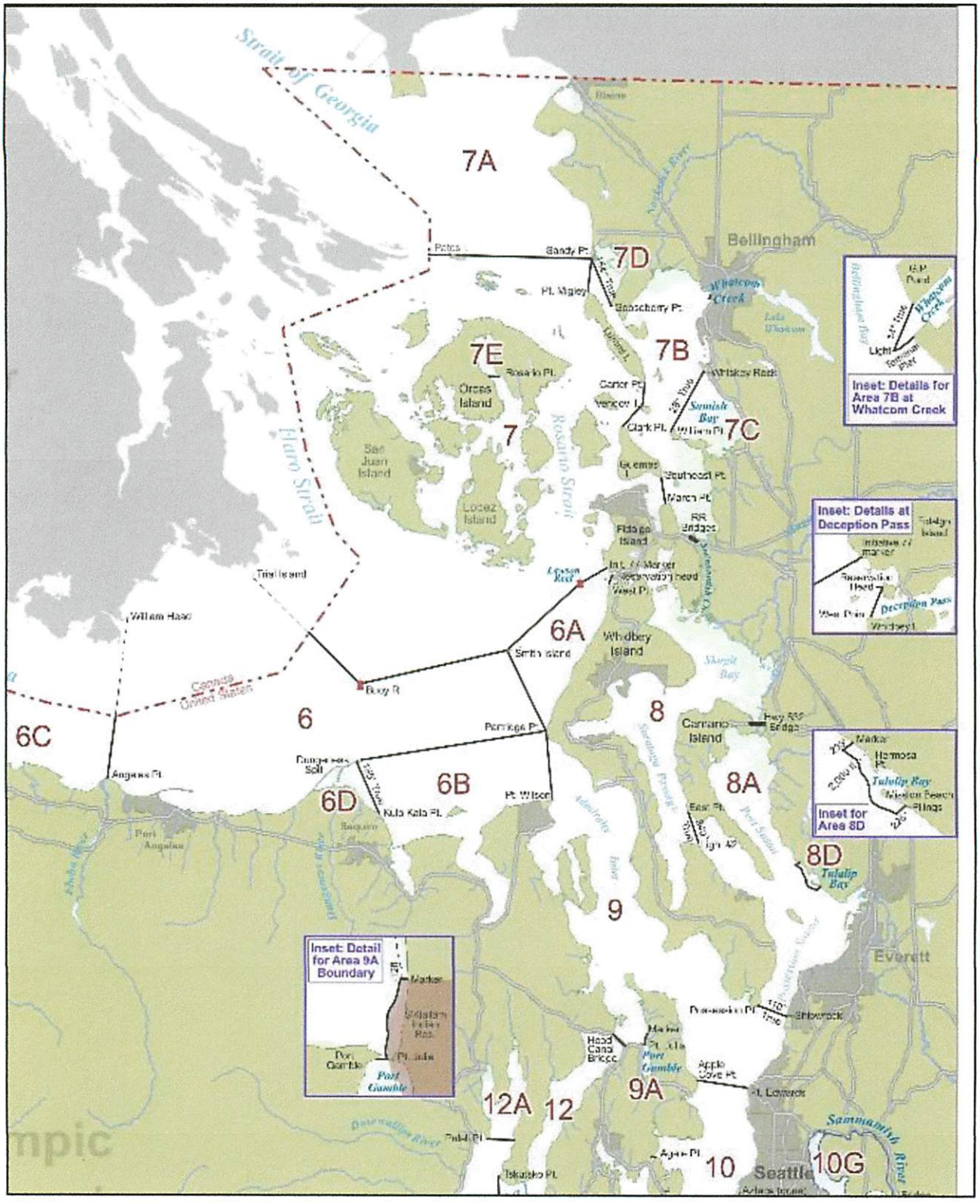


Figure 2. Shellfish Harvest Management Areas

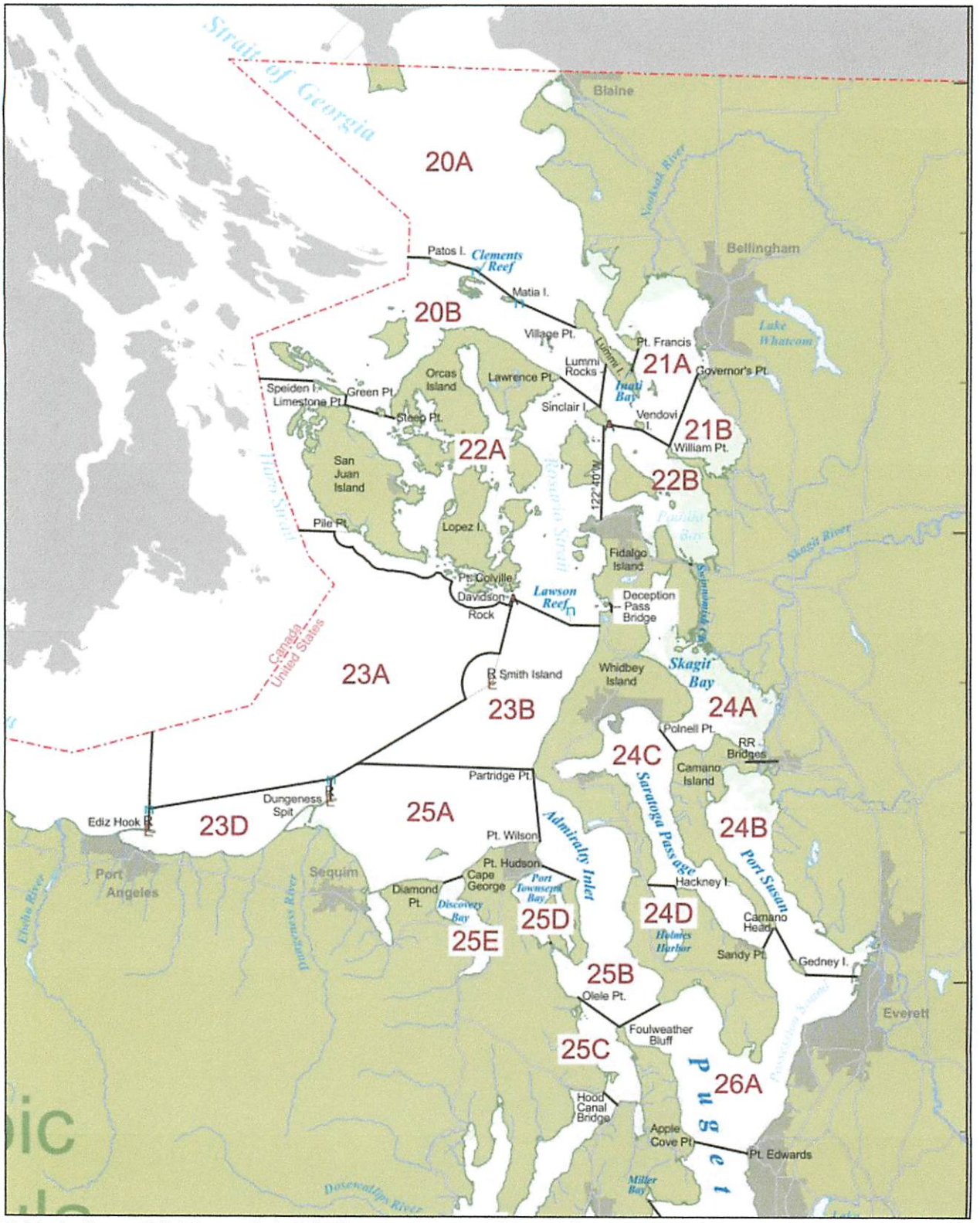


Table 1. General fishing and shellfishing seasons near the Mukilteo Ferry Terminal

Exhibit 3

Hearing Order OH-001-2014
File No. OF-Fac-Oil-T260-2013-03 02

IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT

DECLARATION OF JASON GOBIN

I, JASON GOBIN, state and declare as follows:

1. My name is Jason Gobin. I am the Fish and Wildlife Director for the Tulalip Tribes. In this position, I oversee management of all the Tribe's activities relating to finfish, shellfish, wildlife, forestry, hatchery production, as well as our marina. I supervise a staff of approximately 30 people. I have served in this role for 1.5 years. Previously, I managed the Tulalip Tribes' Forestry Department and logging enterprise and was Vice Chair of the Tulalip Fish and Wildlife Commission. I also represent the Tulalip Tribes in a number of intertribal and governmental forums related to fisheries and habitat management, including Northwest Indian Fish Commission, Inter-tribal Timber Council. I offer this testimony in my official capacity as a representative and official of the Tulalip Tribes, and am personally knowledgeable about the matters discussed in this declaration.

2. The Tulalip Tribes is the successors-in-interest to the Snohomish, Snoqualmie, Skykomish and other allied tribes and bands signatory to the 1855 Treaty of Point Elliott. Our tribal population is about 4,300 and growing, with 2,600 members residing on the 22,000 acre Tulalip Indian Reservation located north of Everett on the mouth of the Snohomish River and Port Susan and Port Gardner. The reservation includes 16 miles of marine shoreline along the Salish Sea, reflecting our heritage and culture as a marine tribe.

3. There are approximately 60 employees of the Tulalip tribal government that are devoted to the management and protection of natural resources, reflecting the importance of these considerations to the Tribe.

4. Fishing is very important to the Tribe economically. Based on permit data available to me, approximately 355 Tribal members received permits and directly engaged in some fishing activity in 2014, roughly similar to prior years, for an aggregate value of approximately $5,691,634 of the 2014 commercial fisheries. Tribal fishers are engaged in the harvest of all commercially valuable species, including salmon, Dungeness crab, geoduck and spot prawns. Over the last five years the tribe harvested commercially 5,234,429 pounds of salmon, 2,699,740 pounds of Dungeness crab, and 845,828 pounds of geoduck clams—species that currently make up the bulk of the commercial catch. However, the Tribes have also harvested many other species (for example, clams, sea cucumber, shrimp, halibut, dogfish, lingcod, skates, black cod, and flounders) in the commercial fisheries in different proportions in

different years. These fisheries are ever changing over time depending on stock conditions and markets. Also, the tribal membership engages in ceremonial and subsistence harvest for many commercial and non-commercial finfish, shellfish, wildlife and plant species in the marine environment. These make up key parts of the traditional diet of the Tulalip tribal members. A 2013 study by the United States Environmental Protection Agency documented fish consumption rates of Tulalip Tribal members that was 5 times higher than the average fish consumption rate of the general population in the United States.

5. Today, it is very difficult to make an adequate income from fishing activities, due to the degradation of habitat and the resulting loss of fisheries resources and increase in fishing restrictions intended to protect weak or endangered stocks. Even so, a significant number of tribal members and their families derive some portion of their income from fishing activities. Along with the 181 permitted commercial fishers, there are between 100-150 Tribal members working as deckhands for permitted fishers.

6. Each permit we issue means employment and income not just for that fisher and their families, but also for others who work with them. For example, in 2014 we issued 56 permits just for the commercial Dungeness crab fishery. All boats carry at least two people, meaning that there were at least 112 Tribal members directly deriving income from that one fishery. Similarly, we have 51 registered commercial divers, who dive for geoduck as well as sea cucumber and urchins. There are at least three people per boat for such trips, meaning the benefit is spread much more broadly than just the 51 fishers and their families. There are many jobs that are in place to support treaty fisheries, such as our marina personnel, fisheries managers and fish and wildlife enforcement staff.

7. Tulalip tribal fishers regularly fish a large portion of the Salish Sea; from Seattle in the south, to the Canadian border in the north, to Dungeness spit in the west. The San Juan Island waters adjacent to the shipping lanes and the Canadian border are a particularly important area for the harvest of sockeye salmon. These valuable sockeye runs travel across the marine shipping lanes in route to the Fraser River. Tribal fishers sell their harvests widely up and down the Salish Sea utilizing a number of public ports. Harm to any of these areas would have significant negative implications for the Tribe.

8. While this declaration provides information about economic value of fishing resources to the Tribe, it is not possible to overstate the central cultural importance of these activities. Although the economic benefits of fishing to the Tribe are very significant, it is critical to understand that their value is more than monetary—the loss of these resources cannot be mitigated through money or any other means. Fishing represents the continuation of our culture and way of life since time immemorial. While the rules and structures of fishing have changed in modern times, fishing is an integral part of our culture. For thousands of years, our people have lived on the marine waters of the Salish Sea harvesting salmon, many other fish species and shellfish. Fishing constituted our economic base prior to European contact, through both trade and sustenance, and continues to this day.

9. I understand that Kinder Morgan is seeking permission to construct a project that would dramatically increase the amount of oil tanker traffic in or near the Tribes' historic and

current fishing areas, and that if allowed, the project would both interfere with tribal fishing and increase the risk of spills of oil and marine fuel. This activity represents a significant threat to the economic and cultural welfare of the Tribe. This project constitutes an unacceptable risk to our rights, heritage, culture and economy, and I am not aware of any way that such risk can be mitigated except by denying authorization to construct this project.

I declare under the penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

Signed this 20 day of May, 2015, at Tulalip, Washington.

<Original signed by>

Jason Gobin
Fish and Wildlife Director, Tulalip Tribes

Exhibit 4

Hearing Order MH-052-2018
File OF-Fac-Oil-T260-2013-03 59

IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT – RECONSIDERATION

DECLARATION OF CHAIRMAN BRIAN CLADOOSBY ON BEHALF OF THE SWINOMISH INDIAN TRIBAL COMMUNITY

BRIAN CLADOOSBY makes this declaration on behalf of the Swinomish Indian Tribal Community, an intervenor in the above proceedings, and declares as follows:

1. My name is Brian Cladoosby. I am the Chairman of the Swinomish Indian Tribal Community ("Swinomish Tribe" or "Tribe"). I offer this testimony in my official capacity as a representative and official of the Swinomish Tribe. I am personally knowledgeable about the matters discussed in this declaration.

2. As Chairman of the Swinomish Tribe, I can attest that the Swinomish Tribe exercises Treaty fishing rights in the marine area directly affected by the vessel traffic that will be generated by the proposed Trans Mountain Pipeline Expansion. The Swinomish Tribe is a present day successor in interest to the tribes and bands that signed the 1855 Treaty of Point Elliot ("Treaty") with the United States. One of the core rights recognized and reserved by the Treaty is the Tribe's right to fish in our adjudicated Usual and Accustomed fishing areas in and around the Salish Sea. *United States* v. *Washington,* 459 F. Supp. 1020, 1049 (1975). For thousands of years, our homeland contained no international boundaries; what is now designated the Canadian portion of the Salish Sea, to us, remains part of our homeland, shared with other U.S. tribes with treaty-reserved fishing rights and our relatives from First Nations in present day British Columbia.

3. Our Treaty guarantees us an unfettered right of access to these Usual and Accustomed fishing areas ("U and A"). Our cultural practices, our elders, and our subsistence needs all depend upon fishing within these areas. As described in the attached letter from us to the Canadian Government panel reviewing the Roberts Bank 2 proposal in British Columbia, the waters upon which we depend know no border; Fraser River sockeye pass through U.S. waters to and from the Fraser River and are an important source of cultural, spiritual, and subsistence food for all Coast Salish peoples, including ourselves. See Attachment A. The fish of any species move over time; for a period of years one area will be a successful fishing area, then the prime areas shift to other parts of the U and A. Some species thrive in certain years and then others take their place. Because we fish in one particular area today does not mean that the rest of our U and A – and our longstanding right to fish there – is any less important.

4. The shipping lanes and separation zones identified by the Coast Guards for both the U.S. and Canada within our U and A are not exclusion zones. We have a right to fish within those areas, and we do. Even if our fishermen elect not to fish there at any given time for safety reasons or other reasons, tankers and their support vessels do not operate exclusively within those designated areas and regularly interfere with our fishing right. We experience a substantial amount of lost gear and danger in areas outside the shipping lanes and separation zones. The survival of our culture and our way of life is at stake.

5. Our treaty-reserved fishing areas extend from the Canadian/U.S. border south, through Boundary Pass and Haro Strait, to the entrance to the Strait of Juan de Fuca. Those areas are identified as the route for Trans Mountain taker and support vessel movements to and from the ocean. Each additional transit through our treaty-reserved fishing areas increases the

loss of access to our fishing areas and creates additional risk of loss of life and gear. The Trans Mountain Expansion Project will direct adverse impacts on our rights. There will also be indirect and cumulative impacts to Tribal rights to fishing and resources.

6. The Trans Mountain Expansion will generate an increase in tanker traffic within our Usual and Accustomed fishing areas on both sides of the border. The impact of this expansion, coupled with increased traffic from other military and private uses threatens our way of life. We respectfully submit the following attached letters and declarations in support of our request for denial. These include maps and a detailed description of our culture and history. Attached are the following:

- Letter from Swinomish Tribe to Review Panel, Roberts Bank Terminal 2 Project, dated October 4, 2018 (Attachment A);
- Letter from Swinomish Tribe to United States Army Corps of Engineers, dated August 14, 2017, with attached declarations from: Lorraine Loomis, Chair, Swinomish Fish Commission and Chair, Northwest Indian Fish Commission; Swinomish Chairman Brian Cladoosby; Tandy Wilbur, Vice-Chair, Swinomish Fish Commission; Swinomish Senator Steve Edwards; Swinomish Senator Leon John; Swinomish Senator Joseph Williams; and Swinomish Senator JJ Wilbur (Attachments B.1 – B.8); and
- Letter from Swinomish Tribe to United States Army Corps of Engineers, dated December 12, 2017 (Attachment C).

7. These letters and declarations support the oral testimony shared on November 28, 2018 from Vice-Chair Tandy Wilbur and Senator Jeremy Wilbur. Each of our leaders is intimately familiar with the cultural significance of our tribal fishing. Each of these letters and declarations provides specifics on where we fish and how close we are to the vessel traffic lanes and potential oil spill pathways related to the Trans Mountain transportation routes. Trans Mountain's own oil spill study clearly demonstrates that spilled oil will travel into the areas fished heavily by our declarant fishers. *See* Trans Mountain Oil Spill Study,

Volume 8A 5.6.9-9 through 5.7.3.3 (A3S4Y9). These same areas are also affected by cumulative impacts of repeated small spills from tankers and their numerous support vessels.

8. The Swinomish Tribe has long been concerned about the developments and increased tanker traffic in the Coast Salish Region, and the Tribe has submitted multiple letters and legal filings to support the concern that all of these projects – including the Trans Mountain Expansion Project – will have a cumulative and harmful effect on Tribal fishing and resources. On the U.S. side of the border, the Swinomish Tribe submitted a letter to the U.S. Army Corps of Engineers in opposition to a proposed Tesoro Xylene pipeline construction project, in part because it will increase tanker traffic in the Salish Sea (Attachment B.1). The Tribe submitted declarations in support of that letter (Attachments B.2-B8) that provided detailed information on Tribal fishing practices. The Tribe also submitted a letter to the Canadian Government on the Roberts Bank 2 proposal, which outlines that the impacts from that proposal will have an effect on our treaty-reserved fishing (Attachment A). The vessel traffic from both of these projects will share the same waterways, as will the vessel traffic from Trans Mountain. And all of these projects will affect the same U and A areas. The cumulative effects felt by the Swinomish Tribe from all of these projects will be staggering.

9. The cumulative project impacts for these proposals are not limited to their use of the shipping lanes. Each of the Canadian and U.S. shipping proposals involve the refueling of tankers and support vessels. The anchorages available for bunkering and the refining necessary to produce bunker fuel take place primarily in U.S. waters, within our U and A. We are gravely concerned about the proliferation of articulated tug and barges

within these areas, ferrying bunker fuel to and from ports and anchorages for the purpose of servicing tankers and support vessels. We understand that bunker fuel for Canadian tankers is produced primarily at three refineries in the U.S.: Cherry Point, March Point (Anacortes) and U.S. Oil (Tacoma). The Vessel Traffic Risk Assessments ("VTRA") conducted by the Washington Department of Ecology identified transportation routes from these refineries into Canada for the purposes of supplying bunker fuel to ports in British Columbia. To date, the Swinomish Tribe has not seen or received any vessel traffic analysis for the Trans Mountain project associated with bunkering.

10. The two primary U.S. bunkering areas are at Port Angeles and Vendovi Island, directly north of our reservation. The attached declarations from myself, Tandy Wilbur, Steve Edwards, Leon John, Joseph Williams, and Senator Jeremy Wilbur all demonstrate that these bunkering and anchorage areas occur within or adjacent to our prime fishing areas (See Attachments B.3 – B.8). Repeated small spills from bunkering are among the leading causes of oil spills into the Salish Sea, according to a report by Glostein and Associates (previously submitted to the NEB for consideration, A4L7G3 and A4L7G4). Access to these anchorage areas for bunkering also presents a unique set of hazards that we did not see analyzed in Trans Mountain's vessel traffic analysis.

11. The current risk of oil tanker spills and marine vessel traffic in the Salish Sea is already high, and approving the Project will multiply that risk. Our studies of tribal fishing in these same areas demonstrate that interference with tribal fishing is increasing year by year, with direct adverse impact to our economic and cultural practices. Our traditional knowledge and culture depend upon the continued survival of five species of salmon that migrate through the above-described waters, and upon the survival of our archetypal icon,

the Southern Resident Killer Whale. Increased tanker and support vessel traffic will generate noise, bunkering spills, and collisions resulting in spills of bunker fuel that adversely affect the species upon which our livelihood and cultural continuity depend. Our duty as the Swinomish Tribe is to follow the guidance of our elders and continue our fishing culture and the way of life developed over millennia in the Salish Sea.

I declare under the penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Signed this 4th day of December, 2018, at LaConner, Washington.

<Original signed by>

Chairman Brian Cladoosby

Exhibit 5

NATIONAL ENERGY BOARD
OFFICE NATIONAL DE L'ÉNERGIE

Hearing Order OH-001-2014
Ordonnance d'audience OH-001-2014

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project

Trans Mountain Pipeline ULC
Projet d'agrandissement du réseau de Trans Mountain

VOLUME 10

Hearing held at
L'audience tenue à

Coast Chilliwack Hotel
45920 First Avenue
Chilliwack, British Columbia

October 22, 2014
Le 22 octobre 2014

International Reporting Inc.
Ottawa, Ontario
(613) 748-6043

Canada

--- Upon recessing at 12:14 p.m./L'audience est suspendue à 12h14
--- Upon resuming at 1:37 p.m./L'audience est reprise à 13h37

4289. **THE CHAIRMAN:** Good afternoon. I would like to thank you for your song and your prayer this afternoon, and I'd also like to acknowledge that we are on the traditional territory of the Stó:lō people.

4290. I'd like to welcome to the -- you to the oral traditional evidence phase of the National Energy Board's hearing regarding the Trans Mountain Expansion Project.

4291. My name is David Hamilton. I am the Chair of the Panel. And with me to my left is Ms. Alison Scott and, to my right, Mr. Phil Davies.

4292. We want to welcome everyone who is here today, and -- both in the hearing room and those who are listening through our webcast.

4293. Before we get started, I think it's important in case there's any need for an emergency or an evacuation of the building to point out our safety exits, which are through the entrances that are clearly marked and then there's two exits, one to the right as you go out and one to the left that takes you out to a safe area.

4294. In addition to the Panel, we have a number of staff that are in the room today who are prepared to answer any process-related questions, and you can identify -- they're identified by their brass tags on their -- that they're wearing.

4295. We will sit until 4:30 today and take breaks as appropriate, either required by the Panel or by our witnesses, so we'll be happy to accommodate breaks throughout the afternoon.

4296. And before we get under way, I'd just like to remind parties of the Panel's guidance in the Hearing Order and Procedural Direction No. 1 in regards to oral traditional evidence. The Board understands that Swinomish Tribe have an oral tradition for sharing knowledge from generation to generation, and this information cannot always be adequately shared in writing. The Board recommends those providing oral traditional evidence focus on their community's interests and rights.

4297. These hearings are not to hear evidence that will be filed subsequently in writing, including technical and scientific information, opinions or views,

advice to the Board or whether to recommend approval of the project or the terms and conditions that should be imposed or questions to the Board or other participants.

4298. Sharing your traditional knowledge and stories about the use of your traditional territory is of value to us. If you wish to share any concerns about the impacts the proposed project may have on you and your community and how any impacts could be eliminated or reduced, that would be also very helpful to us.

4299. This is the type of information we're here to listen to, and we will use this information we gather today, along with all other available information, in considering the possible effects of the proposed project.

4300. We appreciate that you've chosen to be here today. Before providing oral traditional evidence, presenters will be asked to either swear or affirm that the information they are presenting is accurate and truthful, to the best of your knowledge and belief.

4301. Before we get under way and I call upon you to give us your evidence, I would like the representatives of the proponent, Trans Mountain, for the record, to introduce themselves.

4302. **MS. OLENIUK:** Good afternoon to the Board, and good afternoon to the representatives of Swinomish.

4303. My name is Terri-Lee Oleniuk, and I represent Trans Mountain along with my colleague seated to my right, Heather Weberg. And to my left is Annie Korver, and she's a member of Trans Mountain's Aboriginal Engagement Team.

4304. **THE CHAIRMAN:** And as explained in Procedural Direction No. 6, please state at the beginning of your presentation whether you will be responding to any questions orally or in writing, or both. And I may want to point out and acknowledge that this is the first time that U.S. tribes have participated in an NEB hearing, so we're honoured to have you here with us today.

4305. With that, I would ask Mr. Hasselman to introduce the panel and then we will proceed to have them affirmed.

4306. **MR. HASSELMAN:** There's another brief ceremonial step that we'd like to take before we start our presentation.

4307. **THE CHAIRMAN:** By all means, proceed.

4308. (Opening Ceremony)

4309. **MR. CAYOU:** O'siem. Thank you. Thank you for having us to this hearing today. I'd like to introduce Ray Harris, Shulqwilum is traditional name. He's going to be the representative and the speaker for the Coast Salish side here.

4310. He's a fisherman, traditional fisherman. He worked for the Coast Salish Group. He's representing us. He's one of the ones that started this, is carrying it on. He's working on this for his children, his grandchildren and his great-grandchildren. Thank you. O'siem. Shulqwilum, Indian name.

4311. (Speaking in native language)

4312. **MR. HARRIS:** Chairman Hamilton; Chairman Hamilton, you are asked to witness the proceedings today.

4313. (Speaking in native language)

4314. Dear friends and relatives, one of our wonderful customs of the Swinomish people is whenever there is work of a proceeding that happens, we call witness -- the people the witness what's going to happen.

4315. The obligation to the witness is that they must remember this forever. Time and again you'll be called on to reminisce about this day and what they seen and witnessed and felt.

4316. So we want to say thank you to you. We thanked you a little bit already, a little courtesy that you may have had represents the wealth of our people.

4317. The blanket is to say comfort to you, that no hard feelings will come. The kerchief is for you to hold the memory of the day.

4318. Before you go back to your and chairs, I'm going to ask for a song.

4319. (Opening Song)

4320. **CHAIRMAN CLADOOSBY:** That is the Eagle Blessing song. Ask the Creator to shower blessings upon each and every one of you that are here today and pray that those blessings flow to the family members, the spouses, the kids, the grandkids, the cousins, the aunties, the uncles that are back at home. And to thank you for the sacrifices you make to be here as you're away from your family.

4321. Oseam.

4322. **MR. HASSELMAN:** Members of the Board, good afternoon; my name is Jan Hasselman.

4323. At the other end of this table is my colleague, Kristen Boyles. Together we have the very great honour of representing and introducing the witnesses from the four United States Tribes, which are the Swinomish Indian Tribal community, the Tulalip Tribes, the Suquamish Tribe and the Lummi Nation. And I've been asked to just say a few words before we being to provide some context,

4324. The U.S. Tribes want to acknowledge the Stó:lō Nation, whose traditional lands we are standing on, and to whom we express our great thanks for their hospitality and warmth over the last day or two.

4325. We also want to thank this Board for the opportunity to come speak to you.

4326. The U.S. Tribes are not citizens of the nation of Canada but they are profoundly impacted by this project. And as you'll hear today the U.S. Tribes are part of a single shared culture of Coast Salish people that have lived here since time immemorial, long before there was an international border. By allowing us this opportunity to speak, the Board is, I think, acknowledging that the oil tankers and the risk of oil spills from this project affect Coast Salish people on both sides of the border.

4327. So thank you for that acknowledgement and for the opportunity to discuss our very serious opposition to this project.

4328. Here's what you're going to hear from our witnesses today and tomorrow. You're going to be hearing from several tribal leaders, fishermen,

Elders and also the next generation, the youth.

4329. You're going to hear -- what you're going to hear from these witnesses is a story about the U.S. Tribes' dedication to maintain their culture and their way of life, which is fundamentally tied to the natural resources of the Salish Sea. I'm not going to try to describe that connection here; that's what the witnesses are going to do.

4330. But what you're going to learn is that, for the Coast Salish people, the salmon and other natural resources that lie at the heart of their culture have been declining for years, and they continue to decline. The Salish Sea is polluted. It's industrialized; it's dangerous to fish because of the vessel traffic. Gear is damaged and it's lost.

4331. There are several projects, including this one, being considered right now that make -- that would make this situation worse than it is today. A serious oil spill from this or one of the other major industrial projects in the Salish Sea is not a nuisance or an inconvenience. It's an existential threat to people who have lived on this landscape for hundreds of generations.

4332. During the testimony, you're going to hear a little bit about treaties, and I want to put that in some context because our legal systems are a little bit different.

4333. In the 1800s, the four U.S. Tribes intervening in this action, like many others, ceded legal title to their ancestral lands, but they reserved their right to continue to fish and hunt and gather in their usual and accustomed places and ways.

4334. This reservation of long-standing rights was formalized in treaties with the U.S. government, and the treaties are the legal mechanism that ensures that these people can continue fishing and other activities that lie at the core of their culture and their way of life and their economy.

4335. They've had to fight for those rights under these treaties for many decades. Indians have been arrested and beaten up and thrown in jail for exercising their Treaty rights. They've had their fishing gear taken. They've had to fight in the Court system all the way up to the U.S. Supreme Court.

4336. And in upholding the tribes' right to fish and exercise their Treaty

rights, the U.S. Supreme Court observes that the right to fish is, "not much less necessary to the existence of the Indians than the atmosphere they breathe."

4337. The point of discussing our treaties in this forum is not to make a legal argument; it's to make a cultural and moral point. Exercising their Treaty rights to fish and gather is not any less important to the U.S. tribes than the air they breathe, and those rights are in jeopardy because of this project.

4338. So thanks for the chance to make a few opening remarks. I'm going to introduce our first witness. All of our witnesses will be happy to answer questions orally. We'd like to reserve the right to decide if answering in writing would be more appropriate, and I suggest we take that as questions come up.

4339. The Board should feel free to interrupt if there are clarifying questions. The U.S. Tribes are here to share their knowledge and their concerns, and they really want you to understand, so please don't ask questions -- please don't be reticent to ask questions.

4340. I was doing so well.

--- (Laughter/Rires)

4341. **THE CHAIRMAN:** We're here to perhaps ask questions, but we're also here to witness as well, so I'm conscious of the witness part.

4342. **MR. HASSELMAN:** Brian Cladoosby is the elected Chair of the Senate of the Swinomish Indian Tribal Community, which is effectively the chief executive of that sovereign nation. He's also the current President of the National Congress of American Indians.

MELVIN BRIAN CLADOOSBY: Sworn
RAYMOND HARRIS: Affirmed
LEONARD FORSMAN: Sworn
SHAYLENE SKY JEFFERSON: Sworn

4343. **MR. HASSELMAN:** Chairman Cladoosby, can you tell the Board a little bit about who you are and your role with the Swinomish Tribe?

4344. **CHAIRMAN CLADOOSBY:** Sure. First of all, I thank our Creator for this beautiful day. I'm only here because of the grace of God.

4345. And to Mrs. Scott and Mr. Hamilton and Mr. Davies, I thank you for the work that you do. The Creator has chosen you for this position for better or worse, and it's, I imagine, a tough responsibility, but I thank you for stepping forward and accepting the challenge. And I have to divulge that I tried to kidnap a couple of Kinder Morgan's employees this morning. Not knowing that they worked for Kinder Morgan, I invited them to our ceremony. But Heather and Terri-Lee and Annie, thank you for being here to listen to us, to hear us.

4346. My name is Brian Cladoosby. My traditional name is Speepots. The way the crow flies, our community is about 60 miles from here, so it's really close. And I am Coast Salish; I am the Chairman of my tribe.

4347. My tribe is a small tribe, about 900 members. I've been on my Tribal Council for 30 years now, and I've been the leader of my people for 18 years.

4348. And a year ago, I was elected as the President of the National Congress of American Indians, which advocates for 566 tribal nations in the United States of America, so the Creator has put me in the highest position in Indian country in the United States of America.

4349. And it's just an honour to be here, and I want to thank the NEB Board for allowing us to be here today. It's just a testament of your willingness to hear from everyone that is potentially impacted by this project, so thank you very much.

4350. **MR. HASSELMAN:** Chairman Cladoosby, can you tell the Board a little bit more about the Swinomish people, maybe a brief history of what's been taken from you over the years?

4351. **CHAIRMAN CLADOOSBY:** Sure. Like was stated earlier, we are a Treaty tribe. My grandfather -- my father is still alive. His Indian name is Kel-kahl-tsoot. Kel-kahl-tsoot. He's the great-grandfather to my grandchildren. He is 81 years old.

4352. And so it was his great-grandfather, Kel-kahl-tsoot, who signed the Point Elliott Treaty in 1855. So when you think about it, you know, that's not that long ago. My Dad's still alive; he has great-grandchildren, and his great-grandfather signed the Treaty.

4353. So we are a Treaty tribe, one of many Treaty tribes in the United States of America. It's the 1855 Point Elliott Treaty. And we ceded millions of acres of land to the federal government, and we were -- the place that we're living now, we've been there since time immemorial. Our roots go very deep.

4354. We are a place-based society. All of us in the Coast Salish territory are. What that means is, you know, we just can't pick up and move to Ottawa or New York or Texas. You know, we are where we are. We've been there since time immemorial. We are very, very blessed.

4355. We have about 10,000 acres. We live on an island, so we have about 3,000 acres of tide lands. There's about 900 of us, so it's not a lot. You know, the diseases that the non-Indians brought into our community almost wiped us out.

4356. We -- in the 1930s, we got down to about less than 200 tribal members, so we're slowly building to where we are now, and we're continuing to add members. But the Creator has blessed us with -- and we are the second-largest fishing fleet in the Puget Sound. The majority of our members still harvest seafood year round, and we do a lot of Dungeness crab. We do millions of pounds of Dungeness crab. We do millions of pounds of salmon. We do geoduck, we do prawns, we do oysters, we do clams, we do mussels, all of -- you know, if we could have had a sample of everything for all of you right here for lunch, yeah, you guys would have been in heaven.

4357. And so we still harvest all of those resources and, like I said, the Creator has blessed us with the ability to still have that. Our Elders said that, "When the tide is out, the table is set". And so we're very blessed.

4358. At one point in our history, if you Google Swinomish and you look at our front yard, it's the Skagit River which actually starts -- the headwaters are just right down the road from here in Canada. The headwaters of the Skagit River is just -- it starts here in Canada.

4359. And an amazing fact, you know, all the rivers in the lower 48, every single river system in the lower 48, you've got to ask yourself how many of those river systems still has every species of wild salmon spawning in its tributaries. That's a lot of river systems we're talking about.

4360. And the Skagit is the third-largest on the west coast behind the Columbia and the Sacramento. And so it's a big river system. So you ask

yourself, "How many rivers in the lower 48 still have every species of wild salmon in its tributaries?" There's only one; only one river. That's the Skagit River.

4361. And we're very proud of that. We're very, very strong advocates in protecting the salmon in the water, and we have a treaty right. It's a sacred obligation. We inherited that obligation to be stewards of that river to protect that.

4362. And you've got to understand that when those salmon go out, not all of them make it back. Some of our silvers are caught on the west coast of Vancouver Island by some of our brothers up here. So you know, it's very important to us to do whatever we can to protect that river system so seven generations from now, our children can say there's only one river in the lower 48 that has all species of wild salmon.

4363. Our tribe is a large employer in our region. We employ about 800 to 900 employees, our tribe does. Very heavy contributors to the local economy, and we're very proud of that. Our infrastructure and our tribal government is second to none. We are very proud of what we've been able to accomplish.

4364. We're a firm believer in -- you're probably aware there's a statistic across Indian country that says Native Americans have the highest rate of alcoholism than any other segment of society. It's only because of the fact we've only had it in our culture about 100 years, and so we haven't perfected the art of drinking yet like the Germans and the Russians and the Japanese and the Irish and the French. They've had alcohol in their communities for thousands of years.

4365. In our communities, we've only had it around 100 years and so, you know, we're just trying to figure out. There's the one statistic I quoted you where we have the highest rate of alcoholism, but one thing you will never hear is we have the highest rate of non-alcoholism than any segment of society.

4366. So what that should tell you is that, you know, you're either an alcoholic or you're sober. There is not too many social drinkers. That's the one thing we haven't figured out, how to be social drinkers. You know, they say, "Well, did you get drunk last night?" "Well, wasn't that the point?"

4367. And so we're trying to break that cycle of alcoholism through education. We feel that the key to breaking the cycle of alcoholism and drug

abuse and poverty is through education and also trying to re-create that connection to the environment that was kind of severed from us.

4368. Our Elders had this strong connection to the environment, and we're trying to rekindle that fire into our youth. And so we're putting a large emphasis in education, in teaching our kids about the environment, about the water, about, you know, the important things that have been lost in our communities.

4369. So just a snapshot of Swinomish. I can keep going on, but I'm trying to watch my time. So I will -- and once again, feel free to ask any questions. I will do my best to answer them.

4370. But I feel, you know, we've created a relationship here that's only going to be a bump in the road for us. I know -- I don't know if we will ever see each other again, but this is our opportunity to try to get to know each other, so feel free to ask questions.

4371. **THE CHAIRMAN:** You've -- let me jump in if that's appropriate. I don't want to break -- you've made the offer, and I appreciate that.

4372. I'm just trying to understand, you know, you have the largest -- second-largest fishing fleet. Do you have rights to fish over -- is fishing federally regulated, or do you have rights that are different access to fishing or are you restricted to a -- you know, through your treaty and your rights? I'm just trying to understand the relationship there.

4373. **CHAIRMAN CLADOOSBY:** That's a great question.

4374. **THE CHAIRMAN:** Perhaps my colleague to my left phrased it better for me, was that are you licensed federally or is it a right -- an Aboriginal right to fish?

4375. **CHAIRMAN CLADOOSBY:** That's a great question. Our treaty -- in the Point Elliott Treaty -- if you Google Point Elliott Treaty, it's a real short treaty. It's only a couple of pages long. And our Elders secured for us the right to take salmon at our usual and accustomed places.

4376. And so that means that, you know, I can go to the places that our ancestors historically have always gone, so the territory that the Swinomish tribal members are allowed to fish in are from the Canadian border down to Suquamish'

s front door.

4377. **CHAIRMAN FORSMAN:** We don't always agree.

4378. **CHAIRMAN CLADOOSBY:** Yeah. And that was a right that we had to fight for from day one after the treaty was signed. The non-Indians have always tried to take that treaty right from us.

4379. And there was a landmark decision in 1974 called the *Boldt* decision that reaffirmed our right to 50 percent of all the salmon in the State of Washington. So what that did was it made us co-managers, and so we are co-managers with the State of Washington.

4380. So we meet quite a bit throughout the year in setting the seasons, setting the quotas, determining the run sizes and we look at the river systems that are the weakest and we call them the drivers. And so if the Skagit silvers are the weakest for one year, they'd be called the drivers. But we co-manage this with the State of Washington.

4381. It was the federal government that intervened with us in our battle against the state in reaffirming our rights to fish. So we're allocated 50 percent of the salmon and we are looked at as co-managers of this resource. In one generation, the tribe's infrastructure in salmon management, biologists, PhDs -- I jokingly tell people I have two PhDs. They work for me in my planning department.

4382. So we're -- the infrastructure in all of our tribes that you see at the table here is second to none. And we take managing -- and it's all the resources, not just salmon. It's the crab, it's the shellfish. It is, you know -- we've also won the right to protect the environment. It's called the *Culvert* case. And so that is very, very important.

4383. It was one -- the *Boldt* decision, the first step was to get us our salmon rights. The second step was to get us our shellfish rights. And the third step was to make sure that the environment was protected because we felt the state was not doing a very good job in protecting the environment, so we filed a case against the state because the spawning beds, the tributaries, the habitat was being destructed. And the Courts ruled in our favour in that case, too.

4384. **THE CHAIRMAN:** That 50 percent allowed you to take 50 percent

of, you know, all of the -- is that a co-decision as well? Do you -- can the federal or the state trump you and "Gee, well, we don't like that season. No, you can't do it at that time"?

4385. You're shaking your head, which is probably good.

4386. **CHAIRMAN CLADOOSBY:** We've got a great working relationship with the State of Washington. Now, when it comes to our brothers' share in the Fraser River sockeye, now, that's a little different. We also have that agreement, too, the Pacific Salmon Treaty, that sets the mechanism up for the tribes, the Indians and the non-Indians in the State of Washington to share in the resources.

4387. And so right now, our fishermen are out in the San Juan Islands -- thank you, Ray -- catching Fraser River chum salmon right now. And so that's all worked out in international agreements through the Pacific Salmon Treaty, so that there is outside of the work that we have to do with the State of Washington. So there's an international group that works, tribal and non-tribal, to figure out the quota on the Fraser River runs.

4388. **MR. HASSELMAN:** Chairman, can you -- can you focus a little more on the relationship between fishing and Swinomish culture, ceremonial art, how you receive visitors?

4389. **CHAIRMAN CLADOOSBY:** You got to understand, about 100 years ago -- there's a channel right in front of us, the Swinomish Channel -- we call it the Swinomish Slough -- right in front of our community. And 365 days out of the year, we used to be able to get salmon out of that river or out of that channel that was going to the Skagit River.

4390. So in January-February, we would have the steelheads. March, April or May, the spring kings would come. June, July, August, the pink salmon and the silver salmon would show up. September, October, November, the chum salmon would be here. Then December, the steelhead would come back.

4391. So we had a continuous 365-day cycle of salmon, and it has -- that was very awesome. You know, we are salmon people and it is very, very important to us, and we -- it's central to our culture, the salmon is, and to have salmon.

4392. So our tribe, for example, we'll put up 25 to 30 -- 25 to 30 thousand

pounds of salmon that we will put away for ceremonies throughout the year, funerals, namings, memorials, community dinners, and so it's very, very important to us. And then we will have a yearly salmon ceremony where we invite people from throughout the Salish Sea to come. And it was that table that I told you about that was full of salmon and crabs and prawns and clams and oysters.

4393. It's called our first salmon ceremony, and it's the blessing of our fleet. And so having all of those natural resources there still and to be able to share that with our brothers and sisters, we've even -- you know, was able to provide salmon when some of our brother/sister tribes were kind of low on theirs and they had a funeral or a ceremony and they needed salmon. They would call us up and we would provide salmon for their ceremony.

4394. So it is right up there, salmon is, as far as importance.

4395. **MR. HASSELMAN:** Mr. Chairman, you've been discussing the ceremonial relationship with salmon. There was a question raised in this forum a few days ago about the amount of salmon and other resources from the Salish Sea that people eat on a day-to-day basis.

4396. Can you help shed some light on that and some of the things the Swinomish have been doing to protect those people?

4397. **CHIEF CLADOOSBY:** Sure. A few years ago, we were -- our tribe was awarded the largest grant ever awarded to a tribe. It was a little over $1 million. And I had the opportunity to go down to Las Vegas and receive this cheque from the Department of the Interior, the Secretary of the Department of the Interior. It was such a big thing. It was -- no, it was the EPA Director.

4398. It was the largest cheque ever given to a tribe, so they had this big ceremony in Las Vegas. And it was kind of humorous because on the way back, I was going in the airplane with this big cheque on this cardboard and this stewardess thought that I had won a jackpot and she says, "Are you single?"

--- (Laughter/Rires)

4399. **CHIEF CLADOOSBY:** She thought I won a million dollar jackpot.

4400. But we were able to use that money to do an extensive toxic study on all of our natural resources in our region, and it is a study that is second to none.

4401. Once again, one of my PhDs led that work. And it was able to determine the toxins that are present in the salmon and the shellfish that we eat. And you got to understand one thing, that the Salish Sea in the last 100 years -- and when I talk about the Salish Sea, that's the Strait of Georgia, the Strait of Juan de Fuca, the Puget Sound.

4402. A few years back, our Coast Salish gathering and a number of others pushed for the renaming of that whole body of water, the Salish Sea. So when I refer to the Salish Sea, that's what that's referring to, waters that are in Canadian waters and U.S. waters. But it's right now renamed and it took two governments, federal governments, and two -- I guess B.C. is a provincial government -- and the State of Washington to agree to that name.

4403. And so, you know, the Salish Sea, in the last 100 years, has been basically used as a toilet bowl for industry. They've been able to flush all of their chemicals, their toxins, their dioxins, their PCBs, their DDTs, all of these chemicals, their mercuries, their -- all this has been in the last 100 years throughout the Salish Sea, flushed into the Salish Sea and treated as a toilet bowl.

4404. And so this is what we call a pollution-based economy. In the last 100 years, we've lived under a pollution-based economy.

4405. And so we knew that all of these chemicals, all these pesticides, all of these things that were going into the Salish Sea, we need to quantify to see exactly, okay, how sick, potentially, are our people getting from all these pollutants that are entering into the Salish Sea.

4406. And so we did an extensive study. And we did an extensive study on how much salmon that our people consume on a yearly basis, and it's quite a remarkable study to show, you know, what is really in the food that we're eating. And it's kind of sad but, you know, our Elders will say we know that it's bad for us, but they're not stopping from eating it. That's ---

4407. **MR. HASSELMAN:** Could you tell the Board just a little bit about what fishing means to you personally, how you learned fishing, how you teach your children?

4408. **CHAIRMAN CLADOOSBY:** Sure. You know, I've been raised in a fishing family, blessed to be able to have that opportunity. My first memory is

being in that Swinomish Channel with my dad, my mom and my three older brothers. And I must have been maybe three or four years old.

4409. And I remember it very clearly because I fell asleep on my dad's net and I woke up with him dunking me in the Channel. Winter challenge, I guess. My first winter challenge.

4410. And so I've been around fishing all of my life. My -- I remember my great-grandfather, my grandfather, my father. My father is 81 years old, and he still participates in every opening that we have on the Skagit River. And that's pretty cool.

4411. And so, you know, my two girls are involved with our fishery. My grandkids -- my two grandkids will be involved. We have -- we have what's called beach seining in this very almost sacred place on our reservation called Lone Tree Point where every two years -- in the past -- 50 years ago, our Elders would go down to Lone Tree Point and they would stay there. They would camp there from spring until winter harvesting salmon.

4412. Unfortunately, because of the overfishing, habitat destruction in the last 50 years and, you know, just -- those have really hurt the industry. And so now we're -- we only go down there every two years to beach seine. And it is -- if you ever get a chance to come and witness some beach seining, it is really, really cool.

4413. And I was just over here on the Fraser and I seen that the natives were over there beach seining right now. And it's wonderful to be able to still be able to do that.

4414. We're -- like I said, the Swinomish Tribe, that probably out of a 900 members, the largest employer is with the seafood industry. And the Swinomish Tribe -- just a little side note, the Swinomish tribe, our fish company that we -- that we operate down there, it produces more salmon than any tribe in the United States.

4415. We can more salmon than any tribe in the United States. We did over 100,000 cases of canned salmon last year. We export more caviar to Europe and Japan than any tribe in the United States. We do about $6 to $10 million of caviar -- salmon caviar to Europe and Japan every year.

4416. So the salmon industry is -- and the seafood industry, we do, like I said, millions of pounds of Dungeness crab. And so it's very, very important to us to be able to still have those fishers in our community to be able to do that and bring that food home and put it on the table is really awesome.

4417. **MR. HASSELMAN:** Chairman, what -- do the Swinomish people have a position on this project? Is there opposition to this project?

4418. **CHAIRMAN CLADOOSBY:** Yeah, we're very concerned and, once again, we have been -- once again, the treaty right isn't, of course, recognized in Canada, but we take that treaty right very, very serious. And, you know, as I look at that map right there and I look at what we call the apex, right at the bottom right-hand corner there, you see the apex there. That's where the border is.

4419. And one of my fishermen were just fishing there in the apex for the Fraser sockeye here a couple of months ago. And a supertanker came and went right through the middle of his net. And he's got what's called a sternpicker, and so the net was still tied on to his boat and that supertanker was going. You're not going to stop the supertanker. It was going. It didn't care that it hit a net.

4420. And I was at the dock when my friend got there, when he stepped off his boat, and he was still literally shaking, but he thought that that tanker was going to pull his boat down. And he was frantically trying to cut his net, and these nets are like -- they're pretty -- you know, they're 90 feet deep, they're three-eighths of a mile long, so they're pretty big nets. And so he was frantically trying to cut that net. And luckily, the net popped out from under the tanker.

4421. And that just happened here just a couple of months ago. And so, I mean, he was very, very, very shaken by this. And you know, those nets cost up to $10,000 and so he was like, "Now what do I do? How do I put in a claim?"

4422. I mean -- and it's just like, you know, you hitting somebody's car, you know. It's -- you're hitting private property and you're responsible for it, but he doesn't know what to do.

4423. And so when -- you know, we have an issue down there right now, they want to create the largest coal exporting about 30 miles the way the crow flies from here, and so the oil tankers will increase seven-fold in the Salish Sea where we fish and where we crab. And the coal tankers will increase

exponentially because there's just this -- you know, this desire to get this fossil fuel to China where they have an insatiable diet for fossil fuels. And so, you know, that is a real concern of ours.

4424. I'm a firm believer that it's not if, but when, one of these tankers run aground somewhere. And we're talking supertankers that can't even fit through the Panama Canal right now. And so it is -- we have a lot of crab fishermen, like I said, and these tankers just go right through when our guys have openings and they just take those crab pots to who knows where. They cut the buoys; they're lost. And you know, there was a report that, you know, there is thousands of crab pots at the bottom of the Salish Sea and a lot of it's attributed to our fishermen being run over.

4425. **MR. HASSELMAN:** What, in your view, would happen to the Swinomish people and Swinomish culture if there was a catastrophic oil spill?

4426. **CHAIRMAN CLADOOSBY:** Well, once again, we have been very blessed up to this point. It's -- I'm a firm believer it's not if, but when.

4427. We just had a tanker lose control off the North -- you know, North Vancouver Island. Luckily, nothing happened up there in the Haida Gwaii territory but, you know, accidents happen.

4428. And you know, I hate to say it, but I just -- it just worries me when you know this is going to happen because accidents happen. You know, with the coal trains, you know, they're derailing left and right in the United States. I don't know about in Canada, but we've been lucky to avert a natural disaster in the Salish Sea.

4429. But with the increase in the tanker traffic, the increase in the coal traffic by the marine waters, I'm -- I just think it's inevitable. So it would be devastating to our local economy.

4430. You know, we just have to look at the -- they're still suffering up in Alaska, I think, from the Exxon Valdez oil spill. And luckily, we haven't seen that here yet.

4431. **MR. HASSELMAN:** Is there anything else you'd like to share with the Board?

4432. **CHAIRMAN CLADOOSBY:** Just the fact that, you know, this is -- I

understand that, you know, this is a big project. There's a lot of money involved. There's an industry that wants to create jobs. But you have to just weigh out whether or not, at the end of the day, that's worth it.

4433. To be able to move from a pollution-based economy is, I know, not easy. You just don't turn that around overnight. But you know, we have been given the responsibility as stewards of this environment.

4434. And you've got to understand, you know, we're not here just speaking on behalf of the native communities. You know, we are speaking on behalf of all the citizens that live here in the Salish Sea. They all should be concerned.

4435. They are all not likeminded, but, you know, something like this could have a serious impact on them and so, you know, we -- and once again, thank you for allowing us to be here. This is history being made, and you know, we feel like we are the voice for the environment now.

4436. Our Elders never had that opportunity to be able to be that voice for the environment, to be that voice for the salmon, for the water, for the shellfish. And the tribes in the States and the First Nation tribes in the 21st century, this is what our Elders looked forward to, this time we had this opportunity to create this relationship, to have this interaction, for you to be able to hear us because a generation ago, that didn't happen.

4437. So you know, I just raise my hands to the NEB for taking that leap of faith, taking that step to say, okay, we need to listen to the First Nations and the tribes in the States. So my hands are just up to you and, once again, thank you for accepting this responsibility.

4438. And I probably wouldn't want to be in your shoes right now, but you guys accepted this, and I thank you for that.

4439. **MR. HASSELMAN:** So if there are any questions, we can turn to that now.

4440. **THE CHAIRMAN:** I don't think we have any questions of the Chairman right now, but you've others that are prepared to speak or is the Chairman the only one that's speaking?

4441. **MR. HASSELMAN:** No, we will have other speakers. Do you prefer to leave questions to the end?

4442. The one thing is, Mr. Cladoosby has a plane to catch and will be leaving at the break, if not sooner, so this is sort of your best opportunity.

4443. **THE CHAIRMAN:** I think I was the only one that had the question earlier, so we -- my Panel mates. And I'll offer it to Trans Mountain/Kinder Morgan if they wish to ask any questions before the Chairman leaves, for sure.

4444. **MS. OLENIUK:** We do not have any questions, but thank you for your presentation.

4445. **THE CHAIRMAN:** And we -- and the Panel also thank you for sharing your -- and bringing your voice to us today, for sure.

4446. **MR. HASSELMAN:** So we're ready to move on to our next witness, if you are. We're going to ask Mr. Harris to provide testimony.

4447. Mr. Harris, perhaps you could start by just telling the Board a little bit about who you are.

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MR. HARRIS:

4448. **MR. HARRIS:** My name is Ray Harris. I'm from the Chemainus Tribe on Vancouver Tribe. My traditional name is Shulqwilum. The name is from my great-great-grandfather who's from the Gulf Islands, one of the Gulf Islands. I have 11 children, 19 grandchildren, nine great grandchildren. We're fishermen.

4449. I have ended up being a speaker for our people in cultural times that we have, traditional times. I have a position with the Salish Nations.

4450. It's not -- you wouldn't find it in a formal sense, but when we work with the Canadian Salish tribes and American Salish tribes, you could describe my position as a co-chair of the Canadian Salish tribes. I'm not the first one. It's been done before, and I've been doing it now for a while.

4451. **MR. HASSELMAN:** And can you tell the Board why you're here

today offering testimony on behalf of the U.S. Tribes, since you are a member of the Chemainus Nation.

4452. **MR. HARRIS:** I have a great concern that risk is coming to our Salish Sea; that the risk is looking at our culture, straight in the eye of our culture.

4453. We have a very serious time with our culture. We've been guarding it, protecting it jealously for the last 100 years or more.

4454. Each ceremony we have relies on resources from the Salish Sea. It's important to us to have something called a resource and we're very, very concerned about that in the traditions of our people, customs of our people. When we worry about these traditions it's because they're connecting our spirit life with our young people.

4455. The guide that we have for our young people comes from our traditions and our customs. It requires those wonderful resources that we have.

4456. **MR. HASSELMAN:** Mr. Harris, this morning you took part in a ceremony on the banks of the Fraser River. I wonder if you could tell the Board a little bit about what happened there.

4457. **MR. HARRIS:** This morning or today, started a few days ago. The ceremony, actually, should have taken four days, probably did. Our cousins and our relatives from the tribes in the States, gathered water, they told their people what they're going to do, let it be known that they were going to have a chance and opportunity to bring water here, something sacred to us.

4458. One of our special people here in the Stó:lō Nation conducted a water ceremony where the four tribes and the Stó:lō tribes brought us back to a time when we were ready and able to meet with the spirit world. We are asking for all the strength we can muster from ourselves and our ancestors to protect the waters of the Salish people.

4459. So that's what the ceremony was this morning.

4460. **MR. HASSELMAN:** Can you tell the Board a little bit about why fishing matters to Coast Salish people?

4461. **MR. HARRIS:** It's just a way of life. It's such a wonderful way of

life. Fathers get to be with their sons; brothers and sisters get to work together. It's a short period of time.

4462. The salmon and the seasons are short periods of time but it's a quality time. In the salmon season, we can bring food to our Elders. Can you imagine; food? We are talking about food, feeding our people yet enjoying our time fishing.

4463. Every once and a while this is one of the seasons. The Great Spirit will show us how it could be if we look after it.

4464. So the Fraser River brought lots of sockeye this year. Our old people say it's a glimpse; our Great Spirit is showing us a glimpse of how it could be if we all looked after the rivers and the sea. We can only say we are fishermen.

4465. It might be described as we're not White people with tans. I'm trying to impress upon you we are different because of the way we treat and the way we are treated.

4466. Salmon; the many species of salmon are important in our culture. We have dances and songs with our salmon; nourishments for our spirits, a guidance for our young people. If you want salmon you've got to look after the sea. Don't pee in the river. Salmon has a high education -- position with us. We love the salmon.

4467. **MR. HASSELMAN:** You mentioned your role as a Chair of the Coast Salish Gathering. I wonder if you can tell the Board a little bit about how that organization came to be and why.

4468. **MR. HARRIS:** About a decade ago or so, that came to us -- came to the tribes, both sides of the border, ecology or environment was under attack and somebody had to speak for the environment. We tried to find a way to speak for the environment.

4469. One of the things we're up against -- we quickly found out, there are at least -- not counting the municipal issues, but there's six levels of government in Washington and B.C. -- the Province of B.C and the State of Washington. Those six levels of government, the two federals, the province, the state, and the tribes on each side, never -- couldn't get together. You know how it is; it gets territorial, as a description, anyway.

4470. So the Salish leaderships tasked us, a few of us, to say, "Find a way to do this. Let the governments know that there is an environmental issue here that the border doesn't recognize." Pollution doesn't know there's a border.

4471. So with the support of the Nations, we found a way for the six governments to safely come together and talk about environmental issues, how to save the Salish Sea. Yet, at the same time, we're trying to impress upon them that we are the people of the Salish Sea.

4472. So that's really something that came back together. In times long ago our people always got together in the winter months. It was nothing new 10 years ago when we started. We have always been getting together in the customs of our people.

4473. **MR. HASSELMAN**: Could you tell the Board a little bit about the canoe journey?

4474. **MR. HARRIS:** There's been a great, great reawakening of the canoe. We are the champion canoe pullers.

4475. The tribes in the past longed to quit fighting the warring tribes, so they entered into competitions, war canoe racing. Great, great gatherings. You see there's old pictures here and there.

4476. Well, as time went on other tribes through the whole coast of North America, really -- the Bella Bella people had one this year but the first organized one, the Haisla. They are a tribe way out in the middle of the central coast.

4477. In these canoe journeys young people come in, old people start. We have great gatherings of people. In Chemainus, my tribe, over 5,000 people came for a week. It was something.

4478. The canoe journeys also have given us an opportunity to do some testing of the Salish Sea. Agreements -- an effort was made to test the sea for pollutants, something that a motor boat couldn't do because it has pollution. So the paddlers agreed from far and wide to drag a pull belong the canoe to test what was in the sea.

4479. Beyond that scientific experimental, or whatever you want to call it,

the canoe journeys have been wonderful for our people. Songs are sung and gatherings are held; a reminisce time of how we lived by the sea.

4480. **MR. HASSELMAN:** In your view do the Coast Salish people support or oppose the Kinder-Morgan Pipeline?

4481. **MR. HARRIS:** We have no -- we have no information or anything that will allow us to say we support it. The Mount Polley mine disaster; the tanker that went adrift in Haida Gwaii; how could you say that was a world-class operation to save the tanker when it was so close to devastating times?

4482. The Mount Polley disaster was touted by the governments of B.C. that it was the safest and the most modern operation. Nowhere near. We're still wondering -- worried and wondering the effects of that particular disaster. B.C. and Canada's federal fishery department is a lot to be desired.

4483. **MR. HASSELMAN:** I don't have any other questions.

4484. **THE CHAIRMAN:** Maybe it would be a good time if we take a short break. It would be good. So we'll -- yes, the Chairman, you're welcome to say something before you -- yeah.

4485. **CHAIRMAN CLADOOSBY:** Yeah, just to follow up on the Coast Salish Gathering bringing six governments together. It was very awesome. Ray and I had a chance to go back to Washington, D.C. The work that we did on the Coast Salish Gathering and the mapping that we did was the Fraser River, the Strait of Georgia, the Strait of Juan de Fuca and Puget Sound with the sophisticated twenty-first century probes. And we got the opportunity to go to D.C. and be honoured by the Secretary of the Interior. We got the highest honour from the Secretary of the Interior for that great work that we did on mapping the Salish Sea and checking out the water quality and the toxins and everything that is associated with that. So it was really cool.

4486. Then we got to go to -- Harvard University gave us a high honours award in Albuquerque -- in Albuquerque, New Mexico for that work. So it's really powerful. You know, we say that pollution doesn't understand there is a border between two nations. And so it was really powerful to partnership with the United States government, partnership with the canoe journey families. And we had to get permission from the Elders to be able to incorporate this twenty-first century technology with this very sacred celebration that we do.

4487. And so just to be a part of that, to be Co-Chairs of this and to be able to witness this work, you know, it's almost like a sleeping giant is waking up in the Salish Sea and it's the First Nations and the Tribes of Washington. So it's really awesome to be a part of that.

4488. **THE CHAIRMAN:** And just so I clarify for ourselves, that study, that great study that you've indicated, was that part of the joint international group that did that, so there was Canadian involvement in that and support for that study. Am I correct?

4489. **CHAIRMAN CLADOOSBY:** Yes, we worked through the Coast Salish Gathering and we work with the federal government on the United States' side to provide us with the sophisticated equipment to check out the health of the Salish Sea. And it was an international -- and this is an international worldwide thing that we did because it was so unique that we're able to use canoes instead of motorboats. And to be able to do the testing in the Strait of Georgia and the Fraser River, and so although it was funded by the U.S. federal government we were able to do this in conjunction with the Coast Salish brothers and sisters in Canada, First Nations.

4490. **THE CHAIRMAN:** Thank you for that. So we'll take a break. We'll take 15 minutes, come back about 10 after 3:00. That's fine.

--- Upon recessing at 14:54 p.m. /L'audience est suspendue à 14h54
--- Upon resuming at 3:15 p.m./L'audience est reprise à 15h15

MELVIN BRIAN CLADOOSBY: Resumed
RAYMOND HARRIS: Resumed
LEONARD FORSMAN: Resumed
SHAYLENE SKY JEFFERSON: Resumed

4491. **THE CHAIRMAN:** Welcome back. I understand now we're going to proceed with the oral traditional evidence of the Suqualish (sic) Tribe. Am I correct?

4492. **CHAIRMAN FORSMAN:** Suquamish.

4493. **THE CHAIRMAN:** Suquamish.

4494. **MS. BOYLES:** Thank you very much. I wanted to present the testimony of Chairman Leonard Forsman of the Suquamish Tribe.

4495. Chairman Forsman, could you please tell the Board who you are, your personal background and your position within the tribe?

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR CHAIRMAN FORSMAN:

4496. **CHAIRMAN FORSMAN:** Thank you. My name is Leonard Forsman. My Indian name is ^Gvuì, which was gifted to me by the Heiltsuk Nation of Bella Bella, B.C. during our hosting of the Tribal Canoe Journey in 2009. We have a strong partnership with that First Nation through the canoe journey and other cultural exchanges, so I just wanted to acknowledge that while we're here in British Columbia.

4497. I'd like to also acknowledge the Stó:lō people for hosting and allowing us here on their territory and being such a great host today, and also the citizens of Chilliwack as well.

4498. I was born and raised in the Port Madison Indian Reservation in a town called Suquamish, named after our people. And our family was descended from a great-grandmother who was a very integral part of the establishment of the reservation. And I attended local schools and went to the University of Washington, where I worked on my studies in anthropology and also in the formation of the Suquamish Museum, which was opened in 1983.

4499. And a lot of the early work, I did research on our history, primarily through photographs and oral history with our Elders. And after that, I became the Director of the museum and served some time on tribal Council.

4500. During -- shortly after that, not shortly, but a decade after that -- it seems like shortly now; it seemed like a long time then -- I became an archaeologist with a consulting firm in Seattle.

4501. And in the United States, we have an Act called the *National Historic Preservation Act*, which is a federal law that tries to preserve, to the best of its ability, historic sites, buildings, archaeological sites, sacred lands. And we work with a number of large municipal public projects to assess the cultural resource

probability and then a presence of archaeological sites in traditional places in some of these larger projects.

4502. And I worked in that industry for another decade and then, during that time, I got my Master's degree in historic preservation from Goucher College in Baltimore, Maryland, and then came back to the tribe to become the first full-time paid Chairman of the Suquamish Tribe. I was fortunate to be able to do that and had some great mentors to get me there.

4503. And since that time, I've been on the -- since that time I've been Chairman, I've had a lot of responsibilities, volunteered for a number of positions. And there's a term we have on a canoe journey, you can also get "voluntold" to do things. I'm sure you're all familiar with that.

4504. So I mean, I serve on a number of Boards and commissions with -- and cultural activities, economic development and historical societies. And then also was very honoured last year to be appointed by President Obama to the Advisory Council on Historic Preservation, which oversees the implementation of the *National Historic Preservation Act*, which is nearing 40 years in age.

4505. And I've been doing that for a year now, and I serve as a Native American member that oversees a lot of the issues with Indian country in the lower 48 and Alaska in protecting sacred sites and archaeological sites and burials for native people.

4506. **MS. BOYLES:** What are your responsibilities as Chairman?

4507. **CHAIRMAN FORSMAN:** Well, I serve -- I call the Council meetings and schedule the Council meetings. We have a seven-member Council.

4508. We have about 1,110 members. About more than half live on or near the reservation, which is in Kitsap County just across from Seattle, Washington right next to Bainbridge Island. And we conduct the government's business, which is overseeing the government programs. And we took over a lot of the government responsibilities that were -- some of them were in the early -- late sixties and early sixties were being provided by federal agencies and moved those to the reservation.

4509. So we have our own police, our own courts, a housing program, a fisheries/environmental program, legal department and a lot of administrative

departments. We have Elders programs, health benefits programs, a school.

4510. We provide higher education for our members. Like all other tribes in the U.S., we're able to provide a lot of those services on our reservation and beyond.

4511. And I also do a lot of diplomacy, I tend to call it, with the U.S. government, with the state government, with the local governments, the cities and the counties, and also with other tribes. And that includes the First Nations of B.C.

4512. And some of -- most of those are positive relationships. We joke around a little bit about our fishing disputes that we have. We're still settling those, but -- in the U.S. side, but we in the northwest are very well-known for having a great amount of unity and a strong relationship with the State of Washington, whereas other states in the United States have poor relations with tribal nations.

4513. We've been able to build, since he -- we talked a little bit about the *Boldt* decision which may -- debated some of the lower point of state-tribal relations. We've been able to work really hard on improving relationships and cooperative efforts with the State of Washington and also with other governments. And we really rely on the Treaty of Point Elliott, our government-to-government relationship with the United States, and the fact that the other governments need to respect that.

4514. And we have a seat at the table with the other governments of the United States and work together on trying to solve our differences and work on a government-to-government basis. And we have Memorandums of Understanding with some of our local governments that memorialize that and kind of outline how we work together and how we solve disputes, knowing that some of them can't be solved, and sometimes we have to take legal action.

4515. But in my time, we've been able to address some of these and come to some solutions a lot of the times, but we also work together on legislation at times as well when necessary.

4516. **MS. BOYLES:** Could you tell the Board about the historical importance of fishing to the Suquamish people and the areas that were traditionally fished?

4517. **CHAIRMAN FORSMAN:** Yes. The Suquamish Tribe are kind of unique in some ways amongst the Puget Sound Tribes in that we didn't have a major river in our territory; we live on a peninsula.

4518. We don't have any glacier-fed rivers, so all of our river -- our streams are -- we call them streams -- are based upon rainfall and aquifers to recharge and provide the stream flow necessary for the limited amount of salmon that we have in the areas of our winter villages. So our people travel far and wide to get enough salmon for wintertime.

4519. In this map, you can see down below kind of the Kitsap Peninsula where the Suquamish name is, and we're -- that's primarily our winter territory there where our winter villages were, but we went as far north as the Fraser River to get enough salmon to provide for ourselves.

4520. Can you go back to the previous slide real quick?

4521. That's Chief Seattle. He was one of the signers of the Chiefs -- of the Treaty of Port Elliott. That's the only known photograph of him. And he was one known to travel and has documented travel throughout the Salish Sea in not only gathering resources, but also in economic and trade relationships with the First Nations of B.C. as well.

4522. If you could go on to the next one there so you can get a feel for a vision of what the Salish Sea looks like. And we've been fortunate that we've had the opportunity for many generations to rely upon the salmon to provide us our sustenance; and, of course, salmon was the backbone of our economy as it was for most of the northwest coast. And, you know, it stretched from northern California all up to southeast Alaska.

4523. And salmon provides a -- not only a food, but also what we might call medicine or our cultural strength to our people. And our people believed that the salmon, you know, have a spirit and when they go up to spawn, they go to their houses and they wait for us. And if we don't respect them and if we don't take care of the water and if we don't take care of the habitat, if we are disrespectful, they may choose not to come back.

4524. So it's very important that that tradition that's been passed down to all of our people throughout the northwest coast and the Salish Sea be understood

because that's why a lot of the leadership is here today because our people expect us to be here to carry that message. And that's one of the main things I do as Chairman, is try to bring that message and those values to people as we move throughout our territory, exercising our Treaty rights.

4525. And, of course, there's a lot of historic evidence regarding our use of the area, and we fish in the Strait of Juan De Fuca and the Haro and Rosario Straits, where there's already a lot of shipping traffic.

4526. And, of course, salmon wasn't the only staple that we relied upon. Like the many of the other tribes we fished steelhead cod, flounder, perch, trout, herring, rock codling cod, black cod, sturgeon, skate, dogfish. There's also a large amount of shellfish harvested; crabs, clams, cockles, mussels, barnacles, geoducks, oysters, and all the seafoods that you guys are used to seeing around here, including sea mammals and ducks.

4527. And of course plants and berries were very important to us as well. They were dried just as the salmon were. The clams were dried. Everything was processed and stored away for the winter ceremonials.

4528. So we have really relied on those traditional foods and continue to try to rely upon those today as we are trying to incorporate many of those traditional foods to be a bit larger part -- even a larger part of our diet, especially the plants and medicines.

4529. **MS. BOYLES:** What does the tribe mean when -- or what do you mean when you say you're protecting for the next seven generations?

4530. **CHAIRMAN FORSMAN:** Of course, as an archaeologist I not only think about the seven generations in front of us, I think of the seven generations that preceded us as well. And I always believe that we're a link in the chain of our ancestors to our future and we have some of our future here, will be testifying later.

4531. And so we try to -- at Suquamish we know that the Treaty signers were carrying values from their grandparents and great-grandparents when they made the decisions they had to make, under great pressure, and when they signed the Treaty.

4532. And then, also, we feel responsibility during our lives to carry those

same values forward and try to preserve all we can in the time that we have here on this earth so that we can be looked upon by the future generations as people who carried that on so that responsibility can be passed on, because everybody who's in this room, from the First Nations to the U.S. Tribes, takes that responsibility extremely seriously. And we feel that we have an obligation to speak for the habitat, to speak for the water, to speak for the fish and the animals, and remember that the Creator put those things here for us to sustain ourselves but also to respect.

4533. **MS. BOYLES:** Switching gears a little bit. Economically, how big is the tribe and how many people are employed in fishing or shell fishing?

4534. **CHAIRMAN FORSMAN:** Well, we have about 1,100 enrolled members and many of them are crabbers or salmon fisherman or both. We also have a large annual harvest of geoduck clams that you're probably familiar with, or have heard about in British Columbia as well. And we ship those to China, primarily overseas. And we have about 25 to 30 divers that are employed full time doing that.

4535. And we also harvest shrimp and crab. And also, we have a lot of clam diggers that will dig in the inner tidal areas and we're trying to grow that more because there's a lot of single parents and families that can participate in that and supplement their incomes, and also to get on the beach together.

4536. Like my Elder said, it's so important that our people can go out together and harvest together. And sometimes we'll have 60 to 80 members of our tribe out on the beach, maybe in an evening or an afternoon, depending on the tides, out there together harvesting salmon.

4537. So we have about 80 fishermen, 160 clam diggers, at any one time and, of course, it varies upon the season.

4538. **MS. BOYLES:** And how much fish do the Suquamish people eat?

4539. **CHAIRMAN FORSMAN:** Well, it's interesting you ask that question because I've been pretty heavily engaged, as Chairman Cladoosby has as well, in an issue in the State of Washington, which we call a fish consumption rate. And currently the fish consumption rate in Washington has been set at six grams a day, and that's about a Chicklet size piece of fish per day. And I think our friends here probably have already eaten a month's worth of -- within the last

24 hours. So probably you as well up here as you're familiar with that. So it wasn't a realistic estimate upon how much fish we consume.

4540. So we have been working with the State government on trying to raise that rate to a compromise rate of 175 grams a day.

4541. However, a study that we did about 10 to 15 years ago estimated our -- the Suquamish Tribe's fish consumption rate at about 800 grams a day.

4542. So we -- this fish consumption rate's used to regulate industry on what is allowable amount of pollution to be allowed in the water because they base upon the cancer risk and they say, "Well, if the fish consumption rate is low, the water can be more polluted because people don't use much fish."

4543. So it's important because our people eat so much fish and Chairman Cladoosby said earlier, our Elders have said, "We're not going to stop." We're very concerned about that. That's created a lot of meetings with the Governor. Governor Inslee's been very committed to trying to become as knowledgeable on this as he can and it's undergoing rule-making now and still is a controversial issue.

4544. **MS. BOYLES**: What has shaped your personal understanding of fishing and your personal background with fishing?

4545. **CHAIRMAN FORSMAN:** Yes, I -- of course, my father fished a lot when he was young, and he was born in 1917. And as a young boy fished a lot with my great-uncle, Virgil Temple, who was blinded at the age of 13 and actually was known as the blind fisherman because he could paddle from Indianola -- from Suquamish to Indianola and back to his home without any help at all. He could hear fish as they came swimming through the water and he could tell the species just by the way they hit the water, and he was very well adapted to being blind.

4546. And, actually, my father as a young boy and as a young man used to fish in his rowboat for salmon and other fish for sale to Seattle.

4547. So I was fortunate enough in my early adulthood to be able to fish with my father, gill netting in Puget Sound and Agate Pass and learned a lot about his way of life.

4548. And, of course, when the *Boldt* decision was finally ruled, it gave us a better opportunity because before that there was very few opportunities for us to fish together.

4549. And so our family -- my brother fished on a purse seiner for many years. My cousin still operates a purse seiner and has fished for most of his life. And we've been -- our family has been engaged in a lot of the political side of habitat protection as well.

4550. **MS. BOYLES:** There was an earlier exchange between Chairman Hamilton and Chairman Cladoosby about the *Boldt* decision. I wonder if you could talk about that a little bit more to explain how that's worked out and what that really means.

4551. **CHAIRMAN FORSMAN:** Well, of course, the Treaty of Point Elliott 1855, ratified in 1859, many of the tribes here signed that Treaty, including the Suquamish, and when the Treaty was signed, the tribes had an understanding of what that meant to them. In the United States law, the treaties are interpreted as the Indians would have understood them at the time it was signed. So there's a number of principles that get brought forward in the courts.

4552. In the 1960s and early 1970s there was a lot of tribes were tired of the management of the fishery, the exclusion of the tribes from the fishing off Reservation and the Elders saying that our Elders signed this Treaty that was supposed to allow us to gather fish for our livelihood.

4553. So there was a lot of activism that was part of this with a lot of fish-ins. There was a lot of people thrown in jail. One of our Elders who just passed away this year was a veteran of the Fishing Wars, as they called it and he was jailed 45 times by the State of Washington for exercising fishing rights on the Nisqually River, and so there was a lot of controversy around this at that time.

4554. So when the treaty was being argued in -- it's called the *United States versus Washington* because the United States Department of Justice took up this case on behalf of the tribes. The tribes were also plaintiffs to that as well, but the United States was protecting the Treaty rights of the tribes because of their trust responsibility to protect those as that Treaty was signed prior to statehood. And it was signed 30 years before statehood and, therefore, under the Constitution of the United States treaties are the supreme law of the land. So they override all State rights. So they were one of the plaintiffs -- a major plaintiff in that case.

4555. So when it went to court in front of Judge Boldt in 1974, during the trial there was a big -- there was a big discussion about "in common with" because in the Treaty it says that the Indians should be able to fish in their usual and custom areas in common with the citizens of the territory. But there was a lot of discussion about what "in common" is defined as.

4556. And when the Judge was looking at it he said, "How have the Indians understood this Treaty?" There was very few non-Indians in the Washington, what's now Washington State at the time of the signing of the Treaty so that the Indians were catching most of the salmon.

4557. And Judge Boldt came down and said, "At least they caught 50 percent," and ruled that 50 percent of the harvestable salmon in Washington belongs to the tribes because of the Treaty. And this just reaffirmed what already existed prior to the signing of the Treaty because the tribes gave up the land in exchange for Reserve Treaty rights.

4558. So that case was very important in the respect that not only did it recognize the tribes reliance and right to the share of the harvestable fish, it also recognized, just as importantly, that the tribes were co-managers as well. So Judge Boldt at the time he believed -- he was very disappointed that the State had mismanaged the fishery. In fact, the Washington State Department of Fish and Game were the primary enforcers of these illegal seizures of salmon and jailing of our tribal fishermen.

4559. So that they were more managing the fish for the sport and commercial fishing of the State and nothing for the tribes. So in the process of that, management had pretty much decimated most of -- many of the runs in the State.

4560. So the Judge felt it was very important that the tribes become part of the management system because of their value system that we've heard a lot about already today. And also that somebody needed to be there to look out for the salmon, and so we have a pretty complex management system that you've heard about where it's very important to remember it's 50 percent of the harvestable salmon.

4561. So you have to determine if there's going to be a run -- a harvestable run first so the biologists from all the tribes and the State and the federal government get together and try to do the fish estimates; try to estimate what the

fish runs are going to be. And sometimes there's no fishery because there is not a harvestable right because there is a certain amount of escapement that needs to be met. So those are the things that we work together on, on a government-to-government basis to try to do what's best for the resource.

4562. And just to end, I think that also you heard a little bit about phase two of the *Boldt* decision because the *Boldt* decision has become one of the more stronger pieces of law that has helped protect the habitat of salmon and shellfish of Puget Sound because of the leverage that we're able to put on local governments to prevent sprawl, to prevent wetlands -- fill in wetlands and trying to have better water quality as well.

4563. **MS. BOYLES:** Could you tell the Board a bit about the relationship of the Suquamish Tribe to the B.C. First Nations?

4564. **CHAIRMAN FORSMAN:** Well, as you can see from the previous slides that we've travelled up here quite a bit and had a lot of cultural connections and then we also have a lot of intermarriage in our past. That was fairly common, intermarriage with tribes from Canada. A number of our families have First Nations ancestry. It continues on today. While it has a lot to do with the canoe journey because we're getting together a lot more and our young people are meeting each other and it's very powerful that this is an old way of our people meeting together in a clean and sober environment, a culturally based environment, a safe environment for them to interact.

4565. And so we actually have a child at the Suquamish whose first name is Journey so that might explain a few things. So, anyway, we find that's an extremely important part of our history. So not only do we have the pre-contact ancestral connections, we have the more modern connections. We also have the language connections; we have similar languages.

4566. We also share weaving. Weaving is an important tradition of ours that's practised in Puget Sound and also in the Coast Salish where they wove with a combination of mountain goat, wool dog wool, natural fibres to make the beautiful blankets that you've probably seen in some of the museums, and that's a practice that continues today. And we are -- the only two places in North America where people weave on looms to my knowledge is in the Salish Sea and the Navaho. And I always felt like they stole it from us; right? They say otherwise.

4567. **MS. BOYLES:** Could you describe a bit more about the canoe journey, about how it started and why it continues?

4568. **CHAIRMAN FORSMAN:** In 1989 was the 100th birthday of the State of Washington and I was working for the museum at that time and a lot of the tribal leadership felt like the tribes had not been recognized in a lot of ways by the State for our cultural traditions and our work to try to regain and restore a lot of our cultural ways and we believe that the State really couldn't celebrate their 100th anniversary without including the tribes and recognizing the tribes.

4569. And there had been a protest in Australia at an anniversary there a year or two before that and the State felt like, "Well, we don't want this to happen here either." So they relented and agreed to include us and put us in some leadership positions in the Centennial Commission, and a lot of the people wanted to restore the canoe carving back to the tribes. So we worked on getting old world cedar back to the tribes to build canoes with, and then in addition to that some tribes from the coast felt like it would be important to have a voyage in some of the ocean-going canoes and travel from tribe -- from Reserve to Reserve on a 20- to 30-mile pull each day and then celebrate at each stop. And all that culminating with a celebration at Suquamish with what they call the Paddle to Seattle.

4570. So when they all got to Suquamish in 1989, Frank Brown from the Heiltsuk Nation stepped out onto the floor at Suquamish and said, "I'm challenging everybody here to paddle to Bella Bella 600 miles in four years." You don't have four years to get there; you've got to leave in four years. You get four years to prepare.

4571. So some of our people went on that journey in 1993 and then after that it became an annual event, and as it grew more and more of our youth have got involved. And what happens is that you come to -- when you land after you've pulled all day and you get to the Reserve or the Reservation where you've being hosted, you get a meal and then you're asked to sing. And each tribe is represented and your Nation is represented, every -- to do what we call a protocol or a presentation.

4572. So a lot of the tribes like us, we didn't have a lot of our songs left and we were able to get a lot of those back. So before we had two songs and now we have dozens. And then we also brought back the regalia, creation and people learning their language and carving. And there's more cedar hats in this room than I had ever seen in my early days at the University of Washington when the

only place you could see them, primarily, was in the museums.

4573. So today, they're part of our everyday life and that's a lot to do with Tribal Canoe Journey.

4574. **MS. BOYLES:** You were telling me earlier about some issues about canoeing across the -- near the border or at ---

4575. **CHAIRMAN FORSMAN:** Yeah, whenever we cross the Strait of Juan de Fuca, we try to call in to the Coast Guard and let them know that we're -- when we're leaving because there's a lot of freighter traffic out there. And when -- the first time I went across the Strait in 2004, we left Port Angeles for Songhees, so we left from Elwha to Songhees.

4576. And we were in our canoe and there was a flood of fog out there. And I had a 12 year old in front of me. I was in my forties at the time, and he just kept saying, "I hate those freighters, I hate those freighters" because I kept hearing this err err, and I thought it was a foghorn, not knowing there's no foghorns out in the middle of -- there's no lighthouses in the middle of the Strait. That's how inexperienced I was.

4577. And then we went by through the fog and then this big freighter went behind us. And my skipper said, "Oh, that's where that freighter was". And unfortunately, at the time we didn't know there was a canoe behind us that almost got hit -- actually, did get swamped but unfortunately, were being towed at the time. And the sailboat came very close to hitting that freighter.

4578. So we do have to dodge freighters sometimes and do our best to try to find out where they are.

4579. **MS. BOYLES:** Does Squamish have firsthand experience with an oil spill at Point Wells?

4580. **CHAIRMAN FORSMAN:** Yes. In 2003, we were, unfortunately, the victim of an oil spill. Over there at Point Wells, there's a Chevron on-land facility that pumps bunker fuel into barges, and that bunker fuel was going to be shipped down to the South Sound near Tacoma for use at a sawmill.

4581. It was being pumped around midnight. They usually run these at night and the barge was being filled, overflowed. The alarm did not kick in. The alarm

was broken.

4582. The tender wasn't paying attention, and by the time he realized what was going on, about five to six thousand gallons of oil had gone over the side of the barge and into Puget Sound. And it drifted around in the water and we believe that it would have been probably even worse if it hadn't been for the freighter traffic that cut that into slices and those slices kind of moved around. And one of the big slices of that bunker fuel ended up on our beach there at Point Jefferson area in one of the places we call Doe-Kag-Wats, so the place of deer.

4583. And the oil came onto the beach and you can see one of the booms out there got out there a little bit too late. And this is an inland -- one of the last remaining fresh water/salt water estuaries in the Puget Sound. Most of them have been filled. This one has not been, and this is on a reservation.

4584. It's a very important place to us traditionally for ceremonies and recreational and fishing and general isolation, provides -- the isolation of the place -- it's one of the few isolated places on the reservation where people can conduct ceremonies and also just have a little bit of family time when -- because in the summer, it's really very beautiful out there.

4585. So when the oil hit along this beach, it hit it pretty hard and that inlet there where the tide comes in and out brought a lot of the oil in after it landed.

4586. This is part of -- some of the cleanup you see.

4587. **MS. BOYLES:** Right. I was going to say, we have -- there's some slides of the cleanup.

4588. What lessons did you learn from that or what lessons did you take from the spill and the cleanup?

4589. **CHAIRMAN FORSMAN:** Well, one of the things I found out about -- if you could go back to the previous slide because I didn't have grey hair at that time.

--- (Laughter/Rires)

4590. **CHAIRMAN FORSMAN:** That's also Congressman Inslee there in the middle. He's actually our Governor now, came out to visit the site as well.

And one of the things -- you can go to the next slide.

4591. One of the things that I learned about the -- is there a slide after that? That's it. If you can go back to the previous one of the cleanup, that would be great.

4592. Working with the contractors who were engaged in the business of cleaning up after spills is -- and I also learned a little bit about the oil industry because when we went down to the Legislature to testify about the spill, we were -- you know, there was a lot of representation from the oil industry there as well that, at that time, there was an approach to -- oil transport has what they call a zero spill strategy where basically they were just -- invest in the technology to prevent spills from occurring and just invest everything into just believing that no spill will happen rather than investing in reacting to spills and cleaning it up.

4593. And that was one of the things the contractor, I believe, was frustrated a little bit about the fact that we needed to invest in, you know, being -- having the contractors on board, educating governments, educating the community, having spill materials at sensitive areas to be deployed when necessary.

4594. That was one of the problems with the Fas spill was that the boom that was supposed to be deployed was -- they weren't able to do that because the outboard on the skiff that was supposed to tow the boom wouldn't start because they hadn't run any drills in a long time.

4595. So when they went to start the outboard, it hadn't been started in probably a year or two and it wouldn't start, so they couldn't get the boom deployed. So that was one of the other big issues, is that they didn't pre-deploy.

4596. That's -- the navy always deploys -- whenever they transfer fuel, they always deploy the boom. So there's a lot of philosophy about that that I learned about that needs to be addressed when you're talking about the potential inevitability of an oil spill.

4597. **MS. BOYLES:** Why is Suquamish tribe opposed to this project?

4598. **CHAIRMAN FORSMAN:** There's a number of reasons. I think that we are really concerned about the risk -- the increased risk that more oil on a daily basis being put on the Salish Sea increases the risk of oil spills. The more traffic there is, the more oil there is, the more opportunity there is for a catastrophic spill,

whether it be done during loading or if it be due to collisions or breakdowns or all those things that can happen on the water.

4599. As we've learned on our canoe journey, we've -- safety first, and we've had some close calls here and there just in our canoes, just let alone in a big giant tanker. So we're very concerned about that.

4600. We're very concerned about the increased traffic and its impact on our harvesters and their ability to harvest fish or crab or other species on the water. And we're also very concerned about the catastrophic impacts that an oil spill could have on the ecosystem of the Salish Sea.

4601. **MS. BOYLES:** Did you want to leave the Board with any final words?

4602. **CHAIRMAN FORSMAN:** Yes, I'd just like to thank everybody for your attention. I thank everybody's -- I'd like to once again thank our First Nations people for a powerful ceremony this morning on the Fraser River, and I just wanted to leave with the fact that we're all in this together.

4603. We have -- as First Nations and also as our neighbouring family of governments and our citizens and our businesses, we're all in this together and our value system is something that we need to take -- everybody needs to take an assessment of because we really have to get our priorities straight.

4604. And we really feel that this proposal is something that we can't accept because of the way it doesn't recognize the importance of a lot of the resources that are so important to us as Indian people and that we need to really invest in educating people the fragility of our environment.

4605. And we need to think about the future and really not focus so much on the short term because the clean water, good habitat, robust fisheries are good economics as well and provide a lot of jobs. And we can try to work together, invest in technology that can better improve our habitat, lessen our dependence on fossil fuels and work towards trying to reverse the impacts and degradation of our -- of the Salish Sea because right now, we're at a no net loss, but we're trying not to lose any more habitat and we'd like to start reversing that and going back where we're gaining habitat. And we're just fighting for our lives just to -- to stop any more loss and just trying to hold it at what it is, let alone trying to restore what we've lost.

4606. So at that, I'd just like to thank the Board for your attention and the audience for staying with us. O'siem.

4607. **MS. BOYLES:** Thank you. Unless the Board has any questions I can move to our last witness for today.

4608. **THE CHAIRMAN:** The Board don't. I don't think TransMountain have either. So ---

4609. **MS. OLENIUK:** I was shaking my head vigorously and I thought I might be confusing you with mixed messages.

4610. No, we don't have any questions, thank you.

4611. **THE CHAIRMAN:** Thank you, Chairman Forsman, for your knowledge and sharing today. I appreciate that.

4612. So please to go on to your next presenter.

4613. **MS. BOYLES:** I would like to present Ms. Shaylene Jefferson.

4614. Ms. Jefferson, would you like to introduce yourself to the Board?

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MS. SHAYLENE JEFFERSON:

4615. **MS. JEFFERSON:** (Speaking in native language.)

4616. Hello everybody. My name is Shaylene Jefferson. My mom is Serene George and my father was Jay Jefferson. I'm 17 years old; I'm a senior at the Suquamish High School Chief Kitsap Academy. I'm a Suquamish Tribal member. My mother was Suquamish and my father was from Lummi. I come from a family of generational fishers. I have relatives of the Cowichan Nation, something that Leonard mentioned earlier.

4617. I've dug clams, and harvested crab, shellfish, finfish and everything pretty much my whole life. I grew up in that kind of lifestyle. I have my own crab pots and I plan on buying my own fishing gear one day.

4618. I harvest traditional cedar bark, roots, cattails, and I speak the Lushootseed language. I started about my sophomore year and I've been learning Lushootseed for three years. I plan on continuing to learn it, and also I teach Lushootseed. I teach, like, fourth to -- or, yeah, like, four to eight year olds.

4619. I was Chief Seattle Days Royalty. Chief Seattle Days is a Powwow that the Suquamish Tribe hosts. I was the Princess 2013-2014, and also I was the Junior Princess back in 2009.

4620. I participated in the citizen science program with the Seattle Aquarium. That's when we go survey the beaches to find out what's all -- like, all the different species that are on the beaches in different areas.

4621. I was involved in producing a film about ocean acidification that was presented at the National Museum of American Indian in Washington DC. In 2013 I interviewed Billy Frank, Jr., a Nisqually Tribal Elder who fought for years to protect our tribal Treaty rights. Leonard mentioned him earlier; he's been to jail a numerous amount of times for fishing.

4622. I've gone on many inter-tribal canoe journeys in the Coast Salish Sea. I participated in the 2014 canoe journey to Bella Bella. And, yeah, that's about it.

4623. **MS. BOYLES:** And Chairman Forsman talked a little bit about this, but can you tell the Board about the canoe journey a little more; what happens on it.

4624. **MS. JEFFERSON:** During the canoe journey is when the Reservations, we all gather together. We travel along the waters in our sacred canoes. You get to meet a lot of new people along the journeys, like Leonard said.

4625. At every different Reservation they have different ways of preparing their food. We get to go and share how we eat the salmon and every different reservation eats it differently and prepares it differently. We get to share our songs and our dances during the protocol at the different stops that we stop at. And I think that's about it.

4626. **MS. BOYLES:** Could you explain to the Board what it means to you to be part of the Suquamish Tribe?

4627. **MS. JEFFERSON:** For me it is kind of important. I'm a part of the seventh generation. I understand my role in carrying my culture forward in all aspects it. Includes the exercise of my Reserve trading right -- Treaty rights, fishing, hunting, gathering.

4628. In the past our ancestors have fought hard for our Treaty rights, to keep our culture alive and to continue our tribal customs and practices is my main goal, my main -- I don't know how to say it.

4629. **MS. BOYLES:** You're doing great. Do you have any concerns about fishing for you in your future?

4630. **MS. JEFFERSON:** Yeah, a big question that goes through my head quite a bit is will there be fish to harvest for my -- for the future generations, for my children and my grandchildren? I wonder if the shellfish will be edible; if they won't be too poisoned. Will they still be able to eat them? I wonder if it'll still even be economical to harvest the shellfish and the finfish that we do.

4631. I've already invested my own money in fishing gear and crab pots and I plan on getting my own boat eventually so it's really scary thinking just the thought that within the next couple years there wouldn't be fish out there to catch. And we all know that the salmon habitat is declining and that the pollution has a big impact on that, and it has a big impact on our ability to gather the natural resources.

4632. **MS. BOYLES:** You mentioned the film that you were involved in. Could you speak a little bit about that?

4633. **MS. JEFFERSON:** Yeah, me and four other -- three other students from the Suquamish High School last year, we travelled from Washington State to Washington D.C. to the National Museum of American Indian, and we presented our film there in front of an audience and on live news. And it was about the impacts of ocean acidification and the film was named "We Are Aware/Are You?" The reason we went was to raise awareness about ocean acidification and how it's impacting our natural resources.

4634. **MS. BOYLES:** Can you tell the Board your concerns about the pipeline's impacts on the Suquamish?

4635. **MS. JEFFERSON:** Well, with another impact -- or with another oil

pipeline, I know that the traffic will increase by -- I don't even know how much. I know it will be a lot more traffic though, and that'll affect my ability to even access my fishing grounds, or feel safe in my fishing grounds. Tanker ships, they leak and spill oil every time they fuel up and with even more vessels out there fuelling up, every time it adds on the amount of oil and fuel that's spilt.

4636. And if we ever -- if a big oil spill ever occurs it would devastate the Salish Sea and all of the Treaty Reserve resources. Native foods will not be able to be harvested for our ceremonial purposes and subsistence uses. It could take decades to recover, even my whole life. The Salish Sea may never even fully recover if the oil spill is too major. It could destroy the Suquamish culture.

4637. **MS. BOYLES:** What message would you like the Board to hear from you today?

4638. **MS. JEFFERSON:** My generation is facing the future consequences of this project. It offers nothing but the possibility of a devastating oil spill that could lead to the end of our culture, our reserved Treaty rights that my ancestors fought so hard for. Suquamish culture is not only a thing of the past, it's the present day, and it's my future. It's my children's future. And I think that's it.

4639. **MS. BOYLES:** Okay. Thank you, Ms. Jefferson.

4640. **MS. JEFFERSON:** Thank you.

4641. **THE CHAIRMAN:** Again, thank you, Ms. Jefferson for providing your voice on behalf of your tribe.

4642. Is there any closing remarks or is there -- for the presentations for...

4643. **MR. HARRIS:** Thank you. We did start this day with the call of witnesses, including yourself. One of the obligations of a witness is to -- an opportunity to respond is not a -- sometimes witnesses hold their responses for another time, so -- but that's up to the people we've called to witness.

4644. So I would like to see that we at least give the witnesses an opportunity to respond or hold your response for another time. So that one of our customs -- I would like to let you know that's a custom that we have.

4645. So I did call some witnesses here.

4646. **THE CHAIRMAN:** Probably, with respect, our process -- if they are to speak tomorrow, it probably would be a better time tomorrow. I respect the witness, and I also acknowledge the honour you gave me to -- for the blanket ceremony and for the witness today, but perhaps if there are those who are speaking tomorrow, that would be a better opportunity, if I may suggest that, if it's in agreement with the other tribes that are presenting tomorrow.

--- (A short pause/Courte pause)

4647. **THE CHAIRMAN:** Again, I respect your process and in respect of our process, that you would have to be sworn because you're providing your evidence on this matter and who you are, perhaps representing yourself as an individual or a member of one of your tribes. So we'd be happy to hear from you if you're prepared to be affirmed, if that's okay.

4648. And you may have to be leaving tomorrow, and that may be another opportunity that you may not have tomorrow as well.

4649. So we'd like to offer that to you if you're prepared to be affirmed. And we would be pleased to hear from you.

PATTI GOBIN: Affirmed

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MS. PATTI GOBIN:

4650. **MS. GOBIN:** My name is Sq^{w}atalaq. I carry the ancestral name of my great-great-great-grandmother. And I want you to know where her name comes from.

4651. Her name comes from the Pilchuk River that flows into the Salish Sea. My people are the St'qoye people and the Snohomish people. I am Snohomish and St'qoye in English.

4652. I'm also -- I don't say that I'm French. I'm also French Hudson Bay Trader that came to my territory through my father's side. And my brother will be speaking tomorrow.

4653. The reason I'm speaking today is because I'm not speaking tomorrow, but I am a witness here today and I honour my brother here that asked.

4654. I'm also speaking on behalf of my -- I call her my niece. She's from Suquamish. She comes from my mother's side of the family. Her great-great-grandmother was my grandmother's sister, and we just found that out today.

4655. That's how our journeys begin, and that's how our journeys end. She is mine. She's very shy. She was to be a speaker here, but just didn't feel like she's -- her spirit is mature enough to do that yet, so I speak -- I am her voice, and that's very traditional. I am her voice.

4656. I just want to stress from what I've heard, and it was spoken so eloquently here by my leaders, and specifically my young leader here, and this one here that has talked silently to me, that in order for our future to go on as Coast Salish people, we have to be mindful of what we're doing to the Salish Sea.

4657. I want to tell you that, long before I was human, I was King Salmon. That's where I come from. That's my grandfather. That's who I am.

4658. That the cedar tree is my grandmother; and the salmon people always lived, and still live, my relatives, her relatives, our relatives under the Salish Sea. That's my lineage.

4659. As much as the water and the saltwater and the freshwater flows from whitecap to whitecap, this is the life we live. These life ways that were spoken here today is the life we live from the past, present, and to the future.

4660. We're fighting for the future of their unborn children to celebrate, to practise our cultural ways, to have that salmon, to have that clam, to have that -- the crabs, to have the eel grass that provides the bed for our baby salmons. That bed is my bed.

4661. I come from a long line of fishing people, long line. The only reason I cease -- I exist as a human is because my ancestors promised Grandfather, King Salmon, that if he would allow my ancestors to become human, he said these are the three conditions.

4662. And my brother will share those with you further tomorrow about that ceremony, but those three conditions are, he said, as you can imagine, little

grandchildren begging a grandparent, please, we see that the eagle, the yəx̌ʷəlaʔ in our language, has already became human. We'd like to be like that.

4663. And as he contemplated and we sing a song, and in it, it says ahhh chee dash. My grandmother told me, Grandfather King Salmon said, "Ahhh chee dash, ahhh chee dash"; that means "Oh, my, oh, my" because he was concerned about the human world.

4664. He said, "If -- I will let you become human on these three conditions. That every season, you come back here and you sing our songs as salmon people. You dance our dances on the earth, not in the Salish Sea, and show me that you haven't forgotten who you are and where you've from," he says, "because I don't understand English." But this was done in our language.

4665. But that's what he was meaning. "I don't understand this human language that's on earth, on the dry land, but I understand the Salish Sea language." And he says, "So you sing the songs and you dance the dances, and I will know that you haven't forgotten who you are and where you come from."

4666. And we still do that every year, along with every First Nation, every Coast Salish people. We have our salmon ceremony every year.

4667. When the monarch butterfly appears, we begin and we prepare to do that salmon ceremony because our people didn't have calendars. They always said when the monarch -- my people said when the monarch butterfly appears, it's time to go fishing. That means it's time to put down what you do during the wintertime and your winter house, and it's time to pick up and now it's time to go fish and prepare for the next winter season.

4668. And we still do that today as Coast Salish people.

4669. So the second thing he wants us to do, so he says, "When I hear the drums and I hear the songs, I know it's you, my grandchildren."

4670. And so when you hear these sacred songs we sang today, we know and my grandmother told me, "Your ancestors and my ancestors don't see colour." They don't see Keystone. They don't see Tulalip Tribes. They don't see anything. They see us as human people, as spirits, and they look in your hearts to see where you're at, what you're doing with your lives, and are you living according to what your ancestors have raised you to do.

4671. The second thing is, he says, "I want to know how you're treating your people as humans." How are you treating them? Are you taking care of them, are you hurting them, are you harming them? But more importantly, are you respecting them?

4672. The third thing he said, "I want to know how you're treating this earth, the dry land that you're going to live on now as human people". And so every year we tell in our language, in our songs, in our dances, in our sharing with our brothers and sisters that come how we're treating in our area, the Peugeot Sound.

4673. I want to be able to tell them this May that we did it right, that we're doing it good, we're protecting her right to do the same thing until there's no earth left to tear apart or to protect, and that's to eternity.

4674. From time immemorial, our people have been doing these things. We ask you to understand and consider the indigenous people of this land that we still live our indigenous ways.

4675. There aren't, I believe, a people in the northwest that live the way we do with our foods, our medicinal medicines, and we're asking that you think of that when you're making your decisions. Think about our way of life because we have to report to Grandfather King Salmon and our Grandmother Cedar Tree what's taking place.

4676. So I just felt as a witness I had to speak her voice through my ancestors, her great-grandmother -- great-great-grandmother and my grandmother. And the name that I carry is her great-great-great-grandmother. And somebody will carry on these ways long after we're gone.

4677. And we do not support the desecration, the pressure, the imprint of one more thing that harms the Salish Sea. And that's all I have to say.

4678. **THE CHAIRMAN:** I acknowledge your voice, and I'm sure your -- both your hearts must be fuller today from what you have connected -- reconnected today. So I -- my heart's full for you on that point as well.

4679. I think -- are we fine for -- thank you, Mr. Harris.

4680. With that, then, we stand adjourned until 9:00 a.m. tomorrow morning

when we'll hear from the two other U.S. tribes.

--- Upon adjourning at 4:17 p.m./L'audience est ajournée à 16h17

Exhibit 6

Results for the Swinomish Seafood Diet Survey

Summary:
The results are based on interviews with 72 adult Swinomish tribal members in 2004-2006. The data show that the Swinomish people eat significantly more finfish and shellfish than the general population, recreational fishers and even some other area Tribes.

These rates are *suppressed*, meaning that Swinomish people, in general, would like to eat more seafood than they do, but cannot for a variety of reasons (lack of access, abundance, fear of pollution, harvest time constraints). Using suppressed rates with out a disclaimer in environmental standards and regulations could lock the Tribe into creating a false baseline of fish consumption, and thus environmental health, by saying that the waters do not need to be cleaned up more than can support the current fish consumption rates (if the Tribe seeks to increase fish consumption in the future, it may not be "safe" to do so due to contamination).

Table 3. Summary of consumption rates for the consumers of the 72 adult respondents.

Consumption Variable	Number of Consumers	Mean ± SD	Min	25% Quantile	Median	75% Quantile	80% Quantile	85% Quantile	90% Quantile	95% Quantile	Max
Total Seafood, g/day	72	118 ± 136	8	40	80	133	152	186	259	384	674
Fin Fish, g/day	71	49 ± 63	2	15	26	51	62	89	113	156	388
Shellfish, g/day	71	72 ± 113	1	15	34	75	80	100	144	272	587

Table 4. Other WA area Fish Consumption Rate Survey Results (in grams per day, g/day)

Population	Number of Adult Surveys	Mean	50th percentile	90th percentile	95th percentile
General Population (consumers only)	2,853	56	38	128	168
CRITFC Tribes	464	63	41	130	194
Tulalip Tribes	73	82	45	193	268
Squaxin Island Tribe	117	84	45	206	280
Suquamish Tribe	92	214	132	489	797
Recreational Fishers –marine waters (multiple studies)	NA	11-53	1.0-21	13-246	

Exhibit 7

NATIONAL ENERGY BOARD
OFFICE NATIONAL DE L'ÉNERGIE

Hearing Order OH-001-2014
Ordonnance d'audience OH-001-2014

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project

Trans Mountain Pipeline ULC
Projet d'agrandissement du réseau de Trans Mountain

VOLUME 11

Hearing held at
L'audience tenue à

Coast Chilliwack Hotel
45920 First Avenue
Chilliwack, British Columbia

October 23, 2014
Le 23 octobre 2014

International Reporting Inc.
Ottawa, Ontario
(613) 748-6043

Canada

--- Upon commencing at 9:11 a.m./L'audience débute à 9h11

4681. **THE CHAIRMAN:** Good morning. I would ask that perhaps that we stand for a moment of silence today in recognition of the events that happened in our nation's capital yesterday, and out of respect to the family of the fallen soldier.

4682. So with that, I'd ask everybody to stand for a moment of silence.

--- (Moment of Silence)

4683. **THE CHAIRMAN:** Thank you.

4684. Good morning. I don't propose to go through my whole opening statement as yesterday because I think most of you were here yesterday, so you were able to hear it.

4685. We will sit until noon today -- and maybe for the record, those who weren't here yesterday, my name is David Hamilton; I am the Chair of the Panel. Alison Scott is on my left, and Phil Davies is the other Panel Members.

4686. And perhaps for the record, I'd ask the Proponent to introduce themselves.

4687. Ms. Oleniuk.

4688. **MS. OLENIUK:** Thank you, and good morning to the Board. Good morning to Lummi and Tulalip.

4689. My name is Terri-Lee Oleniuk, and I represent Trans Mountain. To my right is my colleague, Heather Weberg; and to my left is Annie Korver, and she's a member of Trans Mountain's Aboriginal Engagement Team. Good morning.

4690. **THE CHAIRMAN:** We'll sit until noon today, and so -- and we'll take appropriate breaks as necessary. And how you wish to present, we will leave that up to you as you provide your oral traditional evidence today.

4691. So with that, perhaps I would ask whoever to introduce your panel. I think it's Ms. Boyles, by the looks of things. And then we can have them affirmed or -- sworn or affirmed, if that's appropriate.

4692. **MS. BOYLES:** Thank you, Mr. Hamilton.

4693. I would like to introduce Deborah Parker, the Tulalip Tribe Councilwoman; Inez Bill, who's a Tulalip Tribe Cultural Resources Specialist; Glen Gobin, Tulalip Tribe Councilman; Dana Wilson from the Lummi Tribe; and you've met Mr. Hasselman.

4694. We can do the swearing in now if you wish.

DANA GORDON WILSON: Sworn
GLEN GORDON GOBIN: Sworn
INEZ MADELINE BILL: Sworn
DEBORAH PARKER: Sworn

4695. **MS. BOYLES:** If the Council is ready, I would like to introduce Glen Gobin from the Tulalip Tribe, Council member.

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MR. GLEN GOBIN:

4696. **MR. GOBIN:** If you don't mind, I would prefer to stand and speak. It's more free.

4697. (Speaking in native language.)

4698. Honourable ones, friends and relatives, my name is Glen Gobin; I'm a leader down at Tulalip and I represent the people at Tulalip; the Snohomish, Snoqualmie, Skykomish, and other the relatives who were placed there through the Treaty of 1855.

4699. I come here today to speak to you about our ways, those things that are important to us as who we are as a people. Tulalip Tribes is made up of numerous tribes that were placed there. In 1934, we took the name Tulalip Tribes, plural, but we represent the interests of those tribes, Snohomish, Snoqualmie, Skykomish. We have the Treaty hunting and fishing rights to those tribes, all signatory to the Treaty of Point Elliott.

4700. Within that Treaty there's a provision that was never given up, it was never negotiated for; it was retained by the tribes in exchange for many things, for

housing, education, health care. The tribes ceded over millions of acres of lands from the tip of Vashon Island to the Canadian border. But they never ceded over their right to continue hunt, fish, and gather in all of their usual and custom fishing places.

4701. You heard testimony yesterday of the Judge George Boldt's ruling, landmark decision, which upheld those treaties and reaffirmed the tribes' right to continue to take up to 50 percent of the salmon, a shared resource, co-manager of that resource. We do not depend on the State for authority to go and exercise our Treaty fishing rights. We write our own regulations, we manage our own resources, and we control what our future is going to be.

4702. I come here today to tell you that I am a fisherman like my father, his father, and his father before him; we're all fishermen. My children are fishermen. I have four children, two sons, two daughters. Three of them fish actively. My grandchildren are fishing with me; they're only two and five. They come with me already on the boat to the beach.

4703. Wherever we go when we're on the water they come with me and we take them and we start to teach them about the ways of the water and how you act upon the water, and most of all, how you respect those things that come from the water.

4704. And as we look to the future we talk about seven generations as we go forward. But to keep it in perspective I ask each of us to remember we were all once great-grandchildren, we were all once a grandchild; we were all once a son or a daughter before we were a grandparent. Today, our job continues on like it was from our ancestors to continue on to teach those things, growing up, never thinking that one day we'd be standing here talking about those things that you were taught, those things that were instilled in you.

4705. Elders, at various times in your life, come to you and they start to instil things upon you at an early age, and you don't recognize it until you get older, your responsibility. That responsibility -- I was tapped on the shoulders at an early to start to learn our teachings, our traditions; learning to fish, to gather, learning to respect those things that come from nature.

4706. Not knowing that I would be here today to speak of that, to be here in a land crossing a manmade border, to a land, where through history thousands of years before, we would come and we gather and we'd share of the resource of the

Fraser River, Stó:lō. Tribes from all over would come and gather in this area to harvest, Coast Salish Tribes. We were one of those, and we still continue today.

4707. The message that we bring is one about our people and who we are as a people and what's important to us, and what's important to us is our way of life. The Elders have handed us down teachings through the years that bring us to this point, that bring us to realize again who we are once more and what we feel is a tipping point, a tipping point for the future.

4708. I tell you that our people had ceremonies for everything and recognizing things that come from nature. Our homes were built from the cedar trees. Our transportation, our canoes were built from the cedar trees. Our sustenance was gathered from the sea. As was spoken yesterday, when the tide was out the table was set. And as a young person, I got to grow up and experience that, growing on the beach, beach seining, spending the summers down there.

4709. There were many days we didn't even bring a lunch. The fish you caught, you filleted up and you cooked on a stick on the shores. The crab you caught was brought up and cooked and boiled in a pot on the shores. The flounders you caught were either baked on the fire or boiled in with the crabs.

4710. That's how we lived. We knew where the water pools were on the beach. We knew where the waters would seep out of the bank and you could dig it up and get clean water that would come out. These are all things in my lifetime, and I don't think I'm an old person, but it wasn't that long ago.

4711. Not that I like to brag about it, today is my birthday. I'm 58 years old. These things I grew up learning. My grandmother lived with us for many years. My grandmother was a product of the boarding school. My grandmother knew people that signed the Treaty. That's the connection. When we keep things in perspective, what seems like a long time, when you put it in life application, it's not that long ago. So much has changed in that short period, so much has changed, but yet our people still try and sustain our way of life on the water, and we've been able to maintain that.

4712. We had a ceremony if we fell a cedar tree, songs, prayers that were sung before anything took place there, recognizing a life that was going to come down. If we went hunting, you prepared yourself in a spiritual manner, and if you were lucky enough to harvest an animal you gave thanks for that life, you gave

thanks. You took what you needed and you recognized that and you gave thanks.

4713. Today, I lead what we call our salmon ceremony. It's the first returning King Salmon. We call him hikw siyab yubəc, Big Chief King Salmon. I lead this ceremony. It was almost lost, and it was in 1976 that the Elders gathered together and they remembered things that either they had witnessed or things that they were told of how the salmon ceremony went and what its purpose was.

4714. In 1976, they gathered together and they revived, they brought it back and we practise it every -- ever since.

4715. But even before that, our teachings were whenever we went out and you gathered and you got that first salmon that came back, the first one was always shared. You had a salmon bake. You invited guests, relatives, your friends, your family and you fed them, you shared, you rejoiced in that.

4716. So when the salmon ceremony was revived, it gave strength to what we've always done. It gave the connection again. This is what it's based in. The first returning king salmon, he's a scout. He's a scout for the salmon people that live out west in the ocean.

4717. You heard my sister talk yesterday briefly that we were once part of the salmon people. Even today at Tulalip, we are known as the salmon people. We were once, before we became human and came to the land, we were part of that family. These are our teachings. These are our stories. These are the oral traditions and oral teachings that continue to be handed down.

4718. So when hikw siyab yubəc comes, we start to prepare for him. We know that he's coming because we see things in nature. Again, my sister said the monarch butterfly, the black and yellow butterfly, his name is yuyubəc. Yubəc is the king salmon. Yuyubəc is the indicator, the butterfly that comes.

4719. Before the butterfly comes, the salmonberry starts to bloom and come out. We call them stəg^{w}ad is the salmonberry. We start to prepare. We know to get ready. But it was when yuyubəc comes that we know the time is right.

4720. When our visitor comes, he comes by canoe and we gather and we go down to the beach and we greet him and we start to drum him in, bring him back into the longhouse. We give him a place of importance. He leads the way.

Nobody goes in front of him. We show him that respect. We start to honour him as he comes.

4721. We announce him to our visitors. We announce him to the people as we enter the longhouse, and we come in and we announce him at each corner of the longhouse, addressing the people, acknowledging.

4722. When we're done there, we do songs and dances within the longhouse rejoicing that he is here, our visitor is here. We take him up into -- and share a meal. And today's salmon ceremony, when we do this there are 1,000 people that will show up.

4723. Some say they come for a -- to witness a performance. Some say they come for a free salmon dinner. We hope that they come to experience a ceremony that we do because for us, it is not a performance. It is a ceremony. It's recognition of the gift that's coming from the water, and we share.

4724. We all share a piece of that first returning king salmon. On the plates we all have a small piece of fish and there's a clear glass of water and we all share the first bit together. We eat that piece. We share hikw siyab yubəc all at once and then we drink the water. And the water represents the purity of life and also the life-giving waters from which it comes from.

4725. We take his remains when we're done. He's all filleted out; he's still all intact. We've only taken the flesh off. He comes back out, he's covered in cedar boughs and salmonberries and ferns, and we drum him back out and we bring him back down into the longhouse. And our teachings are -- is that we now are going to recognize and share him with our ancestors that are on the other side. We do what we call we'll feed the fires, sending that to the other side.

4726. When we're done there, again, we take him out, we bring his remains out. We load him onto the canoe and we sing hikw siyab, hikw siyab, Otokuit siyab. We sing him all the way out of the bay, "Farewell big chief, have a safe journey home."

4727. When they get out to the middle of the bay, the canoe stops and they release his remains back pointing west towards the salmon village to aid him on his journey in hopes that our visitor will tell his people that the Stó:lō people, the Tulalip people were good people. They honoured him. They respected him. They recognized the gift that he was going to bring. They gave thanks for that

gift and returned him back, and he will send his people to come and take care of us through the remainder of the summer and into the winter.

4728. And our people recognize that. These ceremonies that we have are about our cultural teachings of who we are and respecting where our gifts come from, from nature, from mother earth.

4729. So much is changing. Today, we hear about things of global warming. I was thinking of this last night and I was thinking that it wasn't long ago that people were saying global warming was secular. It really -- it's going to change again. I don't hear that argument any longer. I don't hear it the same way. secular

4730. The glaciers are melting, water levels -- fresh water levels are decreasing, sea level is rising and there is not one single source of pollution that you can point to that said you did it. It's the cumulative effect that we have of not recognizing what's happening to Mother Nature.

4731. We, as Indian people, Coast Salish People, we believe that we are the voice for Mother Nature. Mother Nature cannot tell us what's going wrong. She can give us indications, but she can't speak the same way that we do. We have to be that voice. We have to recognize that.

4732. When we talk about this pipeline that's coming across, crossing many rivers, wetland areas, much of it seeping, draining down into the Salish Sea, we talk about the shipping impact, the ships that will be coming and going through our waters. We are on the U.S. side.

4733. As Tulalip people, we have no treaty with Canada, but yet we partake in the Pacific Fisheries Management Council. We partake in management of the Fraser River and the harvest as tribes. We take an active role understanding the run sizes, harvest rates and how we're going to share this resource. So even though there is no treaty connection, there is a connection. We do have impacts.

4734. We come across this man-made border and the potential impacts that eventually will happen -- we believe wholeheartedly will happen; it's just a matter of when -- will know no boundaries. They will know no borders, and they will travel -- those impacts will travel freely through the Coast Salish Sea. Coupled already with where we -- where the sea is at, in my lifetime I would have never anticipated seeing signs "this beach closed due to pollution", "this beach closed to

harvesting", "this beach closed to swimming", just to swim. The thought was that there is enough water there it will -- whatever enters it will be diluted, you won't have to deal with it. It will be mixed in and you won't -- it won't amount to anything. That's not the case.

4735. The cumulative impacts are having devastating impacts upon our way of life. The shipping that will come to increase to 34 ships is actually 68 because 34 is only the loaded ship; it has to come in empty. So for a fisherman, the impacts are 68 ships travelling in and out now, when it was four or five.

4736. And you say, "Well, they can stay in the traffic lanes, in the shipping lanes." When you're out fishing and you're harvesting out in the deep water, the fish don't know traffic lanes. They don't know the borders, they sure as heck don't know the traffic lanes. They don't know where they shouldn't be. And so fishermen have to harvest where the fish are, and oftentimes it will be in traffic lanes.

4737. We used to fish five to seven days a week. Today, sometimes we fish for four or five hours, that's the opening. To set your net out and risk it being run over by a ship, you can't do. So you have to wait. I have a four- or five-, six-hour opening and now I wait an hour for a ship to come and go. I can't set where the fish are running.

4738. We feel it as a taking; a taking of our opportunity, a taking of a Treaty right for us to harvest in these areas which we've always harvested in.

4739. The biggest threat we have, though, is what it means to our future. What does that mean for my grandchildren if a spill happens, a catastrophe happens, if I no longer can sustain my way of life? The effects that happened in Valdez with the Exxon are still being felt; it is not come back to the way it was.

4740. The impacts are long lasting. The product that will be shipped, there's no real evidence as to what's its impact will be in water, let alone saltwater. There's no real assessment for how it will be cleaned up.

4741. And we talk of opportunities. Opportunities -- economic opportunities of here. Do we build an economy around potential spills? Do we become oil responders? Do we trade our way of life to be oil response economies making money off the devastation that will take place? That is not the vision that we have for the future.

4742. Ours is one that will continue to gather in the way that we always have. To continue to be on the water that sustains who we are inside.

4743. Yesterday I was fortunate; I was at the water blessing ceremony. But like I said, I'm a lifelong fisherman. And when I say that, I've been a fisherman my whole life. And some will say, "What does that mean?" I literally have been fishing since I could row a boat and I've been on the water before that. But since I could row a boat, we were fishing and have done so ever since.

4744. Yesterday I had the opportunity to get on the river and go out and witness the fishing that was taking place.

4745. To see the families gathered at the different spots along the river, to know exactly what they were feeling inside, to see a whole boatload of a family on one boat, travelling upriver to where they're going to set. I know that feeling. I know what it's like to be on the boat with my father, my brothers, and my children, all harvesting at the same time. I know what that bond is, I know what that means. I know the teachings that come from that. I know the teachings from the eldest and the learning from the youngest. I've experienced it all.

4746. And I could feel that on the river. I could see that taking place in the midst of all the work and all the joy, I got to witness a good set. But I also saw sets with very little.

4747. Those feelings are who we are. Those feelings are deep inside us. Those feelings have been handed down to us and it is our job to hand that down to the next generation. We are here today because of those teachings. Will we be here tomorrow if we lose what is so sacred to us?

4748. The threat of the potential spill in the Salish Sea is unacceptable to us. It is unacceptable to risk our way of life any further. Today, we have the most advanced technology at any time in human history. Today, we have thousands of years of firsthand experience and knowledge of how to treat Mother Earth. And today we are still talking about putting it at risk.

4749. We've seen factories change and how they did business in India when they're producing chemicals. We've seen industry change within the States when they dealt with things like asbestos, and that it was going to hurt the industry and shut it down and the economies were going to fail because you had to deal with

asbestos. We did not fail, we changed. Regulations came in to deal with things in a responsible manner. Today it's not used in the same way. Today, it's still getting cleaned up, you're still dealing with it.

4750. We do not want that to be the case with these oils that get shipped in these tankers, these massive tankers.

4751. I know these waters where these ships are going to travel. I know they are a narrow passage. I know there are shallow points. I know it won't take much for one to tear open on the bottom, to be grounded. And I know the currents in these waters, and they move freely back and forth and they are not slow moving; they are fast moving. The pollution will spread quickly and disperse far and wide. With the massive amounts of capacity in these tankers, the threat is too much.

4752. We cannot express enough what that threat means to us of who we are, who we have always been and who we will continue to be as long as we have the sea to be able to go out and harvest. And it's not just salmon, it's the shellfish, it's the animals, it's the birds, the seabirds. My Elders would talk of hunting ducks. They weren't necessarily talking about mallards, migrating birds, they were talking about the black sea ducks. Those were the ducks that they cherished most.

4753. The killer whale that depends on these waters, the killer whale is the emblem of our tribe. Some will say, "How can that be because you're the salmon people and the killer whale eats the salmon." We have a connection. In our language, he's qal'qaləxič.

4754. He saved our people. Our stories tell us of a time when the seals had encamped in the mouth of the river, and they were eating all the fish, unfortunately much like today, but they were eating all the fish. And the people began to cry and wail. They were starving.

4755. And the killer whales, they heard the pleas of our people and they came in and they devoured the seals, throwing some up on the shore, chasing others away. And they drove them out. And they went out and they gathered up the salmon and they drove them back into the shallows for our people to gather once more.

4756. Today, we still honour and respect that. Today, we still have that

connection with the killer whale. We are bound together through that.

4757. We tell these stories because ours is an oral teaching. Ours is an oral history. Our Elders told us that we travelled far and wide with the canoes up and down the Coast Salish Sea, well into Canada, well below the tip of Ashland Island.

4758. One of our people, his name was Washkalatchi. He was actually a guide. One of the early explorers that would take him well into the mouth of the Columbia River and well of this manmade border north here. How did he know these things? Because they travelled these areas. They knew the trails.

4759. But none of that would be valid, none of that would be good enough, our stories, our legends, unless it was validated through some, I'll say, non-Indian process.

4760. The documentation that our people, Sdoh-doh-hohbsh people, were seen well into Canada, it's documented in trading books, well below the Vashon Island area. It's documented in trading books. Then it became valid.

4761. But I should also validate our teachings, our oral history that we share. They're founded on the same things; we travelled far and wide, we lived off the land.

4762. In a canoe, you could not pack enough resources for a month-long trip. You lived off the land, off the sea as you travelled.

4763. We still do that today. That threat to the Coast Salish Sea and who we are again is unacceptable. We cannot afford to take that risk. With all that is happening within the Coast Salish Sea, all the pollution effects, the combined impacts we cannot add any more. We need to be protecting the seas in a more responsible manner.

4764. And we stand here as Coast Salish people, First Nations, Northwest Tribes protecting our way of life. I question who is questioning for the rest of the people. Who is looking out for the other users of this land?

4765. The same air, the same water, the same fish, the same everything in this area will have the same impact on everybody, but for us, it's our way of life.

We cannot just pick up and move to another country, move to another State, move to another area and think that you will be the same. We are tied to this land. We are bound to this land. We were bound to the water. It is who we are. We are a fishing people.

4766. So again, I thank you for the opportunity to come and share some of our teachings, what's important to us, what we need to continue to survive, to go forward. And it isn't dollars. We need water; we need clean water, land that's usable, and clean air to breathe. We need all of these things.

4767. Thank you for taking the time to listen to us, our concerns. And I just pray for wisdom and a good decision to come forward that protects all of us, all of our interests in a good way. O'siem.

4768. **MS. BOYLES:** Mr. Chairman, may I introduce Ms. Inez Bill.

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MS. INEZ BILL:

4769. **MS. BILL:** Good morning. My name is Inez Bill. My Indian name is See um tonat, which is on my father's side, who is Lummi. My other name that I carry is Quilsimia, which is on my grandfather's side.

4770. And I want to first acknowledge the people of this land, the First Nations people of this land and their ancestors.

4771. I'm here to talk about the teachings and values of our people. These teachings and values are shared with all of the people of the Coastal Salish nations. You can go to another tribe, another nation and hear the same teachings of respect, of taking care of the resources, honouring the resources because they nourish our bodies. They're the medicine that we need, and these are the natural environment is what helped our ancestors survive. They were as one.

4772. I think that a lot of times, it's hard for the people to understand who we are and what we carry. We carry a spirit unlike any other race. And this spirit is a spiritual connection to our land.

4773. This connection helped our people survive, and that's what we're trying to do here today. I pay tribute to our ancestors every day for their wisdom, for the connections that they had, for the life that they gave us to be here today, that we're

not different. When we travel into other nations' areas, we're connected with them, with every nation because we share the values and the teachings.

4774. We have ceremonies that we share together. We participate in canoes, which also in everything in the life ways of our people, we have teachings and values that govern the way of our people.

4775. So when we travel to Lummi, when we travel to this area here, we hear the same teachings and values. It's an echo, and sometimes when we're teaching our young people and sharing these teachings and values of respect, honour, and taking care of the things that we use, we hear it in Lummi. We hear it here with the nations here. And this environment and this connection that we have is a strong connection.

4776. And we still carry that today. It's something that our people will want to carry on for the future, future generations. Our prayers are united here with this. And when I first found out about this, I began to pray.

4777. A lot of prayer went into this and a lot of prayers are coming in from all of the other nations, and my question is, you know, as much as people are not having a hard time understanding us as Native people, I wonder myself as a Native, why would we consider on doing something like this, something that could impact our fragile environment, something that will take away from what we have today because all of our people believe that the water is sacred.

4778. All water is sacred; the saltwater, the rivers, the streams, the lake, the rain. We need this water and when we look for prayer areas, we look for the clear, clean water, the areas that are pristine, and we share our prayers with the water.

4779. There are a lot of gifts that the sea gives us and shares with us and provides us, and a lot of ceremonial things that come. This fish and the sea life and everything that water provides us not only nourishes our body, it feeds our spirit.

4780. When we have ceremonies, there are a lot of things from the sea that's gathered for the ceremony and the land, and we share that. We say our ancestors partake before our visitors and we partake. So we're honouring our ancestors. We're honouring the people that we have called to gather together.

4781. I say now, and I've said this past year, that I cringe and do not look forward to the day that we gather people and we don't have the foods to share with them, the foods of our people, the foods of our ancestors, that we don't have them there available.

4782. It's devastating to think that our people will no longer have the foods that nourish our spirit and our bodies. They're that important to us. This water is that important to us; it's sacred.

4783. I thank everyone for listening today, and I pray that decisions are made that will help this fragile environment of the water, the water that is sacred to us, the water that we would love, we need to and want to continue this way of life for future generations, this way of life that's -- for us, that's built on traditions and teachings and values and remembering our ancestors today and carrying them forward into the future.

4784. This is very important to us. There are times where I feel that when we talk to people outside of our own ʔaciɬtalbix^{w}, our Indian people that they think that we're emotional. It's an emotional issue.

4785. This is not an emotional issue and we bring -- we do our best to explain who we are as a people, but people don't understand that what we have here, what we learn here is kept here. It's not the Western -- the Western way of learning is through our mind, but we have a spirit that we share, that we keep things here in our heart.

4786. These teachings and values are important to us and it's more than -- it's a way of life. It has nothing to do with economics.

4787. And I thank Glen for the words that he shared and my relative from Lummi, and the people that are here today. Thank you for being here and supporting this and, as we came into this -- this travel here, I knew that I was not coming to a place that I'm intruding on an issue because I've come here as a young girl in growing up for ceremonies, and, likewise, people have traveled to where I was for the winter ceremonies.

4788. I've participated in canoe racing and canoe journeys where we come together as one nation. The stick game, all of these things kind of sounds recreational, but everything in the life ways of our people, we all follow teachings and values, and it's important that we are able to continue that.

4789. Thank you very much.

4790. **MS. BOYLES:** May I introduce please Ms. Deborah Parker.

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MS. DEBORAH PARKER:

4791. **MS. PARKER:** (Speaking in native language.)

4792. Good morning. My Indian name is Tsicyaltsa; it's my grandmother seven generations back.

4793. I am here today representing my people, the Tulalip Tribes. I am here today with my family. I am here today with my ancestors.

4794. I want to give thanks to the people of the Stó:lō Nation for allowing us to come upon their land and to speak the words of our people, to speak the words of our ancestors. I want to thank the speakers before me who laid the path and drummed us in so that we could be with one heart and one mind.

4795. I want to thank the ladies who gathered the x̌paẏ̓ac, the cedar, so that we could speak our truth and be rooted in this land as well.

4796. I want to thank the Creator for bringing us all here today as we sit in this room because we're all here -- we're all here for an understanding. We're all here to make a decision.

4797. And I know in each and every one of our lives each day we make decisions. As a tribal leader, I have to walk into my Council room and make the most important decisions of not only my life, but the life of our people.

4798. And I say as a younger person that I too have just had a birthday. So I'm getting up there.

4799. But each and every day, it weighs heavy on my heart. And I wonder day to day if I'm strong enough to carry these teachings as you've heard from Ti chut, Glen Gobin, and Quilsimia, Inez Bill. These are my teachers. I wonder if I'm strong enough and if I'm in the right place.

4800. But as I sit here today, in this exact moment, I'm reminded of a dream I had when I was a young girl. And in that dream, I was in a room much like this room here today. And it shakes me up because -- shakes my spirit because I dreamed of these words that I'm going to be sharing with you here today. And in my dream, I said the Burrard Inlet, and I never knew what that meant until today.

4801. You see, I'm a mother of three beautiful children. My son's name is Cedar. His Indian name is Scaluús. He carries the warrior name of his father. He shares it with his father, Ruben George, from the Tsleil-Waututh Nation.

4802. My daughter is Kaia George. Her Indian name is Haliyia. She carries the medicine name from her grandmother, Amy Marie George, also from the Tsleil-Waututh Nation and the Squamish Nation. I have a son, Wetuah. He's four and a half years old. He comes from the States side. He's actually Paiute-Shoshone. But these are my children, and as a life-giver I have decisions to make as a mother as well.

4803. And I only hope and pray when I come into the office, when I walk into our Council room, that the decisions and the laws that I create for our people not only honour generations back, but I want to honour those generations before me, my grandchildren, their grandchildren and seven generations forward.

4804. I want to ensure that not only our lands of the Sdoh-doh-hohbsh Territory, the Snohomish peoples are protected and safe and that our fisherman can go out into the waters and catch our salmon and bring that salmon home to our tables so that we can feed our Elders, so that we could feed our children, and so that we cannot only sustain our way of life, but so that we could pray with our brother salmon, as Ti chut had mentioned.

4805. These are our history. This is our way of life. These are our values. These are our core teachings of who we are, not only who we've been but who we are today and who we will be in the future. These are the teachings that I give my children.

4806. Some of these teachings, they feel really conflicting sometimes because we're taught we're stewards of the earth. We're taught to protect the very resources which sustain us, the gift of life. But as a mother, I have to ask myself how I'm protecting these -- not only these teachings, but how I'm following through with my actions.

4807. When I mentioned the Burrard Inlet, I now know today and at this moment what that means. When I met my husband at the time many years ago, I moved to the Tsleil-Waututh Nation, and I remember looking out the window and looking at the Burrard Inlet, how beautiful it was.

4808. I listened to the story of their people and how the canoes raced in the waters, the champion canoe pullers, of how the Tsleil-Waututh people did the same thing that we as Sdoh-doh-hohbsh people do, we as Tulalip people do. We go to the waters. We dig clams, catch our crabs. We feed our children, we feed our people.

4809. But as the stories continued, my mother, Haliyia, said, but we don't do that as much today, and I asked her why. She said the crabs, they're now polluted. We can't go out there and dig as we once did.

4810. And it made me sad because she got that, my children's father got that, but now my children don't get that. And that -- to me, all I can think of is that, to me, is a crime. That, to me, is devastation of not only our way of life, but all way of life.

4811. It's a devastation to the crab, to the salmon. That's their habitat. That's their world, and we've infringed upon their world. We were taught to give back and take only what was needed, but at this point we've taken too much.

4812. And as a mother, I'm wondering what should we feed our children. I want my children to live in a life, as my Elders here have mentioned, on the waters free from that distraction. And I wonder if we've come to a point where we've come too far.

4813. My children as well, they have participated, as many of our children have, on these very sacred waters down the Burrard Inlet, into the bay, onto the island where my great-great-great-grandfather lived and my grandmothers, the East Saanich and Cowichan people.

4814. We've pulled down on the waters towards Lummi Bay, where my grandfather is from, into Tulalip Bay, where my grandmother, who's Snohomish from the Snohomish Tribe, we've pulled into those waters where, me, I feel at home. That's my home. That's our home. That's the home of the medicine people. That's the home where our healers come from.

4815. And as I'm reminded by the name I carry, that is my role now as a young woman, to carry that medicine, to share that medicine and to take care of our world, our spiritual world, which encompasses everything about us from the salmon to the wing to the eagle to the qal̓qaləxič, that orca whale, black fish as we called it. To take care of the deer.

4816. But also very important in our roles as women, as Coast Salish women, is to take care of the rooted, to take care of our cedar tree and everything that comes with it, our huckleberries, our wild blackberries. These are all a part of our life. This is the medicine that we bring to our tables to feed our spirit, to feed our children, to feed our Elders.

4817. I am concerned about the devastation. I am heartbroken in what we have done. And I say we because it's up to each and every single one of us to protect the land. And I would say it's in the name of humanity that we protect. It's in the name of our Aboriginal teachings that go far and wide.

4818. We talk about these connections because it truly is who we are as a people. These connections run deep and they run far.

4819. And yes, I wish I was home today because my kids had to wake up without me. They had to go to school today because they hope to get into school, a good college, where my daughter wants to be an environmental attorney. She wants to fight on behalf of the laws.

4820. She's not decided whether she'll go to a Canadian school or an American school, but one thing you can be assured is she is going to be the best fighter for the way of our life, for our Aboriginal law that supersedes these borders.

4821. My heart hurts for those bands, the territories where they have to participate in this process where they have to be a part destruction of the land. We know this; that commerce is a part of -- we have to feed our people, not only from the land but we also have to sustain a life, a livelihood.

4822. My heart hurts for those Nations that have to participate in this because I know that’s not where we come from. And I too send my prayers not only to our people but for all people. I pray that we all stand together. One of our Elders has taught us that when we link arms with each other, we stand united.

4823. And I ask you, each and every person in this room, that you stand with us and that we lock arms. We are not enemies but rather a people who must live together, work together, and breathe together.

4824. These are our sacred teachings. These are very powerful teachings and I hope and pray that we don't create and add to the destruction. I hope and pray that you hear these words in a good way; that we stand united; that we protect not only ourselves and our children but we protect the environment and those animals, and the fish, the winged, the four-legged, all of these beings who breathe with us, who partake and drink of the sacred water. They're not just stories but this is the breath of life. This is our way of life and I truly -- I raise my hands and I say (speaking in native language).

4825. I thank you for coming here with open ears and open heart and a clear mind to hear these sacred words. I ask you, as a tribal leader, and as a mother, and as a grandmother that you please help us stop this destruction, and that you make the best decision that you can for the sake of this next generation.

4826. O'siem. (Speaking in native language)

4827. **THE CHAIRMAN:** Perhaps this would be an appropriate time to take a brief break? If that's the case then we'll take a 15-minute break and we'll come back at twenty-five to eleven, if that's fine.

--- Upon recessing at 10:19 a.m./L'audience est suspendue à 10h19
--- Upon resuming at 10:39 a.m./L'audience est reprise à 10h39

4828. **THE CHAIRMAN:** Thank you, welcome back.

4829. Mr. Hasselman, I understand.

DANA GORDON WILSON: Resumed
GLEN GORDON GOBIN: Resumed
INEZ BILL: Resumed
DEBORAH PARKER: Resumed

4830. **MR. HASSELMAN:** Thank you.

4831. Before we call our last witness we wanted to see if there was questions for the Tulalip witnesses?

4832. **THE CHAIRMAN:** I see none from Trans Mountain. If you can just give me a second, thank you.

--- (A short pause/Courte pause)

4833. **THE CHAIRMAN:** I apologize. I sometimes need some reflection time from all of the voices we heard this morning.

4834. Perhaps, Glen, we're trying to get the -- you mention the -- and I know it was mentioned, perhaps yesterday, and if I've missed the connections yesterday on the Pacific Management Council and the management of the resources knowing that the salmon don't know where that line is that -- the geographic line between our two countries,. Is there any -- is the Pacific Management Council and the management of the resources joint? Is that the one that was referenced yesterday in -- I was just trying to -- if you could maybe expand a little bit on that if you wish, on that aspect of it.

4835. **MR. GOBIN:** Yes, as a managed partnership. It's the Pacific Salmon Commission and they work together gathering the information and then they set the season, what the opening is going to be, do the projections, and any adjustments in season as well.

4836. **THE CHAIRMAN:** And is that within the State and federal, or is that also with the Canadian authorities as well?

4837. **MR. GOBIN:** It's what the tribes, the State and the Canadian Fisheries as well.

4838. **THE CHAIRMAN:** So that's the tribes and the First Nations on both sides of the boundary are involved in that, as well our -- I assume somebody in the Canadian government, the province and the government. Because there was some reference to it yesterday on the aspect of the three -- six partners in that, so...

4839. **MR. GOBIN:** Unfortunately, I'm not sure of the Canadian First Nations but we can certainly address this in writing.

4840. **MR. HASSELMAN:** It's our intention to provide additional, more technical evidence on the management of fisheries, in writing, at an appropriate stage.

4841. **THE CHAIRMAN:** That's fine. That would be the appropriate way to do it then.

4842. Well, that's fine. That's all the questions I have at the moment so we'd be quite prepared, Mr. Hasselman, to proceed with the Lummi presentation.

4843. **MR. HASSELMAN:** Our final witness is Dana Wilson from the Lummi Nation, and I'm advised that today is also Mr. Wilson's birthday.

--- (Laughter/Rires)

4844. **THE CHAIRMAN:** There must something in the air that you guys breath down there because you all look very young for your respective ages, so good fresh air and living on the ocean must make it for you.

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR MR. DANA WILSON:

4845. **MR. WILSON:** Good morning. My name is Dana Wilson. I'd like to thank you for this opportunity to speak with you this morning.

4846. I'm from the Lummi Tribe. I've been a fisherman all my life. My Indian name is Negatsie (ph), that comes from Qualicum on Vancouver Island and I carry my father's name, Claxton (ph) that comes from the Gulf Islands, the Kuper Island. That's how closely our relation is to these -- to the other tribes.

4847. My grandfather moved down to Lummi and married my grandmother down there. That's how I ended up in Lummi. But that's the ties that we as tribes and First Nations are so closely related, especially with Lummi; we carry the same songs, we carry the same dances, we carry the -- we speak the same language.

4848. And to get to the fishing side of this, I'm a commercial fisherman. I've been a commercial fisherman all my life. It's all I've ever done. My father was a fisherman, his father was a fisherman, and his father was fisherman. My son is in the industry, he's fishing now on his own. My grandkids fish with me.

4849. I have 11 grandkids, nine boys and they -- that's the way of life that we teach our children is the water and the way to fish. In our language it's called

a Shelangen, the way of life, the way of the water.

4850. You know, I'm a direct descendant of the signing of the Point Elliott Treaty and my father was born 1925. He was born on a beach on San Juan Islands in a fish camp. One of the last -- probably one of the last Lummis born on the islands. And this is pretty emotional for me to stand here and speak about who I am and what I represent for the tribe because, you know, it's such a way of life. As Glen said, it's such a way of life for us to be on the water that Lummi and the other tribes, that's how they were grown, that's how they were taught, that's -- their grandfathers have taught them that way.

4851. Lummi is -- probably has one of the biggest fishing -- Native fishing fleets in the world, probably is the biggest fishing fleet, Native fishing fleet, in the world. But to get back to -- I just came in from fishing yesterday. I got pulled off the water to be here, actually, you know.

4852. And Glen and I have just been speaking about how things have changed since we've been in this industry and -- fishing industry, and the areas that we've lost in our lifetime, not to mention the areas that our parents have lost. And that's why I'm here, is what -- what is my grandkids going to have to look forward to? How much area are they going to be able to fish and gather, and fish crab, prawns, halibut, all these things that we fish as a people?

4853. How much -- we're losing, losing, losing every generation. And what is going to -- what are we going to have left for our future generations if we don't start managing and watching where we're at and which we're going and what direction we're going in this.

4854. You know, I would like to speak on some of my experiences on the last week of fishing, if that's all right with you.

4855. I spend half my time watching for ships, half my time fishing and the other half of my time on talking to Victoria Traffic trying to get boats around my nets, around my gear. I started fishing in Point Roberts out of Tsawwassen up on the apex there in the early seventies.

4856. It was kind of like the end of the world back then. There wasn't -- there wasn't any ships hardly around there, you know. But today, it's like trying to fish on a freeway.

4857. And back then, it was like fishing in a green pasture. It was great. It was beautiful. It was relaxing. It was -- but it gets pretty overwhelming having a 200-tonne ship bearing down on you. You don't know which end of your net to run to. You don't know who to -- or you don't know whether to let go and run or sit there and keep talking on the radio and make sure that they make it around you.

4858. This is real-life stuff. I live it. Glen lived it. It's not -- we're not here making this up. This is real.

4859. And with these ships that are going to start -- if there's another -- I don't know how many more ships coming in?

4860. **MR. HASSELMAN:** Four hundred and eighty (480).

4861. **MR. WILSON:** Four hundred and eighty (480) ships coming in. They're not going to care who I am or what -- you know, it's not even about the catastrophic -- it is about the catastrophic pollution and if there's a catastrophic spill. But you know, I -- you know, sometimes I'm afraid for my life, and other people.

4862. My son, I said, “I'm going to go up and speak to the Energy Board tomorrow. Can you take my boat out?” He said, "Dad, I'm not going out there at night with those ships.” That's exactly the words he said.

4863. So I've -- used to do a lot of fishing down further south on the Salish Sea in Georgia Straits. We lost a lot of area down there because of oil tankers. I can't fish in that area now because of BP, Arco, and Telco. All three of those docks are in there, and the ship traffic has increased tenfold since I was a kid.

4864. That area is -- you can't fish there anymore because it's just -- you just can't do it. And as -- to give a little history on Point Roberts is where Lummis, other tribes, Canadian tribes used to gather in the 1800s. That was their main fishing ground to gather fish. That was their income. That's what they traded.

4865. You know, there's documents of canoes going up from Point Roberts going up the Fraser River. You know, they're counting 100 canoes at a time loaded with sockeye to go trade at Fort Abbottsford.

4866. That's just the history of -- a little bit of the history on how important

that little neck of the woods is to the tribes. And that's all we got left.

4867. We got new container facilities going in at Tsawwassen. Those ships are coming out of there daily. You know, you got the coal. We got the coal dock there.

4868. These ships used to be small ships I watched come out of the coal, but those ships are getting huge. They're getting bigger and bigger, heading for China twice a day. I watch it.

4869. One ship comes in, another one loads, he's gone. And that's my real concern, is that I don't know if there's -- where else -- we don't have any place else to go. We fished this area -- I fished this area with my Dad since the sixties, started on my own in the seventies.

4870. And you know, Glen and I have been talking a little bit, and what do our grandkids have to look forward to? Are they -- they're not -- are they going to have the same opportunities we had? I don't think so. I don't even think I have the same opportunities my Dad had.

4871. And to give a little history on the pollution in the Gulf of Georgia, it used to be one of the biggest herring fisheries on the west coast, but that -- those herring have been gone since the eighties. Nobody -- scientists can't figure out what happened to them.

4872. You got to realize that the herring is what feeds everything, the whales, the salmon. You know, you start killing off the environment, then we're going to start killing off the mammals, the fish. Then we -- we won't have anything to argue about.

4873. You know, that used to be -- we used to do that herring fishery as -- I remember doing that fishery in high school. All my friends, we'd get let out of school for two weeks, we'd do that fishery, go back to school. But you know, nowadays I can't even explain it to my son how that was.

4874. You know, where I fish now for halibut is right at Saturna. It's right at the corner where they turn between Patos, Patos Island and Saturna Island there. There's a light there, and that's where I fish halibut. I have to fish them in the traffic lane because that's where they are.

4875. And I've watched these ships come around there on a daily basis, especially one that's trying to overturn another, you know, pass another one. They don't stay in the shipping lane. I watch them. They don't -- they've got schedules they've got to keep.

4876. They overpass each other. You know. if one is slower than the other, the other one is not going to slow down. He's going to pass it. And you've got three ships there all at once. They've got -- one has to go way out of the shipping lane and that's where you've got to stay -- you know, you've got to really keep a sharp eye and a sharp ear and try to fish at the same time.

4877. You know, at night we can't fish in those same areas because it's so scary in those areas you can't -- you can't fish at night. So you've got to move in further towards the -- but that fish -- you know that fish is running out there. You're not going to catch as much fish, but you've got to -- you've got to move in just to be able to relax and protect yourself.

4878. You know, if these ships are going to be 400 and some more a year -- is that a year -- is that even as many as since they've put in the new container facility at Tsawwassen. Just watching that, you know, I'm on the water 200 days a year. I see a lot.

4879. You know, I check in with -- as soon as I get to the fishing grounds, I check in with Victoria Traffic. I tell them I'm in the area. I didn't have to do that 10 years ago. I let them know what I'm doing. I let them know I'm fishing in that area. I let them know how many boats are there.

4880. And sometimes I have to be the voice to Seattle -- Victoria Traffic for the other boats because, you know, they're saying, "Hey, can you call and tell them where I'm at and let them know what I'm doing?" You know, to keep everybody safe, I do that.

4881. But to get back on -- Lummi is down -- down a little bit on the map there from -- I wish we could raise that up. But we have -- we have aquaculture there that we grow oysters, clams, geoducks, salmon. You know, if we have oil spill from any of those places down in the west coast, that's going to land down there and that's going to -- that's going to really affect our aquaculture, our clams, our oysters. And that -- you know, that's -- those are all real threats.

4882. And on the other side, I'll tell you a story of -- I live on Bellingham

Bay when Georgia Pacific was there. Part of that bay is dead now because of mercury, other things. You can't eat crabs around there. You can't harvest clams. You can't -- you can't do anything.

4883. You know, the way I look at Tsawwassen, Point Roberts, that area, that's the last of the pristine area in the world, at least in our neck of the woods. That's all we have. You cannot rebuild that.

4884. There's a big reef there at Point Roberts. That's where Lummis go harvest a lot of their shellfish because that's the cleanest place in the Sound. That's one of the cleanest places in the Salish Sea that you can harvest shellfish.

4885. There's no factories around that area. There is no towns. There is -- you know, it's just -- it's where we gather our shellfish to put away for the winter.

4886. I'm not -- I hate to even say I'm an Elder in Lummi but, you know, I am in this industry. I've been -- I've seen a lot of changes, and that's the only place I ever fish is that area because it's the most abundant place to -- it's the best place to fish. It just is because of the Fraser River.

4887. I've never been very far up the Fraser River, but -- I don't know what its health is, but you know, I and the Lummi Tribe depend on that Fraser River as Tulalip, Swinomish, these other tribes, and the tribes of Canada. That river is probably one of the most productive rivers on the west coast -- is the productive -- most productive river on the West Coast.

4888. And what this -- that oil spill doesn't even have to come into where I live to affect the way I live. That is -- I was just fishing out there last week, just telling some of the other fishermen how healthy those fish look this year, big, healthy fish. Like you know, they were just beautiful fish this year. You know, and that's a sign of a healthy ecosystem where they come from.

4889. You know, I don't really have much more to say on this, but this is what -- I'm just letting you know what I lived for the past 40 years and what my son is to look forward to and our grandsons and our granddaughters and what they've got to look forward to in this system.

4890. We all depend on this system from all the bands all the way down and the bands up into Alert Bay, through that area. They've had the best sockeye season they've had in their lives because of that river. It's been historically large.

The biggest runs in history. So something right is going -- something right is happening. Are we going to jeopardize something right?

4891. Ten (10) years -- or in '10, we had the second-biggest sockeye run in history since 1934. We got -- we got to partake in that because this year the fish went north and didn't come in our side of the water. So you know, we struggled a little bit, but it has a good chum season. That's why I just -- I hesitated to come in to be here today because it's such a good chum fishery.

4892. In my mind, from my experiences in this business for the last 40 years, things are on an uphill swing. And that's what I would like to say is that my community -- our communities depend so much on this system. It's always -- it's just not since the border's gone in. We've always depended on this system.

4893. Our ancestors grew up on the island, San Juan Islands, to catch the sockeye that were going to the Fraser River. They had summer camps out there. My dad was born out there.

4894. This isn't anything new to us. We got songs. We got dances. We got everything that ties to that river or those fish that go to that river.

4895. So with that, I would like to thank you again for listening and thank you for giving me this opportunity to speak. If you have any questions.

4896. Thank you.

4897. **MS. BOYLES:** I want to thank the ---

4898. **THE CHAIRMAN:** Would you want to have questions before your closing? Just in case we have questions, I'll offer it to Trans Mountain first.

4899. Ms. Oleniuk.

4900. **MS. OLENIUK:** Thank you, Chair. We have no questions, but we do want to thank them for the presentation.

4901. **THE CHAIRMAN:** I'm blessed to live on Vancouver Island, so I have an appreciation of the ocean and living in that environment as well. And also, we heard yesterday from the Chairman of the Swinomish that they had the second-largest fleet. So I assume there's -- you have got the first and you're

holding that bragging rights and can prove it, that you have the largest fleet.

4902. I was fishing around Point Roberts and Tsawwassen and round the areas you're fishing in. And controlling that through Victoria, this is all new as you indicated that the amount of -- you've always fished in those areas.

4903. And how much of that is in Canadian waters? I think a lot of what you're fishing is in Canadian waters. Am I correct?

4904. **MR. WILSON:** It's all U.S. waters.

4905. **THE CHAIRMAN:** So you've no ability to -- even though you've talked about Victoria, but that's because they control that area in that ---

4906. **MR. WILSON:** It's from a little bit south of Point Roberts goes to Seattle Traffic. Then you get to, I believe it's Saturna Island, then Victoria Traffic takes over.

4907. **THE CHAIRMAN:** Do you have any ability to fish within Canadian waters? Can you come into Canadian waters, or is that restricted through our fact that we have two countries?

4908. **MR. WILSON:** No, we don't have the ability, but you know, you're always thinking the grass is greener on the other side, but I don't know.

--- (Laughter/Rires)

4909. **THE CHAIRMAN:** We wouldn't -- yeah, interesting answer. You don't want to go there.

--- (Laughter/Rires)

4910. **THE CHAIRMAN:** I think, with that, that's all the Board's questions. So if you'd like to summarize or wrap up, we'd be happy to hear that and then -- well, thank you.

4911. **MS. BOYLES:** Thank you, sir.

4912. Again, I want to thank the Stó:lō people for their welcome and their hospitality on their lands. And I want to honour the witnesses who have been

here today and yesterday, each who volunteered to take time away from family, away from fishing to come and do a very uncommon thing, that is, to come here to a sworn legal proceeding in a different country and speak from the heart and from the head about their culture, their heritage, rights and hopes and fears for the future.

4913. That's something we're seldom asked to do in public, any of us, and it's certainly something we're seldom asked to do in front of strangers. And so I want to honour the commitment and the courage that the witnesses showed these last two days.

4914. It has been a rare proceeding, and I know that some have struggled with how best to do this, who should speak and what are the right words to convey these messages. And frankly, I wonder sometimes what will be done with this testimony and how the Board will use the messages that, first, neither the culture nor the oil pollution nor the vessel traffic care about the borders.

4915. And while the people of the Salish Sea are one, they are also united by the grim fact that an oil spill would devastate their nations. And I use the word nations on purpose. The U.S. tribes are sovereign governments. They co-manage the fisheries with Washington State.

4916. They are entitled to 50 percent of the harvestable salmon. They are entitled. They do not ask for, nor do they need, permission. They are caretakers of shoreline habitat, of the ocean and river waters and their people.

4917. For the U.S. tribes, this pipeline is all risk and danger; dangers of increased vessel traffic, as you've heard this morning, dangers and risks of interference with the treaty-protected fishing, risks of oil spills large and small. There are too many risks and harms and it would be irrational and, dare I say, immoral to approve this pipeline, and the tribes are united in opposition.

4918. I have been honoured to be here for the last two days with the Tulalip, Swinomish, Suquamish and Lummi Indian Nations. And I think the Board for your time and attention as well.

4919. **THE CHAIRMAN:** Perhaps if I could close the proceeding and then we can finish with a -- the significance of all of the tribes' appearances with us in the last two days has not been lost on the Board and the challenges, I'm sure, especially, as we heard today, that Mr. Wilson had took the time away from his

important work as a fisherman to be with us today and so did others, I am sure, and to travel to Chilliwack to the Stó:lō land is not lost on us, the significance of it and the significance for the Board of -- for us to hear from U.S. tribes. It's the first time in the Board history that we've done this.

4920. So on behalf of my colleagues on the Panel and of the National Energy Board, we acknowledge your voices, your full hearts, your teachings and values that you have imparted and shared with us today.

4921. And we acknowledge all of that and, us being witnesses, I am honoured by the blanket ceremony, to have been a witness to this as well. And I am joined by my colleagues in that appreciation.

4922. So with that, we thank you. May you travel home safely and, with that, we are adjourned until 9:00 a.m. tomorrow morning.

4923. (Closing native song)

--- Upon adjourning at 11:15 a.m./L'audience est ajournée à 11h15

Exhibit 8

NATIONAL ENERGY BOARD
OFFICE NATIONAL DE L'ÉNERGIE

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project
National Energy Board reconsideration of aspects of its Recommendation Report as directed by Order in Council P.C. 2018-1177
Hearing Order MH-052-2018

Trans Mountain Pipeline ULC
Projet d'agrandissement du réseau de Trans Mountain
Réexamen par l'Office national de l'énergie de certains aspects de son rapport de recommandation, conformément au décret 2018-1177 de la gouverneure en conseil
Ordonnance d'audience MH-052-2018

VOLUME 6

Hearing held at
L'audience tenue à

Delta Hotels Victoria Ocean Pointe Resort
100 Harbour Road
Victoria, British Columbia

November 28, 2018
Le 28 novembre 2018

International Reporting Inc.
Ottawa, Ontario
(613) 748-6043

Canada

2666. **THE CHAIRPERSON:** We're the one thanking you for sharing your traditional knowledge. You said a lot and I think Chief Don Tom kind of summarized it.

2667. B.C. -- British Columbia -- is indeed beautiful.

2668. So we thank you again for what you shared with us today. We will consider all that we have heard as we decide on a recommendation in this hearing.

2669. So we have -- we will reconvene in a few minutes because we have another -- your cousins are coming from the U.S. So we will reconvene at five past three o'clock.

2670. Thank you very much, and safe travel.

--- Upon recessing at 2:49 p.m./L'audience est suspendue à 14h49
--- Upon resuming at 3:23 p.m./L'audience est reprise à 15h23

--- (Opening ceremony, prayer, and song)

BILL JAMES: Affirmed
JEREMIAH JULIUS: Affirmed
LISA WILSON: Affirmed
LEONARD FORSMAN: Affirmed
NOEL PURSER: Affirmed
MARIE ZACKUSE: Affirmed
RAY FRYBERG: Affirmed
JEREMIAH WILBUR: Affirmed
TANDY WILBUR: Affirmed

2671. **THE CHAIRPERSON:** Before we commence our hearing today, the Board wishes to acknowledge with respect the Lekwungen-speaking peoples in whose traditional territory we are gathered, and the Songhees and the Esquimalt and *W̱SÁNEĆ* people whose historical relationships with the land continue to this day. It is with truth and respect we would like to acknowledge all the Indigenous ancestors of this place and reaffirm our relationship with one another.

2672. We would like to thank you for welcoming us today through your ceremony, and we'll welcome to our hearing process.

2673. So good afternoon, everyone, and welcome to the Oral Traditional Evidence phase of the National Energy Board's hearing regarding the Trans Mountain Expansion Project Reconsideration.

2674. My name is Lyne Mercier. I am the Chair of the Panel. With me on my left is Alison Scott, and on my right is Murray Lytle. We want to welcome everyone who is here today both in the hearing room and listening in to the webcast.

2675. As a matter of housekeeping, I'd like to describe the evacuation procedures in the event of an emergency. If the building's evacuation tone begins sounding and we are asked to leave the building, the muster point for the venue is the waterfront walkway. Please exit in an orderly fashion through the lobby. At the muster point, please ensure your party is accounted for.

2676. In addition to the Panel, we have staff in the room to answer process-related questions that you may have. You will be able to recognize them by their brass name tags.

2677. With respect to our schedule for hearing oral traditional evidence, today we scheduled time to hear from three Indigenous groups. You are the last one. We will normally plan to take breaks if required.

2678. In order to be fair to all presenters, we have allotted up to two hours to hear from you. If two hours is not enough, at the end of the session please feel free to file additional oral traditional evidence by electronic means, such as a video or some other method.

2679. Before we get under way, I would remind parties of the Panel's guidance in the Hearing Order and Procedural Directions in regards to oral traditional evidence.

2680. The Board understands that the Swinomish Indian Tribal Community, Tulalip Tribes, Suquamish Tribe, and Lummi Nation have an oral tradition for sharing knowledge from generation to generation and this information cannot always be adequately shared in writing. Sharing your traditional knowledge and stories about the use of your traditional territory is of value to us. We appreciate that you've chosen to be here today.

2681. Following oral traditional evidence, Trans Mountain, other

intervenors, or the Board may have questions for the witnesses. If so, witnesses can choose whether they will answer questions orally or at a later date in writing, or a combination of both.

2682. With that, I believe we are ready to get under way. And before I call on the Swinomish Indian Tribal Community, Tulalip Tribes, Suquamish Tribe, and Lummi Nation to present their traditional oral evidence, I'd like to have the representatives of the Proponent, Trans Mountain, introduce themselves.

2683. **MR. DUNCANSON:** Thank you, Madam Chair.

2684. Good afternoon. My name is Sander Duncanson. I'm with the law firm Osler, Hoskin & Harcourt. With me is Cassie Richards from our office, and representing Trans Mountain is Georgia Dixon. Good afternoon.

2685. **THE CHAIRPERSON:** Thank you, Mr. Duncanson.

2686. I will seek to see if there is any other intervenor in the name or any other preliminary matters.

2687. Yes.

2688. **MR. MURRAY:** Thank you, Madam Chair. Thank you, Panel Members.

2689. My name is David Murray. I'm a senior policy advisor with Natural Resources Canada. I'm here as a representative of the Federal Crown to hear the witnesses' oral traditional evidence in relation to the reconsideration of the Trans Mountain Expansion Project.

2690. I do not intend to ask any questions today but, rather, am here as a representative of several federal departments and agencies that are registered intervenors. If necessary, we will ask additional questions through the NEB's information request process.

2691. Finally, I'd like to note that I'm honoured to be present at this hearing in the traditional territory of the Coast Salish.

2692. Thank you.

2693. **THE CHAIRPERSON:** Thank you, Mr. Murray.

2694. Are there any other intervenors? I see none.

2695. Usually -- I understand that the member will give us information that is accurate, truthfully and to the best of their knowledge, and we will accept the ceremony as being your affirmation of that. Thank you very much.

2696. Ms. Counsellor, you don't have a tag, so I wish -- please, can you name yourself?

2697. **MS. BOYLES:** Kristen Boyles. And at the other end of the table is Stephanie Tsosie. And our job here today is to try to coordinate the testimony from the four Coast Salish U.S. tribes that have travelled here today for you.

2698. That's the Swinomish Indian Nation, the Tulalip Tribes, the Suquamish Tribe, and the Lummi Nation.

2699. Our plan today is to have two speakers from each tribe and -- present their traditional oral testimony. We thank you for inviting us to do this. We thank you for your attention. We thank the Songhees and Esquimalt peoples on whose land we are.

2700. And we'll get started with Chief Bill James from the Lummi Nation.

2701. **THE CHAIRPERSON:** Thank you.

--- ORAL PRESENTATION BY/REPRÉSENTATION ORALE PAR SWINOMISH INDIAN TRIBAL COMMUNITY, TULALIP TRIBES, SUQUAMISH TRIBE, AND LUMMI NATION:

2702. **HEREDITARY CHIEF BILL JAMES:** (Speaking in Native language)

2703. I guess I'll go back and interpret a little bit. My name is Bill James. I come from the Lummi Nation, and we're down in the States.

2704. If you look at your map, we're not that far away. We're really just across the water a little ways.

2705. And I was just explaining how we don't recognize the border as a people. We are all one people. We are all relatives, all throughout the Puget Sound area. We're all related to each other.

2706. And I was explaining that my great-grandmother come from Penelakut, from Kuiper Island, so I have Canadian ancestry in my blood, too.

2707. But today, we're here to talk about a number of things, the pipeline, as well as the protection of the *qw'e lh'ol mèchen*, the black fish or the killer whale. That's one of the things that we're here for.

2708. One thing that we have to remember is that as we go through the process of what we're doing is these are very serious decisions that you folks are making because it's not only going to affect the people; it's going to affect our plant life, our trees. It's going to affect our animals, our birds, our fish, but also it's going to affect our water and our air. These things are going to have to be taken under consideration when you make a decision. That's most important to remember. It's not just a matter of the pipeline. It's going to affect everything and all of these things.

2709. I was born and raised at a fishing village. I spent the first major part of my life at the fishing village. I was raised with a lot of old people born in the 1890s. They were my teachers.

2710. The values have changed so drastically amongst our people nowadays. The values have changed. Part of the reason for the change of the values is the boarding schools and the church schools took away our children. They changed our diets. They're changing -- they tried to change the environment of our people. There were still people that practiced the whole ways, you know, living off of the land.

2711. Going back to *KELL-OLEMEĆEN*, the black fish, or the killer whale, I listened to the elders come to my home and tell us stories of the black fish how we come to be related to them, the people that live under the sea. I heard stories years ago of people that live under the ice at the north pole. I've heard stories of people that live under the mountains.

2712. I've heard stories years ago -- oral history that's not written down, you know, that I teach to my young people coming behind me.

2713. But as we go through the -- like I say, the protection of the earth, I

used to listen to the old timers speak years ago. You remember now. You tell the (Native word), the non-Indian people, you have to be aware of when we start to die you're next. You beware when we start to die and you're next.

2714. As I've grown up through life different species are already disappearing from our earth, and even in just my lifetime species are disappearing.

2715. Be aware of what's going on around us. You see Tahlequah, the mother that carried her baby, the black fish that carried her baby for so long, she's giving us a sign. Our Native people know how to read that. She's giving us a sign to stand up and tell the world that we've got to be getting ready. The black fish are dying around us. We tried to feed them the best we could.

2716. But as I say, the pipeline is going to affect each and every one of us. The food chain -- the food chain is going to trickle down to each and every one of us. Our young people are already starting to die. I see so many young people dying now unnecessarily.

2717. Like I say, I come from the Lummi Nation and down -- just outside of Bellingham. But I've been involved with the blackfish or the killer whale. I've been out on the boat when we were trying to feed them out there. I feel their hurt, and it really affects me personally. And the pollution of the water, the pollution of the boats, you know, the big boats, all of this is affecting each and every one of us.

2718. And like I was saying, you know, with a pipeline what's going to happen if a major earthquake hits. What's going to happen; oil's going to be all over the place. You know, that's going to be sad for our environment. It's going to happen. It's going to happen. We know it's going to happen.

2719. And we know that our salmon are disappearing. We know that our salmon are getting sick already from the pollution. The salmon are getting sick.

2720. I live right on the water right by the beach on the water. I walk the beach quite regular. In more recent years it's the first time I ever saw bamboo on our beaches. Bamboo is on our beaches now. Pollution's coming at us. You know what I mean. I don't have to explain. You know what I mean.

2721. Things are coming at us and we have to do what we can while we can.

You turn around and you look at your children and your grandchildren now; what are you going to leave for them. That's most important. What are you going to leave for them? there's not going to be much left for them to survive.

2722. These are just a few things that I'd like to talk about, because we relate to the Salish Sea as a family. Years ago many of our tribes came to (Native word), the Point Roberts to do the reef net. Many peoples come there to do the reef netting. Our people did reef netting all throughout the Sound. That's most important to remember that. That we were reef netters. That's our own method of fishing that was given to us by the Creator.

2723. I can't explain to you how -- I don't know how to explain to you my values, what I value. My values are entirely different than your values are because culturally, and spiritually, and through our genealogy we know who we are. We know where we come from. We know that the Creator gave us all of these things to protect. That's what we believe. This is what we believe; the Creator gave these things to us.

(Speaking in Native language)

2724. I talk to your spirit. I talk to your spirit and I hope your spirit will understand what I'm saying, you know, your spirit will understand.

2725. As a teacher for many years I teach the values of our people to our young ones that are coming behind. What can you do to help us better understand and change the values of your people? Number one, you need to change your curriculum of your schools to protect the environment. This is most important. You need to protect the -- teach the children that are coming behind you. Because Mother Earth is sacred and you only have one mother. You only have one mother. When she's gone there's no more.

2726. That's kind of what I was thinking about today that we talk about global warming. Global warming is affecting each and every one of us too. It's not getting as cold as it used to. It's not raining as much as it used to still. We have to remember that everything that we do, the clear cutting of the forests, you know, it's affecting everything. You know, (speaking in Native language).

2727. If you have any questions, feel free to ask.

2728. **MS. TSOSIE**: Thank you, Chief James.

2729. I'd like to next introduce from the Lummi Nation, Lisa Wilson.

2730. **MS. LISA WILSON**: (Speaking in Native language). My name is Lisa Wilson. My grandmother was Sarah James from Lummi and my grandfather was Charles Wilson from Cape Mudge.

2731. My grandfather met my grandmother in a fish cannery in Tsawwassen in the early 1920s. And that's a major part of who I am. I grew up fishing with my dad. I started the year before the Judge Boldt decision and for those of you that do not know what the Judge Boldt decision is, it was a major court case that was settled in 1974 and as a result of my tribe and the other tribes that are here today that signed the Treaty of 1855, the Point Elliott Treaty, and in that Treaty, my people were promised that we were going to be able to fish and gather in our usual and accustomed areas, to fish, hunt, and gather in our usual and accustomed areas.

2732. And so what my people signed on for is to make sure that we had that way of life. My ancestors got into a canoe and paddled down to Muckl-te-oh in 1855 to reserve our rights to hunt and gather in our usual and accustomed areas. And that is the area that is all around us in the Salish Sea.

2733. And I'm here today because my people, all of these people here, are depending on sustaining our way of life. I work for Lummi Natural Resources. I'm the *Endangered Species Act* Manager and Policy Representative for Lummi Natural Resources. But I am here representing my whole tribe today.

2734. I worked on the Orca Task Force with the governor's Orca Task Force this past year. I sat in for my chairman and I worked extensively with a group of people to try to come up with some solutions to this crisis that we're in, and that is that we are in danger of losing our southern resident killer whales. And you know, it's not -- if we don't do something right away, then we are going to be losing them and that is a fact.

2735. So we know that the impact on vessel traffic, we know the impact of the noise, and we know the impact if there was oil spill, the major devastation that's going to wipe out all of the species in the Salish Sea.

2736. So I come to you today to protect what we have left. Because you see, 100 years ago, when my grandfather met my grandmother in Tsawwassen, if you

could just imagine what the waters were like back then, you know, when our fish and our other animal life were healthy. And since then, all of the cumulative impacts that have happened since then due to vessel traffic, due to pollution, water quality, habitat degradation, population growth -- what that's done on our ecosystem and as a result of that, what it's done to our fishing stock, that what, in fact, is doing to our people. Because if the salmon are not healthy, if the orcas are not healthy, and our people are not healthy, it's exactly what my chief has said, that we are not going to sustain ourselves either.

2737. So we've come to a crossroads were this is the opportunity to start changing things and making a shift. We've got to stop taking and taking and taking and we've got to turn the tides, literally, to make sure that we can actually save a species if we all put our efforts together.

2738. There is a lot of different solutions that came up in this Orca Task Force. And it is definitely a holistic. There's a lot of different things. And I know that the vessel traffic and the threat of an oil spill is one of those major things.

2739. And that makes me very sad. I am the *Endangered Species Act* Manager for my tribe. I sit in meetings. I remember fishing with my dad and it wasn't even a thought that we would never have fish. You know, it's been said before, when the tide is out, the table is set. Fishing the salmon are as important as the air that we breathe and it's true, you know, because I know that I grew up fishing all my life with my dad and that's part of who I am today, and that's why I'm here. That was instilled in me from a young age to be able to fish and how important salmon are to our people.

2740. It's very emotional to me, you know, because of my lineage, of my grandfather being from Cape Mudge and my grandmother being from Lummi. And I actually lived in Victoria for 15 years. And it feels like I've come full circle today. It feels like there is a lot of weight on my shoulders and I carry that. I carry that for my people. I carry that for my father who passed away three years ago. I carry that for my grandmother that passed away 35 years ago. And I carry that for my ancestors that paddled down to Muckl-te-oh to sign that Treaty.

2741. You know, it was a promise that was made that we would always retain our way of life and what I've seen from my experience in -- you know, fishing's always been a part of my life that when I went to school, I researched the history of our Lummi people. I went back and I did my Capstone project and I

created a documentary on the fishing history of the Lummi people. So I've been back and I've researched what has been promised. And I've researched all of the injustices that have happened and all the court cases that led up to the *Boldt* decision, all the cases even after the *Boldt* decision, you know, the *Culbert* case on habitat, to where that we were able to be co-managers.

2742. And that's what's different down there is that we have a lot more say. And that's why I am actually really glad to know that that's why we're here today for lack of consultation with First Nations people and tribal people. Because you know, to me, I don't have a border. I don't have a border. Like it's been said before, these are my family and the family, I have a lot of family up here too, and it's not about a border, it's not about -- it's about saving what we have.

2743. And for a fact, like I said before, I know that if we don't do anything right now, then we're going to be losing that.

2744. So the impact that my tribe has felt over the last 100 years was losing a lot of their fishing rights, gaining fishing rights, and then losing a lot of their fishing rights due to the habitat degradation and due to such projects as the Kinder Morgan Pipeline.

2745. We went from a very strong fishing tribe of 1,000 people and now we barely have 500 fishermen. And so that's something that is devastating to me to see our fishermen struggle, to see our actual people struggle, and you know, we've had to -- over this habitat degradation and dams, we had to put a lot of emphasis on our hatcheries, and we've had to create our own salmon. But you know, we have made a mandate to increase our hatchery production and we know that, you know, producing the hatchery production is not going to be the end all, but it's what we can do to survive right now, and we also know that, you know, our habitat -- our hatchery fish need habitat too.

2746. So you know, we have stood on the forefront for many years, and we come from a lot -- a long line of people that have fought through, starting with the court case in Point Roberts in 1895 over our reef net sites, and we've been fighting ever since, like I said, with the *Colvert* case, and we're fighting every single day, and we are going to continue fighting. You know that's -- this is not -- it's just not our livelihood. It's who we are. It's our culture, and that's -- you know, we have people that work for our tribe into their seventies and eighties because it's not a job; it's who we are, and it's what we do.

2747. **MS. TSOSIE:** Ms. Wilson, can I ask you to explain to the Board some of the efforts the Lummi Nation has undertaken to save and help the blackfish?

2748. **MS. LISA WILSON:** So our orcas were in trouble. You know, we saw the mother carrying her baby for 17 days, and it was devastating. It wasn't, you know, just in our -- it wasn't just us that saw it, but the world saw it. You know, I've had people tell me that they were in Germany, and on the news was this baby, and so the world is watching us. So we had to do something.

2749. And so we coordinated with our federal trustees and our co-managers, and we took up an effort to literally feed Scarlet, the orca that -- you know, she ended up passing away, but it's like we couldn't stand back and we couldn't watch this happen, we had to do something. And it took a lot of coordination and a lot of involvement.

2750. You know, it's not the first time that we have stepped in as the Lummi Nation. A year ago, we had an Atlantic salmon spill that was an emergency, and we stepped in and we were on the forefront of trying to catch as much as we could and try to work with the Emergency Management System.

2751. And one of our biggest fights over the last decade has been the Cherry Point fight. And it was because of our way of life and our treaty. *Xwe'chi'eXen* is -- that's why we stopped it, and you know, we will be there to stop it. You know, we will be there to fight every time that we can. And you know, we are working with our co-managers, and we are working with our federal trustees to do what we can. And that's -- we are on the forefront of producing more hatchery fish so that we can feed the orcas, you know.

2752. And so we can do all that we can do, like we can put all our efforts into that, but unless we're all -- unless we all do something, then we're going to lose this -- we're going to lose the orca and that will be on our watch and that will be on our conscience if we let that happen.

2753. **MS. TSOSIE:** Thank you. Can you also explain to the Board that -- some of the impacts, the adverse impacts -- and we've heard a little bit, but if you could tell the Board what this project will mean to Lummi Nation if it gets approved?

2754. **MS. LISA WILSON:** So I know that we've had fishermen that have

testified before -- one of our fishermen, Dana Wilson, and I heard his testimony. And he talked about -- you know, I remember fishing with my dad when I was younger and we would be out there and we would be worried whether our net would get run over. We worried for our safety. You know -- and so that -- what it is doing is impacting us from our treaty right of being able to set our net out there, to be able to set our crab pots. That's impeding us. That's not letting us continue our way of life.

2755. And like I stated before, you know -- and I've sat on the oil spill team for my tribe because -- and we've partnered up with the neighbouring oil refineries, you know, because we have to protect what we have, and -- so I've been through a lot of oil spill training and I know the devastation that an oil spill will cause, you know. So that will be a major impact. That is just -- that's going to, you know, devastate our tribe and it's going to devastate our people if we do not have our fishing, you know. I just can't even imagine that happening.

2756. **MS. BOYLES:** Thank you, Ms. Wilson.

2757. Next, we want to hear from Mr. Jeremy Wilbur of the Swinomish Indian Tribal Community.

2758. Mr. Wilbur, could you tell the Board a bit about who you are, what you do?

2759. **MR. JEREMIAH WILBUR:** Good afternoon. My traditional name is Kats-Butt-Soot, seventh generation. My grandfather carried that name, and he passed that name to me, and I've passed that name along to my son, who is Kats-Butt-Soot, eighth generation. That name goes so far back in our family history that it has no meaning, it's just a name.

2760. My birth name is Jeremy James Wilbur. I come from the Swinomish Tribe, which is located just south of Bellingham about 30 miles, next to Anacortes, the gateway to the San Juan Islands. My family is from Swinomish. I was born and raised there. I am currently a Swinomish Tribal Senator. I was elected -- it's an elected position on council. I'm a newly-elected senator. I started in March of 2018, elected by my people. I also sit on the Fish Commission -- the Fish and Game Commission for the Swinomish Tribe, and I have been on the Fish Commission for a number of years.

2761. But I think most importantly, which means the most to me in my

lifetime, is I am a fisherman. And that's what I've done for a majority of my life. That's what my father has done, my grandfather, my great grandfather, my great great grandfather has fished the Salish Sea. And we consider the Salish Sea to be from, you know, Point Roberts, Canada, all the way down Southern Puget Sound, and everything in between.

2762. I want to thank our respected Elder, Chief Bill James, for making -- travelling up here today. Every time our Elders like Chief Bill James speak, a younger generation like myself will learn something. In our culture, we're taught to respect our Elders and what they have to say. They have a lot to teach us younger folks. So I'd like to thank him for coming and speaking today.

2763. Three years ago, I did a declaration for this pipeline. I was asked to, you know, indicate the areas that I fish, and the impacts to the fishing. So if you folks have any questions later on, you could probably look at my declaration and see. It was a great -- they reminded me of being a third grader. I got to colour like in a colouring book again, right, highlight the areas that I fish, which is pretty much all over the Salish Sea in my lifetime so far.

2764. My -- where I come from, in Swinomish we're considered -- we call ourselves the People of the Salmon, or the Salmon people. And many of us tribes do, down in Washington.

2765. Salmon has sustained -- is one of the resources that has sustained our people since time immemorial. We've always relied on salmon, clams, halibut, shrimp, prawns, diving. You know, I dive. Our ancestors used to collect urchins off the beaches though on San Juan Island and out in that area, you know, for to set the table.

2766. You know, we have a saying at home, you know, when the tide is low, the table is set. You know, that was taught to us, handed down to us for many generations. That's how our people sustained themselves.

2767. And so, you know, fishing, and not just in my family, but in our communities, is a major, major -- culturally is what we do. And to impact that would be a major disaster.

2768. And, you know, I'm glad Lisa brought up the orca whales. You know, that's just one of many species, you know. It's, you know, salmon, the orca whales. We've got many species now that are not what they were 100 years ago,

you know. And that's due to population, you know, in our area.

2769. And we -- when I heard about this, you know, Trans Mountain Pipeline and the vessel traffic that it was going to create through my ancestral grounds of fishing, it was a major -- you know, it was sad news, really.

2770. The increase in the amount of traffic. We have a hard time at home already making our living on the water. And something our families have done for generations and generations. And these tanker traffic -- even in my lifetime, you know, I started fishing -- I guess to give you kind of a history, I started fishing -- I was born in 1971. I started fishing, really fishing, for myself in about 1984, when I was old enough to actually get my own fishing permit. That was the age I had to be, 13. And I had gone on a boat with my father, my grandfather, you know, before that.

2771. I started fishing back in -- myself -- 1984. And, you know, the vessel traffic back then was minimal compared to what it is today.

2772. And today Lisa touched on Dania's testimony. I know Dania very well. He's a well-respected fisherman. In all of our communities we all know who Dania is.

2773. And not just gillnetting, you know, not just these tankers impacting our gillnets, where we're able to fish at, and, you know, what parts of the water these tankers, we know, anyway, being fisherman, that these tankers, and a lot of this vessel traffic, they don't stick to the traffic lanes. They just don't, you know. If they can take a shortcut from point A to point B, they're going to do that. It's like driving a car, you know, you don't always stay in your lane, sometimes, you know, you take a short cut somewhere. These tanker traffics, boats will do the same thing.

2774. I own a purse seine boat, a salmon purse seine boat, my own fishing boats, and crab boats, and I can tell you that trying to cross these -- number one, trying to cross these, not just the traffic lanes, but it's a fear for myself and my employees that we're going to get ran over by a tanker.

2775. I had an experience just this summer, coming up the side of Lummi Island; it was a tanker, a tug and tow, it was towing a barge, and he honked at me. It was the middle of the night and we were travelling north from Anacortes up along the island. And I had a -- it honked at me.

2776. And at night time it's hard to see on a radar or a GPS exactly what angle their bow is pointing at. So I had a crewman on night watch with me. And so I asked him, you know, "Look through the binoculars, can you see, where is his bow pointed? I see his, you know, his lights, but where exactly is he heading? He's honking at us." And we couldn't tell.

2777. And he honked at me again. So I took a hard right and I went in straight towards the beach. And I'm doing eight knots. And at that point he was blaring on his horn. And, you know, which made me nervous. So of course, I, you know, gave the boat more goose and instead of doing eight knots I was doing nine.

2778. And I made it into the beach, but in the meantime, you know, originally I was fine travelling in the direction I was going. I wasn't interfering with this traffic lane. But being nighttime, you know, I couldn't tell where his bow was pointed.

2779. And what I did was when I turned right, a hard right, I ended up getting in front of it. And, you know, fortunately we made it through to the beach without getting run over, but that's the types of things we deal with with a lot of this traffic coming through. Not to mention the gear that we lose, not just gillnets.

2780. You know, my family, we crab, commercial crab. And, you know, we have, in our usual and accustomed areas that we fish, we have a lot of tug, barge, and tanker traffic coming down to Anacortes -- Cherry Point, and Anacortes.

2781. And every year we lose thousands and thousands of dollars worth of gear to this traffic that comes through.

2782. And so it makes it difficult with, you know, the declining resources and the, you know, population the way it is, you know, for us to carry on our traditional fishing, this increased traffic and stuff makes it even more difficult than what it has been.

2783. **MS. BOYLES:** Mr. Wilbur, can you explain to the Board what a usual and accustomed fishing area is?

2784. **MR. JEREMIAH WILBUR:** Usual and accustomed fishing areas are basically, as tribes we have our -- it's -- usual and accustomed is the areas that we

-- that our families have fished for -- our tribes have fished for many, many, many generations. And so that's basically what a usual and accustomed -- to me that's what a usual and accustomed fishing area is.

2785. And they do define it by law, usual and accustomed fishing areas between tribes, but for me it's where my family has fished for many, many generations.

2786. I guess ---

2787. **MS. BOYLES:** You had mentioned earlier that you were a diver?

2788. **MR. JEREMIAH WILBUR:** Yes, I was going to actually point on -- make a point of that. You know, not to mention the gear that we lose, and sometimes our life feeling threatened with this, you know, with the traffic, increase the traffic that's going through here, I guess the most important thing I could say is when it comes to the species, whether it be salmon -- we've all done -- you've all done the studies on if a tanker blows a breach in its hull and decimates the beach and decimates our, you know, wildlife, which, you know, we already know for a fact the Exxon Valdez in Alaska, there's been studies done on that, and that place has never been covered. We all know that.

2789. But for me, how many people have actually -- how many people are divers? Anybody a diver? You ever dive in the ocean at all?

2790. I do that for a living. That's one of the fishing -- that's one of my fishing ventures, I guess, what I do for a living. I fish for many species, diving urchins and sea cucumbers -- excuse me, tongue twister. And that is also what I do.

2791. And I guess, you know, there's not just the toxic or the chemical pollution. But if you've ever been under water when a tanker, one of these big tankers, or even a ferry goes by four or five miles away, you can hear it underwater, whoop, whoop, whoop, whoop, whoop, and not just hear it, you can feel it in your body. You can feel it like somebody's -- if you've ever been next to a loud speaker with a big -- you know, a kid with the bass drum going in a car, you know, next to you, that's what it feels like, boom, boom, boom, boom, boom. And you just feel it in your body.

2792. So when I think about orca whales and the way they hunt for fish with

sonar, I'm not a scientist, but for me that would disrupt it, wouldn't it? That's one of the reasons, one of the many reasons, you know, our southern resident killer whales are about ready to go extinct, along with salmon.

2793. So I guess there's quite a few folks who need to speak. I don't want to take up too much time. But you know, in closing, we do -- in the States, anyway, we do -- us tribes, all of us that are here and many others, we do a lot of fighting for species, fighting for salmon, fighting for -- we do a lot of restoration. We argue at the county, you know, the state, the national level and fighting for these species that are so important to our cultures, our Native cultures and the way we have learned to live, sustain ourselves on these species.

2794. And for me, now we're doing it internationally. You know, I have to come up to Canada and, you know, express, you know, the fight I have in me to, like the Chief said, save these species, save our culture.

2795. Not just that. You know, we see the salmon decline, we see the orca decline. Well, it's going up the chain. Who's next? What's next? When's it our turn?

2796. We keep being economically driven to, you know, driving force. We're bound to destroy everything that we hold dear.

2797. So anyway, that's what I'd like to say, and thank you for listening to my testimony.

2798. **MS. BOYLES:** Thank you, Mr. Wilbur.

2799. And now I'd like to introduce Mr. Tandy Wilbur. Mr. Wilbur, if you could introduce yourself to the Board and tell them your tribe and your occupation.

2800. **MR. TANDY WILBUR:** Good afternoon. My name is (Native language). It's my Swinomish tribal name I was given by our family. My -- I go by Tandy Wilbur.

2801. And I just would like to say that it's kind of difficult to be up here having to testify to just the impacts alone. That would be so not only heartbreaking, devastating, detrimental, catastrophic, whatever term it is you want to use, to the Native culture, the people on the Salish Sea, up and down the coast.

We -- it's really hard for me to have to try to express the value, the traditions, the spiritual, the meaning of loss.

2802. I don't think there's anyone that could probably put it into words what that would mean. That's our way of life, the Native people.

2803. So a little history about myself. I am -- I was currently no longer Swinomish Tribal Senator. I served as a Senator for 15 years. I currently now hold the job title of Assistant Fisheries Manager, so I have some history on -- oh, and I'm also currently an active commercial fisherman.

2804. And so I know the challenges and the -- that tribes face to continue to protect the Salish Sea and adding another amount of vessels to the Salish Sea is something that is not favourable for mother nature, for the Salish Sea itself and for tribal cultures.

2805. We as people look to the water for survival. It's our lifeline. Everything that we are taught comes from the water. Everything that we do and teach and pass down, there's some form of teaching from the water.

2806. We of Swinomish have a First Salmon Ceremony. We make sure we like to bless the fishermen. This is done by giving back to the water. We do it to the four directions. We have a catch of salmon. We bless it, we feed the people, and we're basically feeding the water for protection and plentiful harvest of the sea.

2807. When I was growing up, it's also a tradition to give back your first catch, but we are now on the verge of not -- no longer having that first catch.

2808. We have come to say seven generations. We like to think out seven generations. Well, I don't even know if we can think -- if that's going to even be the next generation.

2809. We have to realize that we can no longer take, take, take. We have to protect. We have to realize that there's only so much that Mother Earth and the Salish Sea can take.

2810. There's -- and part of the teachings of the first ceremony, and we give away to our Elders, just like was said to the Chief, our first catch, we give that first -- my first catch I give to an Elder. We pick an Elder and give it to them.

And that's a big meaning to me because I feel that it's told to me, you know, it's a sacrifice because your first catch, you don't -- you know, what do you want to do with your first catch? You usually want to eat it yourself or you want to sell it. Well, you give it away. And therefore, you're going to get blessed in return.

2811. And it's part of our culture and teachings when we move that we will be protected out on that water.

2812. And when I was 14 years old, this really sticks with me because I gave away -- I fished all day and night, and I caught two fish. And I was like, "Man, I only caught two fish. I don't even have -- can't afford gas money to go back out."

2813. And then -- so I'm driving with the fish in the back of my truck, and I get pulled over by a tribal member and they say, "Oh, so and so uncle's having a barbecue up there but he has no fish". And of course, he's an Elder, so they're like, "What have you got in the back of your truck?" I'm like "Fish".

2814. They're like, "Oh, well, you go and give it to your uncle". I'm like, "Well" -- you know, it's one of the hardest things I had -- I did, but I did because that's what we were taught. And therefore, these teachings continue on and on and on, generation to generation.

2815. But if we don't protect and we don't stand up and we don't say no to things that can -- are detrimental and have impacts that could wipe out cultural traditions, Native people's way of life, that's what we're faced with today. That's what I'm here today, to give testimony to protect Native people in their way of life.

2816. So once again, there's lots of risk involved. And like I stated earlier, I'm -- I am a commercial fisherman and starting back probably in '97 I started to crab. And I didn't see a lot of tankers. So when you heard the other testimonies of usual and accustomed areas, that's where all the tribes were fishing their usual and accustomed areas, we are being impacted.

2817. For the last 20 years, more and more traffic coming in and bunkering. It's not just that vessel traffic is going from point A to point B. These vessels are coming in for fuel, bunkering and -- which is anchoring -- and they're taking vast amount of real estate or water by sitting there on anchor time and time again. I don't think I've seen the Billingham -- the -- I'm not sure what kind of water you'd call it, but the Salish Sea, which is heavily used for crabbing, has just now flooded

with bunkering of big large tankers.

2818. We are being impacted and cannot utilize our usual and accustomed areas. We are being forced to try to make a living by doing something -- by doing other methods of fishing or take the risk of losing our gear, risking our lives, of a collision.

2819. I personally had to go up and pull a buoy off of the bunker and off of the ship's hull. The buoy was on the hull because -- and I had to go up to it and try to get the buoy and save my pot and gear off of that vessel. And then you think nobody -- no vessel is there so you go throw your gear in the water, and the next day a vessel appears because they're coming in and coming out, and there's no -- you don't know when they're coming or going. And so then you go back to get your gear and it's gone.

2820. So tribes are being affected by their -- on their livelihoods being affected, from their income with loss of gear, their traditional and usual custom areas are being lessened because of the big barge and tankers take up so much area. And we can no longer bear this burden.

2821. This is one another burden that the Salish Sea has to -- is risk, we're risking the Salish Sea of a burden of oil spills, vessel noise, causing orcas -- you know, the Chief was right when he says that that's a sign. You have an orca whale trying to keep her baby alive for 17 days; that's a sign that something's not right. I think we'd all agree here that something's not right. And adding all those extra traffic with the noise and it's just another challenge that's another burden that natural creatures, blackfish specifically, have to try to deal with to survive.

2822. And we are here to say that our way of life can no longer be pushed to the wayside. Your decision has big impacts on tribal lives, tribal culture, traditions, spiritual. We are here to protect that and share with you our story of our way of life. Because we are a strong people and we fight, and we're here to pass on that message.

2823. **MS. TSOSIE:** Thank you, Mr. Wilbur. I'd like to next introduce Chairman Forsman of the Suquamish Tribe.

2824. Chairman Forsman, would you tell the Board who you are?

2825. **MR. LEONARD FORSMAN:** Yes.

2826. Good evening. I'm Leonard Forsman. My ancestor name is Gvúí, and I'm Chairman of the Suquamish Tribe near Seattle. And it is the home of Chief Seattle and Chief Ktsap and many other great leaders. And I'm also the President of Affiliate Tribes of Northwest Indians. And I'm also a Presidential Appointee from the Obama Administration on the Advisory Council on Historic Preservation. And we work on helping federal agencies and tribes and private parties implement the National Historic Preservation Act of 1966, which protects sacred lands and archeological resources.

2827. I've been on our Tribal Council. I was Chairman since 2005 and I've served as Council Secretary for 15 years prior to that. And I have done some fishing in my younger years and most of my -- a good portion of my time now is engaged in treaty resource protection because we are, like all of the tribes here, signators to the Treaty of Point Elliott, and we work very hard on trying to protect our fishing and hunting rights which were affirmed in the Treaty of Point Elliott and adjudicated in the *Boldt* decision in 1974, and then in the *Rafeedie* decision in 1995.

2828. **MS. TSOSIE:** Thank you. Can you tell the Board about the relationship that the Suquamish Tribe has to the First Nations here, and that the Suquamish Tribe has to the Salish Sea?

2829. **MR. LEONARD FORSMAN:** It's been said quite a bit by our Elder, and a lot of our other leaders, the importance of the Salish Sea to our respective tribes and nations, and I just wanted to make sure that we understand because I have a background in archeology and anthropology, worked in our museum; I worked as our contract archeologist for private firm for many years. So I have a couple decades of formal experience.

2830. But in the end that had probably a stronger spiritual impact on me in my life and so I think it's important to remember that and remember the relationship that each of the tribes, each of the families were -- families formed the tribes, they have -- we have our family names, we have our family traditions, and then we unite as families to protect our sovereignty, and I'd like to emphasize that.

2831. And part of that sovereignty is our relationship with our homeland. This is an ancient landscape that our people have inhabited for thousands of years, and we have stories that tell how this land was formed. And when our Elder, Bill

James, I have great respect for, who has done so much for Indian tribes throughout Puget Sound, when he spoke in his language, that language is purely related and part of this landscape. So it was an honour to hear that and also the fact that he has relatives on Vancouver Island as well is very powerful.

2832. And so the relationships between the tribes here of course, that existed well prior to the border being established. Chief Seattle and Chief Chalikum (ph) were two of our major leaders. Hudson Bay Company established a post in what's now DuPont, near Tacoma, in 1832 and operated there for a couple of decades.

2833. And it was still up in the air where the border was going to end up, so if it went one way, we'd be all in the same country right now because they thought about putting it at the Columbia River. But as you know, it went up a little further north and we have our, you know, political relationships that are based upon that. But our people travelled up into this area. Chief Seattle came up to Fort Langley and traded here. He was very familiar with this area. And then Chief Ktsap was -- led many expeditions up to Vancouver Island as well. So we have a long oral history of presence up here and our travels to trade and socialize with the groups from up in the First Nations B.C. -- what is now the B.C. area.

2834. So through canoe journey, of course, we've got a lot of -- even intensified those relationships and today we've been even making them stronger through our cooperative effort to let you know how important the decision before -- in front of you is and how impactful it will be on our way of life.

2835. **MS. TSOSIE:** You mentioned the canoe journey. Can you tell the Board what the canoe means?

2836. **MR. LEONARD FORSMAN:** Briefly, in 1989 the State of Washington was celebrating their hundredth anniversary and the tribes at that time felt that they really couldn't celebrate without us because we'd been here a lot longer than that, and so we were pressuring the State to invest in cultural programs to help the tribes regain and retain a lot of their cultural ways.

2837. So as part of that, a grant program was started to give out money to the 29 tribes of Washington and who were able to do cultural programs. And also another effort was made to bring cedar logs to the tribes so they could carve their own canoes and try and restore some of the voyaging canoe tradition. And then, also, to support the race canoe tradition because Emmett Oliver of the Quinault

was very involved racing canoes in his day and he felt that there needed to be more investment in that.

2838. We ended up with a small flotilla that started out on the coast, came around the Suquamish. On the last day we pulled from Suquamish to Ballard in north Seattle on about an eight-mile pull we call the Paddle to Seattle; it had a nice ring to it. And we thought, well, this is a good way of celebrating and acknowledging our presence here on the hundredth anniversary of the State of Washington.

2839. That night before we left, Frank Nelson of the Bella Bella Heiltsuk Nation challenged all the tribes to come north and he gave us four years to get ready. He said, "You don't get four years pull here. You get four years to get ready and come up." And our tribe and many other tribes went up there, and after that young people asked that this journey was so important that we do that on an annual basis.

2840. So now it goes on on an annual basis. Our hosts from Lummi are here. They'll be hosting the journey this year, and we get a lot of people from around the Pacific Northwest who participate in that and host each leg of the journey as it moves forward and builds to the final hosting site. And we host it in 2009 on the 20th anniversary of the Paddle to Seattle. Create a great resurgence in language, material arts, canoe carving, songs, dances, regalias, all those things have been brought back as a big part of our cultural resurgence from across the Pacific Northwest because of the canoe journey.

2841. **MS. TSOSIE:** Can you describe how the increased marine vessel traffic from this project will have an impact on Suquamish Tribe?

2842. **MR. LEONARD FORSMAN:** Yes. The -- there's a few things that occur.

2843. We've already heard a lot about the conflict with fishing gear, but there's also the impacts it will have on the -- on the orca whale, as you've heard about. And I've also -- I was appointed by Governor Inslee to be on the Southern Resident Killer Whale Task Force. And we're finding that the -- if they have an oil spill, vessel traffic, the noise that was discussed earlier by Swinomish.

2844. Also, the collisions with the pods is more possible. And then also, the promotion of fossil fuel use and combustion will contribute more to climate

change, which is also impacting the warm -- warming waters and raising sea levels has also had a huge impact.

2845. And we are very concerned about its impact in the orcas and also on the rest of the food chain in the -- in the Salish Sea and how everything inter-relates and the orca's just an alarm bell that we've raised for us to consider. And there are other places where we have a lot of other problems with salmon habitat, shellfish habitat, water quality, all those things that impact the food web.

2846. **MS. TSOSIE:** And can you briefly describe the significance of the orcas?

2847. **MR. LEONARD FORSMAN:** Yeah, I just thought I'd tell a story.

2848. I'm wearing this necklace, and it's a replica of an artefact from the Old Man House. And it's a knife handle that was excavated there. And Old Man House was the home of Chief Seattle, I guess, where he was -- his father and Chief Kitsap built. It was one of the largest warehouses in the Puget Sound and in northwest, hosted a lot of large gatherings.

2849. And then when our reservation was established, Chief Seattle was a strong negotiator, was able to get our reservation to encompass the Old Man House so he could -- our people could continue to live in that one of our many winter villages, but that was our main one.

2850. And when the reservation was established under the treaty, it was then divided into different parcels about 25 years after the treaty was signed, and that was an attempt to assimilate us so that the U.S. wouldn't have to hold up to the promises they made to us in the treaty. They thought they could assimilate us by dividing us up, putting us on other -- separate parcels of land and then sending all of our children off to boarding schools and where they were forced to attend boarding schools where their language wasn't allowed to be spoken and their culture was lost.

2851. And as a part of that, the Old Man House was eventually claimed by the U.S. Army to build a fort shortly after this land was divided up. And the fort was never built, but the land was sold off on our behalf to a private developer.

2852. The State of Washington came in and bought one acre of -- which was a portion of the Old Man House village, and we were -- after that state park was

established, we worked really hard to try to get it back because it was the last piece of land that included our ancient village. And Rob Purser, who's in the audience here, led that fight, and we were able to get the park returned to us.

2853. And when the park returned to us, there had been about four excavations that -- archaeological investigations that had been done there, and some of that material was being held by the state at the Burke Museum at the University of Washington. So once we became the owners, the owners of the land owned the artefacts, so then it was transferred back to us.

2854. And those artefacts were put onto the Washington State Ferry, brought over to our homeland and was escorted by a pod of southern resident killer whales that followed and escorted the artefacts home. So we have this strong spiritual relationship there.

2855. They also come in sometimes and eat our fish. They came into Dyes Inlet, which is near Bremerton, Silverdale area, and they camped out there for a few weeks about 20 years ago and feasted on our chum salmon that we have one of the last wild runs of chum salmon.

2856. So we ended up not having a fishery that year because of the fact that they were in need. So we have a strong, strong relationship with the -- with the orca whale.

2857. **MS. TSOSIE:** Thank you.

2858. And I have one last question. You mentioned climate change. Does the Suquamish Tribe have concerns about the cumulative impacts of this project?

2859. **MR. LEONARD FORSMAN:** Yeah, we are very concerned about this and a number of the other fossil-related impacts that our continued investment and commitment to fossil fuel consumption, and I think to the -- to the ignorance of the other opportunities that are out there.

2860. And I just came back from the Global Climate Action Summit in San Francisco. It was held in September. And you're finding a lot of the corporate -- international corporate community is moving away from fossil fuels and moving towards more sustainable energy programs, so they really see that there's a -- there's a short life span for fossil fuel extraction and using the wind and solar and all these more sustainable opportunities for generating energy.

2861. So I think that we need to get more creative and get away from these short-term investments and start thinking more long term.

2862. That's all. I'd like to reserve the rest of the time for other speakers.

2863. **MS. TSOSIE:** Thank you, Chairman Forsman.

2864. I'd like to next introduce Noel Purser from the Suquamish Tribe.

2865. Can you introduce yourself to the Board?

2866. **MS. NOEL PURSER:** (Speaking in Native language)

2867. My name's Noel Purser. I'm the daughter of Rob and Cindy Purser. I come from the Suquamish Tribe, and I also have ancestry in Newfoundland here in Canada. I like to acknowledge my grandmother whenever I can because a lot of my appreciation for my Indigenous culture comes from her appreciation for it.

2868. Sorry. I'm pregnant and sick at the same time, so -- but I made it here today.

2869. So the first part of my introduction, I said you are all my family. Not just the people here at this table with me, but all of you. You are my family. I am here speaking on behalf of my tribe and as one of your relatives, so my hands are up to you. Thanks for being here and listening.

2870. **MS. TSOSIE:** Thanks.

2871. Can you talk a little bit about your background? Professionally, what do you do?

2872. **MS. NOEL PURSER:** I'm an environmental scientist and Indigenous ecologist as well as a Salish ethnobotanist, and a mom. That's most of my professional experience.

2873. **MS. TSOSIE:** And if I may ask, how does your cultural life interact with the Salish Sea?

2874. **MS. NOEL PURSER:** So my literal earliest memory is on my dad's

fishing boat. I had to go to college to become an environmental scientist, but my first lessons in ecology were with my people throughout the Pacific Northwest.

2875. Ecology didn't get a name in the English language until 1935, but it has been a fundamental concept inherent in indigenous cultures throughout the Pacific Northwest since time immemorial as evidenced through the philosophies of *Slahal*, if you're familiar with that.

2876. *Slahal* is a game, a representative game based on indigenous spirituality and stories of our origins played all throughout the Pacific Northwest, and the stories that come with *Slahal* are what guide our way of life and how we relate to the land and share resources with all the other people, mammals, reptiles, et cetera that live here.

2877. **MS. TSOSIE:** Thank you.

2878. And can you talk about how salmon and killer whales fit into that concept and into your culture?

2879. **MS. NOEL PURSER:** So I was asked today to speak mostly as an Indigenous person more so than a scientist, so I'm going to tell you a little -- just a little snippet of some of our stories about how we relate to salmon, orcas and wolves.

2880. During *Slahal*, this was a battle between humans and animals for the right to exist because we had been living out of balance. We'd been over-harvesting. We'd made one of our relatives go extinct from over-hunting, and the animals were revolting because we were not -- we were getting above ourselves, forgetting ourselves.

2881. And so they petitioned to the Creator to -- to do away with us as we've done away with some of our other relatives. So a game was initiated between us. And I can't go into too much detail about that because some of these stories are sacred and can only be told in certain contexts. But there was one animal, the ancestor of the (speaking in Native language) ancestor, there's the coyote, the wolf, and the killer whale who didn't want to pick a side, who was our closest ally to humans. And so he and his brother took to the sea.

2882. Now, when the game was over and the humans had won and retained the right to exist but we've lost the right to communicate with animals directly,

one came back. That's the coyote. One stayed, the orca. And it is from them that we based a lot of our family structure, the way we structure our communities, you know, borrowing a lot of our ceremonies, being passed matrilineally as orcas are matrilineal. Some of our living styles, you know, bilineal as wolves tend to be.

2883. When the wolves went extinct in the Olympic Peninsula, our elders were concerned that the orcas would be next. And they were right. Our orcas are going extinct. And once they're gone, we will too because those are our closest allies. Of all the animals in the Pacific Northwest, those are the ones throughout our human history, according to our stories that have been our greatest allies.

2884. **MS. TSOSIE**: Can you describe how the Trans Mountain Pipeline will impact you and the Suquamish Tribe?

2885. **MS. NOEL PURSER**: So I understand that people need to make a living. We all do. We live in a capitalist continent. We need to have currency to survive. That's our new bartering. So I understand why people who know no other way depend on this. I understand that.

2886. The problem is, this pipeline risks so much. You know, when my ancestors came from Ireland to Newfoundland, there was a lot of people building outhouses near their gardens. And the Mi'kmaq people warning them, "Don't do that. You'll make yourself sick."

2887. As my great-great grandfather William who instilled in my grandma an appreciation for Indigenous knowledge -- he was an Indigenous man from Ireland -- he was descended from Celts -- and he was a fisherman and he followed the cod to Newfoundland so he could maintain that lifestyle even after it became more difficult in Ireland. And they didn't build their outhouse near their garden. They listened. And they didn't get sick like a lot of their neighbours did. You don't poison where you get your food. You just don't do that.

2888. So I understand for some families, 50 families, I think, was it, in British Columbia, this pipeline will provide a way of having an income. But is it worth the potential of a spill, that risk? Is it worth that? Is it really worth that, because that will impact everybody, not just here in British Columbia; it will impact us in Suquamish, it will impact our relatives in Alaska. I mean, the oil spill up in Prince William Harbour Bay was brought up earlier. That had an 11,000-mile reach and it devastated numerous populations in various species.

2889. So that's -- even if an oil spill doesn't -- or even if a spill doesn't happen, even if we're lucky, even if the -- what was it, 70-something percent chance that the Simon Fraser University calculated as being the risk? Even if that 70-whatever percent chance of a spill doesn't happen, just the noise pollution alone, to cut those orcas off from being able to communicate from one another, you know, my grandpa talked about that, being unable to speak with his sisters in the boarding schools. They were together but they were alone because they weren't allowed to talk, especially in their language.

2890. During that game I was telling you about, *Slahal*, the humans were down to their last stick, the chief's stick. We were about to lose. And our friend saw that, the ones I was telling you about, and they gave us a song so we can keep playing because we had forgotten all our songs. We had forgotten how to be.

2891. So they gave us a song. And because of that, we were able to survive and win. Right now, none of these creatures that we depend on, all of us -- I'm sure everyone in this room has had salmon, I'm sure everyone in this room has had some sort of seafood, I'm sure everyone in this room has had some sort of animal or plant that depends of seafood if not seafood itself. We're not giving them a voice, you know? It's not like New Zealand where they've assigned the rights of personhood to a river. We don't do that here in North America. We're not giving them a voice.

2892. And so I would like to lend my song to our animal relatives so maybe they can survive.

2893. **MS. TSOSIE**: Thank you. Do you have concerns about the future generations as a result of this project if it were approved?

2894. **MS. NOEL PURSER**: Oh gosh, yes. I'm pregnant right now with my youngest child and one of the things that drove me to want to study environmental science instead of pursue my passions in the arts is my grandma's stories of what happened to her family when the cod fishery collapsed in Newfoundland, how that way of life and that culture was lost, and how she hadn't really felt at home until she was in Suquamish watching our fishermen filet the fish and set them out to dry and smoke and just seeing the bustle of the community. She would just come and watch. And that had a huge impact.

2895. My papa, he too would go out with my dad. He couldn't fish but he'd just watch because that couldn't happen for them any more. The cod fishery

collapsed in Canada. Multiple species of cod are now extinct there and it's had profound ecological impact there in Newfoundland.

2896. So I've never been able to go there and fish. My ancestors' fishing village is gone. It's been abandoned. All we have is stories and regret and a tool that one of my great-grandparents used. That's all. That's all we have left.

2897. And I worry the same thing is going to happen to my people here in British Columbia, the U.S., Alaska. It's devastating.

2898. **MS. TSOSIE**: Is there anything else you'd like to add as to why you're opposed to this project?

2899. **MS. NOEL PURSER**: You know, I'm sure a lot of us in this room have ancestry from Britain. I know I do on some lines. I don't know how many of you know the story of Coroticus. He was one of the last British war chiefs of the Celtic people before the Romans conquered Britannia. He and his people died trying to protect the River Thames and the name for that river actually comes from their language. It was a sacred spot where they used to pray. And he was sentenced to die in Rome, but the speech he made before the senate begging the Romans to treat his home better than they do theirs left such a lasting impact on them that they allowed him to live although he was banished from Britain forever because they were afraid he would rile resistance again.

2900. He was an ecologist like me before that word was invented. He was an Indigenous person, like me. He was all of our ancestors, those of us who have British ancestry. Now that river is so polluted not even fish can live in it. You know, our ancestors prayed in that.

2901. I hope this perpetual cycle of destruction ends somewhere. And I hope everyone in this room really thinks about their hand in future generations and what we leave behind for them. That's all.

2902. **MS. BOYLES:** Thank you.

2903. I would like to introduce Chairwoman Marie Zackuse from the Tulalip Tribes. If you could introduce yourself, ma'am, and give your story.

2904. **MS. MARIE ZACKUSE:** My name is Marie Zackuse, and I am the Chairwoman of Tulalip Tribes, and I have served on the tribal council for

27 years, and this is the first year about to end serving as the Chairwoman. And on behalf of my tribe, I want to lift my hands to the Esquimalt and Songhees Nation for welcoming us to this traditional land. And I also want to thank the National Energy Board of Canada for sitting down to listen to our testimony today.

2905. I speak on behalf of not only my ancestors gone before us, but to all my people at home, which is up to 4,800, and I am also honoured to sit here beside my relatives and to other nations that have come and spoke before you today.

2906. We are the Tulalip people. The St'hovs (ph) and other allied Coast Salish Nations who have lived on the shores of the Salish Sea since time immemorial. The Tulalip Tribes are the descendants of the Snohomish, Snoqualmie, the Skokomish and other Bands that signed onto the 1855 Treaty of Point Elliott. Our stories tell us we have lived in the Salish Sea since time began. It is our homeland. We are rooted here, and our ancestral life ways continue to be the foundation of our culture and community as we practise the same teachings, values and follow the same calendar of ceremonies as our ancestors passed down generation after generation.

2907. Our inherent sovereignty as a people was reserved for us by our ancestors. We knew that the only way to protect future generations was to negotiate a treaty with the United States that would allow our culture to continue. Just as our ancestors did, we still fish, hunt, and gather throughout the Sound from Seattle up to the U.S./Canadian Border.

2908. We continue to travel up to Snoqualmie to harvest our cedar and huckleberries in the foothills of the Cascades. We harvest a variety of plants and fibres for ceremony, weaving, and for medical uses like teas, salves, and tinctures, the same ones our ancestors made for their ailments and to keep up good health.

2909. Although our reservation and land base is only 22,000 acres, thanks to the forethought of our ancestors, we continue to have access to our usual and accustomed lands and waterways, and therefore, our culture. Our story is one of resilience. Following decades of federal and state laws that attempted to force assimilation, we are here only because of our teachings and values. They helped us to survive. These teachings and values are shared with all of the people of the Coast Salish Nations. Our treaty rights are sacred to us, and they are vital to the continuation of our lifeways for countless generations to come.

2910. As Coast Salish people, we do not recognize the imaginary line that divides us from First Nation relatives. The Salish Sea does not recognize this border. Our relatives, the salmon and the killer whales do not recognize this border. Pollution, industrial waste, and climate change do not recognize this border. Impacts to these species are felt throughout the Salish Sea on both sides of the border, and they are cumulative effects.

2911. Our cultural teachings tell us that we have a responsibility to future generations. Today, the Salish Sea cries out to us that it can't take any more of the impacts that human beings continue to inflict. Just this year we were devastated to see Tahlequah, one of our southern resident killer whales, lose her calf and carry it for over 1,000 miles in a morning ritual. As a mother, this was a wrenching site to see. As Tulalip people, we share a sacred cultural bond with the killer whales. They are the symbol of our tribe and it is our responsibility to speak up for them when they are in need.

2912. Today, our treaty rights in the Salish Sea are experiencing a death of a thousand cuts. Human beings continue to put additional pressures on the Salish Seas one proposal at a time. But we have reached a tipping point. This Trans Mountain expansion may just be the project that brings us past the point of no return. Our treaty rights include the right to access all species of fish and shellfish, including all salmon species, halibut, crab, geoduck, and shrimp. Right now, treaty resources are already depleted because of habitat impacts and vessel traffic in the Salish Sea.

2913. Our fishermen describe how traffic from large marine vessels already interferes with treaty fishing. Large vessels displace our fishermen from our usual and accustomed fishing areas because the risk of collision is too great. Large vessels can also damage or destroy nets, crab pots, and other gear resulting in loss of gear and catch, as well as lost fishing opportunities.

2914. All of these impacts are only what exist today, and they will only increase as a result of this pipeline expansion, which will greatly increase the amount of oil shipped through the Salish Sea. More ships will mean greater danger to our tribal fishermen and more risk of damage to gear and catch, and these significant impacts pale in comparison to the devastation that will result from a possible oil spill in the Salish Sea.

2915. This pipeline will greatly increase the amount of fossil fuels in the

Salish Sea at a time when the fish, the killer whales, and other species are already struggling. This also increases the likelihood of a major oil spill in the Salish Sea. The consequences of this kind of a spill would be unspeakable. It would affect marine life and shellfish for decades to come. Frankly, it would have the potential to put an end to our Coast Salish lifeways. Without access to healthy fish, clams, and wildlife, our culture and spiritual practice could not continue.

2916. And we ask you to please consider all of our words. We come with our -- all of our ancestors, like I said in the beginning, and we speak on behalf of our Elders and all of communities here seated here today. Thank you.

2917. **MS. BOYLES:** Thank you.

2918. And I'd like to introduce Mr. Ray Fryberg, also from the Tulalip Tribes. Mr. Fryberg.

2919. **MR. RAY FRYBERG:** Thank you for the time, you know, taking the time to be here with us and to talk about what we have in front of us.

2920. My name is Raymond Fryberg. I am the Executive Director of Natural and Cultural Resources for the Tulalip Tribes. I have fishing, hunting, forestry, all of the resources departments or things that we utilize, shellfish, are under my department. I also have cultural departments, the language, the museum, carving, different functions.

2921. But I'm here to share my story, which even I hope that you could understand some of this. It's -- my Indian name is Stetolk. Translated, it means spotted tail like on a Chinook salmon, and that comes from my great grandmother's side. It was my great grandmother's grandfather's cousin where that name come from, five generations. And he was actually a treaty signer.

2922. And in our tribe here, like Marie said, we have the killer whale as a crest. We have legends that come to us. The legend of the five killer whale brothers comes from Priest Point. It comes from a family there that his English name was Little Sam, but his Indian name was sʔadacut, and he told this story. And we knew the family. Not Little Sam, but he had children; their names were Hagan Sam and Alfred Sam. And I knew them. And they were able to tell stories like their -- like Little Sam and Priest Point Sam were. They carried a lot of the legends of our people.

2923. And in my capacity, I'm also -- I represent Tulalip at the United Nations. I go there and participate in WIPO, which is the World Intellectual Property Organization. And I go there to protect and defend traditional knowledge, secret and sacred, cultural expression, free and prior informed consent, and genetic resources.

2924. And I have served five times as the Chairman of the Indigenous Caucus at the United Nations there.

2925. And all of the things that we talk about there, there's things that we talk about there at that convention.

2926. And I've also been to the United Nations twice for the meetings on cultural and biodiversity, which addresses things like global warming and carbon emissions.

2927. But, you know, in our territory we know the history here. I tell the people back home that we own half of the history and we're very familiar on this side of the border also. We own a portion of the history here also.

2928. In 1824 the Hudson's Bay Company came through the Puget Sound. And at Steilacoom, down there, south of Seattle, they met up with two Swinomish chiefs. One of them was named Chief Snah-talc. And he guided them up here over by White Rock, over there somewhere. And he brought them up to Nicomekl and the Serpentine River and intersected up into the Fraser River where the first European establishment was made at Fort Langley.

2929. And our Chief (Native name), who was my great grandmother's grandfather, was probably one of the most prominent figures recorded in the Hudson's Bay Company records, the journal of daily occurrences.

2930. So, you know, we share a lot, you know. The waters here, the rivers and the waters were our freeways. We were very familiar with the territory. And after things like that started to happen, our territory really started to shrink. We lost contact with a lot of our relatives up here in Canada and weren't able to move back and forward as freely as we used to.

2931. But there was territories where we used to come up and gather cranberries up in the Fraser River and participate with a fishery up in there, and the sockeye fishing, and different things like that. But we were prominent in the

establishment of this territory.

2932. In our legend, I met -- I went to a beach where Alfred Sam, who was our descendent of Little Sam, who had the story of the five killer whale brothers. And he said, "I'm going to tell you something." He said, "There was a lady that lived at Priest Point and she was kind of a really greedy lady. And she carved a wooden seal and she towed it out into the water out off of Priest Point. And she told her husband, she said, 'Your brothers are really lazy. They won't do anything to give me any food. They won't even go out there and harpoon a seal for me.'

2933. And so her husband and the four brothers, they went out there in a canoe and they harpooned a wooden seal and it came to life and it towed them out into the straits, out into the straits, out into the fog, and turned back into wood. And so they were surrounded by fog. They didn't know where they were at. And they were lost out there in the fog.

2934. And they were paddling around and they came to a canoe. And there was a little man in there. And he was diving over the canoe and he was going down to the bottom and he was catching halibut and he would put them in his mouth and then swim up and then throw the halibut in the canoe and dive back down to get another halibut.

2935. And so the Swinomish brothers were really hungry, so they went over and took one of his halibut. And when they came up, the little man was angry with them because they took one of their fish. And they told them, 'Well, we're lost out here. We don't know where we're at and we want to get back home.'

2936. So he brought them to his village and they were all little people. And these little people, they didn't trust the Swinomish and they wanted them to go home. But while they were there, they were attacked by Bird People from the north. And these Bird People came flying in and they had bows, and they would pull feathers out of their body and they would shoot the feathers at the little people. And the Swinomish helped drive the bird people off. And the little people were thankful, but they still wanted the Swinomish to leave.

2937. And eventually the weather cleared up and the brothers got in the canoe and they started to travel home, back to Swinomish, Tulalip. And all the oldest brother said, 'This is going to take us a long time. We should jump into the water and turn ourselves into killer whales.'

2938. And the other brother said, 'You can't do that.' And the oldest brother dove off of the front of the canoe, and when surfaced he come up and he was a killer whale.

2939. And so the other four brothers, they followed their brother and they all came up as killer whales."

2940. And from that time forward, the Swinomish were known as the brothers of the killer whale, the Killer Whale People.

2941. And whenever they were on canoes and they would see killer whales going by they would stop their canoes and back them in and let the killer whales pass.

2942. Backing your canoe in is a sign of respect. When you back your canoe in when you come into somebody's territory, you back your canoe in, that means you're coming in in non-aggression. There's no way that you could attack coming in backwards. And so they always did that.

2943. I did research for the tribes for the archive for the *Boldt* decision and I later on found that original story by Alfred's grandfather, Little Sam, and it was word for word the exact way that Alfred had told me.

2944. And I'm going to lead into my story now, my own killer whale story. And maybe you could turn that poster around?

2945. In 2003 I lost my brother and he had carved canoes for us, for Tulalip, the first canoes that had ever been carved in decades. Like Mr. Forsman was saying, we were really instrumental in participating in a canoe journey. But we used to have hundreds of canoes in our village, but when the gold rush came through Seattle, all the canoes got bought up and went north.

2946. And so my brother carved a canoe in 1989 and he carved two others. And my brother passed away in 2003. So I knew that if I didn't pick up that carving of the canoes that it was going to get lost in my family. So since then I have made three canoes myself. One canoe went to Ahousaht, one canoe went to Nooksak, and one canoe went to Stilaguamish.

2947. And in 2004 we went to Kalik Bay, right up the coast up here. And let

me stop there.

2948. Also, I was adopted on the island up here by the late Chief Jerry Jack from Gold River from the Mowachaht tribe. His Indian name was Kla-okwa-gee-la, copper maker. And he adopted me and my wife and gave us Indian names to use up here. And my Indian name up here, my Nuu-chah-nulth name is Klopinatoice. It means prays at the first light that comes over the mountain. And he gave my wife a name Quinquinaoakwilla. What that means is the breath that you see when the killer whale comes to the surface.

2949. So in 2004 we came to Kaleet Bay, and I came in by myself, and the Canadians were rafted up, and I seen Jerry Jack and another friend of mine from Clayoquot, Kelly John, the chief also, that was adopted as my brother, and I "Hey" -- "Hey, Ray" and they opened up the canoes and I pulled in right beside them. I was telling Kelly I said "Gee, I seen you on TV with a killer whale."

2950. And he said "Yeah, yeah." He said "There was an old man at the village there, a chief, his name is Ambrose Maquinna, Indian name is Tsux'iit., and he was telling me, he said "I'm old and I'm not going to live much longer." And he said, "I know I'm going to pass away" he said "But when I do, I'm going to come back as a killer whale." And Ambrose Maquinna he said and a few days later this killer whale showed up. It had to come like 25 miles inland of the Nootka Sound, came right to the village at Friendly Cove."

2951. And I said we're really connected, we're connected to the killer whale at (Native language). We have legends about that, about being brothers with the killer whale. I said I'd really like to witness that. You know, a long time if there was something powerful like that people would have went a long ways to see.

2952. And so anyway he was just shaking his head.

2953. And the next day I was walking to the Big House, the smoke house up at Kaleet Bay, and I heard, "Hey, Ray" and I turned around and Kelly John was coming and he had a man with him and he said "this is Mike." I said "Mike?" Yeah, Mike Maquinna. That was his dad Tsux'iit, the one that passed away, come back as a killer whale. And I was telling him we're really connected where I'm from. With the killer whale it's our crest. We have that on all of our paperwork, up on our buildings, and on our business cards and everything like that. And I said I'd really like to witness that. And he said "When the journey's done we'll make arrangements for you to come there."

2954. And so we all went home, and then Mike Maquinna called me up and he said "How about the 27th, why don't you come on up." So I brought my canoe, brought it across the ferry, and I went up to Gold River. I had 17 of my family members on with me. My mother-in-law, my wife, my sister-in-law, my niece, three of my children, probably about eight grandchildren, the youngest probably about two. And we went up there.

2955. And that year I just got initiated into my culture in my own belief, my own way. I was initiated with my family up in Lummi.

2956. So we went up there and we -- they had their canoe ready, and we went out there, and we couldn't find him, and we came back in, had our canoes pulled all the way out of the water. We were like, well, we tried.

2957. And then we heard "Hey, he's out there by this rock." He likes to hang out by this rock. And so we went out there, and we got out there and Kelly said, "Let's put our canoes together because we haven't been around him for a while we don't know how he'll react." And so we put our paddles across and we were holding onto the canoes, and he was going outside of us. He was probably out about 200 yards going like this (making a noise).

2958. And they started to sing that old man's paddle song, that old man Ambrose Maquinna. They started to sing his paddle song and that killer whale his fin stopped, and then he was listening just for a second, then he turned, then he start coming like this right underneath the water. He's coming like a torpedo, and the water was flying over his head. And he went down. And then he came up right between just like this but he was standing up a little bit higher.

2959. And there's no way that you could ever get used to a killer whale coming up and breathing that close to you. And he came up like that and he was just like that, and he had his eye right on me, right on me. He never took his eye off of me. And Kelly over there was talking to him in their language, and he was saying "This is Ray Fryberg, he is like our family. All of our families we travelled together in our canoes. He come along way, brought his whole family so he could meet and pay his respect to you. We sing and we dance together up and down, up and down the coast. Came a long way to meet you."

2960. And he said, "Tell him who you are." And so I introduced myself to him. And I was looking at him like that, then he just kind of leaned forward and

he went right between our canoes with his dorsal fin. And he got up to the front and my daughter was up there in the red up there on the top front -- on the canoe on this side that's me on the back, my sister-in-law and my wife. But he got up to the front of the canoe and he got underneath it, and he put the front of the canoe on the tip of his nose and lifted my canoe about three feet in the air. And my daughter started to get really scared, she was like "Ah, ah, ah" and I go "We're okay. We're okay. We're okay." And he held the canoe up there for a while and then he put it back down.

2961. And he came around and he got underneath my canoe upside down. He was belly to belly with my canoe. And his pectoral fin on this side he went from the back to the front like this rubbing my canoe like this. And Kelly was saying, "He's really blessing you guys up. He's really blessing you."

2962. And he did that -- he came around again, and I was watching him and he was floating to the surface coming up right between us again, but he wasn't like this, he was floating to the surface, and I was leaning over, and when he came to the surface about two inches from the surface I seen this big bubble come out of the blow hole in his head. And when he hit the surface I was leaning over and he breathed right in my face, and I was like how often does that happen to anybody that you could share that breath with a killer whale?

2963. But he never popped his head out of the water, just the hole was out of the water, and he started going (making a noise). And then I was just listening to him and then he rolled over on his side like this and he was looking at me this way and his mouth was open and he had his tongue out like that, and he was looking at me and he started going (making a noise).

2964. And I've been working with the whale scientists since 2007, and after -- after that experience, I called up Ken Balcomb. He's one of the world's leading killer whale scientists. He did all of the identification of all of the pods and a lot of different things like that.

2965. And I was telling him what that killer whale was doing. He said, "Under the water like that when they make that clicking noise, they could see things that they can't even see". They're out there. They could tell what the texture is, whatever it is.

2966. He said, "They are so sophisticated that if you were sitting in the water in front of him, he could probably measure your emotional content". And he said,

"When he leaned over like that and started making that whistling sound", he said, "he was actually talking to you. They have their own dialect, their own sound, but he was -- he was actually talking to you".

2967. And so it started to get dark and I had my grandbabies on there, two little girls, two little boys. And they said, "We better get your kids in there. It's getting dark there. We'll get them off the water".

2968. So we took them in and we went to the village, and we went to the village and they fed us. And they sang for us and they danced for us. And we sang for them and we danced for them.

2969. And the Chief there, you know, he said, "What was that like for you?"

2970. I said, "I been a hunter and a fisherman all my life and I'm comfortable out in the woods. I'm comfortable out on the water". And I said, "I've never felt such a powerful spiritual anything like that in my life."

2971. And I said, "I heard the story about that man," and I said, "my brother just passed away also and I though that, you know, maybe I'd see a little bit of my brother in there when I came up here."

2972. And when we were leaving trying to go back in, I had a paddle that my brother made me. It's a red paddle with a killer whale on it, skipper paddle. He only made like six or seven paddles that he gave to people, and I had one.

2973. And I was paddling like this, and about the third stroke that killer whale came and pushed my paddle out of the water. He had it up on his head. And I was like -- I was afraid I was going to poke him or something with the tip of the blade.

2974. And he was looking at me like that, and then go back and I'd take a couple dips and he'd push my paddle out again. He kept pushing my paddle out.

2975. And Kelly was saying, "Well, he really likes that paddle or else he don't want you to go." And so it took a long time to kind of process things, you know, what did I just see, what -- what was really happening, you know.

2976. But they asked me, "What was it like for you?" And I said, "I been a fisherman and a hunter all my life, but I've never had any spiritual experience like

that."

2977. That was the most spiritual experience I've ever had in my life because I've been around animals and different things like that, but when I was looking at that killer whale and we were looking at each other eye to eye, that was a -- that was a being. There was a spiritual being in there.

2978. And I said, "I knew that we were examining each other all the time that we were looking at each other, but it felt like he knew something that I didn't." And the Chief was going like that.

2979. And I said, "You know, we are" -- we come from Tulalip, and the boarding school at Tulalip for all of western Washington, all of the tribes was at Tulalip. And that education system was really tough on our Indian people. Punish speaking language. Songs and dances outlawed. And the treatment in that boarding school was like being a prisoner of war. And you know, that's part of the history. But it really did a lot of damage to our culture. And you know, you hear that long enough and you start to believe it. Children hearing that over and over.

2980. My grandparents, they never -- they spoke Indian to themselves. I was raised by my grandparents. But they never, ever tried to teach me any language because they probably figured I would get punished for it if I -- if I was participating in the language.

2981. But I told -- I said, "You know, I just went through my ceremony to be initiated into my culture. I been -- I been under my red road, my journey, for 30 years. Where am I going to -- where am I going to land spiritually?"

2982. And I just went through that, the sacrifice that I made. And I told the Creator this is where I'm going to be. And you know, the Creator he was like, you know -- we -- in our belief, we recognize the spiritual life in everything that inhabits the forest, the trees, the water. Everything. The inside of the water, the beef and every -- all of the different things. There's a lot of spiritual power in there.

2983. But most of all, we realize that there's one Creator that made all of this. All of this creation belongs to him. And we need to acknowledge it that way. These are the Creator's gifts. Everything that is made is here from the Creator.

2984. And I said, "You know, we have a -- we've had the boarding school which impacted us. And we have these stories about killer whales, about five killer whale brothers." And I said, "They sound -- they sound fantastic, you know, like a great fable or something like that. They sound kind of fantastic. But after having my own experience with a wild killer whale, I know that these things happened with our ancestors before."

2985. And I said, "That really validates my belief in my ancestors, my own way of life. Before we were connected to everything, we were out in the forest, we were out in the water and then we kind of got separated."

2986. And I ran into an old lady down in Esqualick (ph). Her name was Alma McLeod. And I was sharing some history with her, and she goes -- I was talking about spirituality. And she said, "A long time ago there used to be really strong (Native word) out in the -- out in the forest and different things, Indian spirit".

2987. And I had a -- I had a smaller photograph of that one there. And I slid it over there and I go, "It's still there, Grandma. It's still there. We been separated."

2988. And you know, I was thinking while I was looking at that killer whale, "What is he saying to me?" He's talking to me. What is he saying to me?

2989. He's saying I don't have a voice. I need someone to stand up and speak for me. You're my brother. You need to get up and say things are not right in the water for our family.

2990. They know. They know their ancestors. They travel in family pods. They're all sisters, aunties, nieces. Males are on the outside. They know how to navigate these waters. They know what grief is. They know what death is when they push their baby around for 17 days. They know their ancestry. They know all of this.

2991. They are impacted right now. That one baby, that one baby in that pod, if it was J pod, if that one baby would have survived, that pod would have stayed even. No, they didn't increase the population, but they didn't lose any. But they lost that one, which dropped them down into the negative. They're losing this year.

2992. That one baby whale was really important, dropped them into the loss column. The females, they -- the killer whales, they absorb PCBs and contaminants into their fats. And the males can't slough them off. The females could slough that off. They -- the babies come and nurse but it goes into the babies. But the males and the babies are really impacted, and of course, you know, the food and different things that we look at now to try to help them out, because they do need help.

2993. And you know, thinking about -- we heard here that the killer whales are -- a certain amount of interference, you know, is by -- they're continually just followed by whale watchers and ships coming in and they have blasts underwater and all kinds of different things like that. But when I was saying that echo-location system that they have on there is so sophisticated, it is so sophisticated it's not just a sonar ping where they go bong-bing-bong, there's something in front of them.

2994. It is more sophisticated than that so that propellers, all of these sound noises and everything like that could inhibit them from being able to find their foods properly or more adequately and that's probably how they navigate a lot of different things like that that really has a lot of impact on them, and an impact on us.

2995. Like Leonard said, I'm related in Suquamish too. I'm quarter Suquamish. But I have always admired Chief Seattle in his speech, his ecology speech. He said, "Whatever befalls the beast also befalls the man." They're a barometer of what's going on in our waters, you know?

2996. And I went to the conference on CDB in south Korea. Six thousand (6,000) Indigenous people were there. They were saying, "We're losing our land, we're losing our food, and we're losing our water."

2997. I went up on the mountains where Buddhism was brought into Korea and we went to a temple and one of the Buddhists up there said, "In the world, we all need to be making --how we address carbon emissions. We all need to be setting the same standards, everybody. We need to be reducing the amount of carbons that we release into the atmosphere," because we might not be able to have a place that's even safe for our grandchildren if we exceed tipping point.

2998. You know, the tipping point is here for our killer whales. A lot of this

is happening. Every day we go to work in a cultural Natural Resources. It's all about global warming, the habitat, the environment. No statistics on it. There's none. There's no baseline statistics on what is happening with our global warming. You think the glaciers are melting and increasing the volume of the oceans. Well, if the temperature of the oceans increases by three degrees, increased temperature creates increased volume. We're growing bigger oceans. That's really a lot that we're faced with to make good decisions because our people say, "We don't inherit this earth from our ancestors, we borrow it from the children." We do have a lot to look at to make good wise decisions.

2999. You know, when I was at the CBD they were talking about that we all need to start adopting similar standards for doing something with our global warming. I was saying, "You know, the Indigenous philosophy is going to become really, really important," like it was said down here. Only so much you could take. You can't continue to take or continue to pollute this earth. It could only take so much. We need to learn to live with the earth. And that's the Indigenous philosophy.

3000. And so you know, I encourage you with what you've heard today, you know, because there's a lot. I couldn't say that -- I couldn't say for myself that I could endorse this pipeline and all of the effects that it has with the cultural impacts that it has with our people and the fishing and our lifestyle.

3001. I eat pretty much everything that is in the ocean, clams, shellfish, everything. I eat sea urchin, sea cucumber, shrimp, sole, flounder. I've eaten whale, seals. Like they said, when the tide is out the table is set. That's where my food comes in.

3002. And these things affect us physically. We Native Americans have the highest rate of diabetes and heart disease because we've been separated from our Native diet and those foods aren't there any more for us. We're losing ground, losing ground and we're forced to eat foods that are different to our blood type. And it does have effects. It does have effects.

3003. And I couldn't say that I could endorse the pipeline. And I could say also that speaking for Tsooke, I couldn't endorse it either for what he has to go through also and what my story is that I received from him. But something's wrong. Something's wrong and everybody got their own story from him.

3004. But I hope I haven't overwhelmed you. But I just had to come here

and say, this is my story. This is (speaking in Native language) story. And just glad that I could be here today and thank you for making time available here to hear our concerns. Thank you.

3005. **MS. TSOSIE**: Thank you, Mr. Fryberg. We'll be returning to you shortly.

3006. In closing, I would like to offer several thanks. I would like to thank the Esquimalt Nation and the Songhees First Nations for hosting us here today in Victoria. It's a beautiful island.

3007. And I want to thank the National Energy Board for taking the time to listen to us today. I know it's the end of a long day. You've heard a lot of testimony and we've had a lot of people travel from very far to come and share this with you, to share this with everyone, the story of how the Salish Sea is central to their tribal identity and to their way of life.

3008. And this isn't the first time that these tribes have been in front of the National Energy Board. There was testimony in 2014 and I strongly urge you to review that testimony and you will hear some of the same stories, some of the same concerns about safety, about being able to fish, about protecting homeland.

3009. And I want to thank each of the witnesses here today that testified here on behalf of the Swinomish Indian Tribal Community, the Suquamish Tribe, the Lummi Tribe, and the Lummi Nation and Tulalip Tribes. They took time out of their busy schedules and time away from fishing, time away from their communities to travel here and share with you the essential protection of the Salish Sea.

3010. And I also want to thank the traditional witnesses that are here today. At the beginning of oral testimony when we walked in, they were called as traditional witnesses to watch and to witness what happened here today so they can share that with the future generations. You have a rare opportunity here, and it really is an opportunity. And that is to reconsider this project.

3011. It was mentioned earlier that this decision, that your decision has a big impact on these tribes. And this reconsideration proceeding allows you the opportunity to actually and fully examine the impacts that this project will have on the Salish Sea, on the marine life, and on the people that depend on it and that have depended on its survival since time immemorial.

3012. And any impact that happens here, that affects the marine ecosystem, that affects salmon, that contributes to the dire situation that our orcas are in right now, those impacts don't recognize an international border and they will be felt by each one of these witnesses that testified before you today.

3013. We heard that they look to the water for survival and that water, just because it's south of the international border, doesn't mean it's any less impactful and that it's any less necessary to these tribes for their cultural survival.

3014. And those impacts will also be felt by the traditional witnesses and the future generations that they tell.

3015. The tribes are already feeling the effects of reduced salmon runs and the effects that vessel traffic has on their safety on their ability to fish. And approving this project means that these harms grow exponentially. And Coast Salish tribes and First Nations cannot continue to bear the brunt of that development. And the orca and the salmon cannot either.

3016. We've heard testimony today that it is simply hard to even express what loss of the Salish Sea, what loss of salmon, and what loss of orca would even mean.

3017. And we all have our stories, and we all have our regrets. And this project should not be one of them.

3018. **MR. DUNCANSON:** Sorry, Madam Chair, just if I could interject? I feel like we're straining a little bit beyond the purpose of oral traditional evidence. We're not giving legal argument at this stage in the process, although there will be another opportunity for that.

3019. So I feel like I gave a little bit of leeway, but that was crossing a little bit too far for my comfort level.

3020. **THE CHAIRPERSON:** Yes. You can just wrap up. And you will have the chance to do argument that will read, you know, carefully.

3021. **MS. TSOSIE:** Yes, thank you.

3022. We just respectfully ask that you take to heart and that we talk to your

spirit in your consideration -- in your reconsideration of this project today.

3023. I am going to turn the microphone back to Ray Fryberg, the witness you just heard, who will close us out with a song.

3024. **THE CHAIRPERSON:** I just want to make sure if the Panel has any questions.

3025. **MS. TSOSIE:** I mean, this is the end of what we have. So if there were questions to ask, before the song I think would be good.

3026. **THE CHAIRPERSON:** Mr. Duncanson, any questions?

3027. **MR. DUNCANSON:** I do actually have just one basic clarification question. And first of all, thank you for travelling up here; I know you've come a long way.

3028. One of the things that was mentioned earlier on in the presentation, I just want to make sure I'm clear on it, was around the project related marine shipping impacting nets and equipment, impacting the ability to set nets and creating risks for safety and things like that. And I think Mr. Wilbur, I think, mentioned that part of the concern was that tankers sometimes deviate away from shipping lanes.

3029. I just wanted to make sure that we were clear. So the concern about the shipping associated with this particular project impacting your fishing equipment and nets, is that associated with shipping within the Canadian shipping lanes or is that associated with the risk of deviating outside those lanes?

3030. **MR. JEREMIAH WILBUR:** I guess I can -- all I can speak on is past history. The episodes I've had in the past with shipping in general, that they have been -- they have deviated from the natural shipping lanes or the order of shipping lanes to cut corners.

3031. There are specific spots, specific areas that they do cut across and come out of the shipping lane for a brief moment and back into it.

3032. And so yes, that's all I can speak on. I can't speak on what you're -- the future of shipping, but what my personal -- what I've seen personally in the past.

3033. **MR. DUNCANSON:** Okay, so that -- I think that clarifies it for me. And that's the basis of the concern is, in the future, if that was to happen, the cutting of corners, that's where that concern arises?

3034. **MR. JEREMIAH WILBUR:** You know, they -- yeah. All I can speak for is in my past. You know, in my past or even present today, ships have been known, in my visible eye, that they cut corners out of shipping lanes.

3035. **MR. DUNCANSON:** I appreciate that. Thank you very much. That's all that I have, Madam Chair.

3036. **THE CHAIRPERSON:** The Panel -- our Panel has no questions. And you can have your song and then I will close off the meeting.

3037. **MR. RAY FRYBERG:** All right. Thank you.

3038. You know, we sang our way in, and we will sing our way out.

3039. This song is a family song and it comes from ---

3040. **THE CHAIRPERSON:** Then I will close now, and then you can sing your way out. I think we've got straight now.

3041. So I would really like to acknowledge the Swinomish Indian Tribal, the Tulalip Tribes, Swinomish Tribes, and Lummi Nation, first for travelling this far, and then for sharing your history, your current challenges, your stories, and your traditional knowledge that you have shared with us today.

3042. We'll consider all we have heard as we decide on our recommendation in this hearing.

3043. We will reconvene tomorrow at 12:30 p.m. to hear from the Squamish First Nations.

3044. Safe travels. Thank you.

--- (Closing prayer and song)

--- Upon adjourning at 6:03 p.m./L'audience est ajournée à 18h03

Exhibit 9

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IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT – RECONSIDERATION

DECLARATION OF NIGEL LAWRENCE ON BEHALF OF THE SUQUAMISH TRIBE

NIGEL LAWRENCE makes this declaration on behalf of the Suquamish Tribe, an intervenor in the above proceedings, and declares as follows:

1. My name is Nigel Lawrence. I am an enrolled member of the Suquamish Tribe, a federally recognized Indian tribe.

2. The Suquamish Tribe is a signatory to the 1855 Treaty of Point Elliot with the United States, one of the Stevens Treaties. The Suquamish Tribe is located on the Port Madison Indian Reservation in Suquamish, Washington, in Kitsap County. There are approximately 1,100 enrolled Suquamish Tribal members.

3. I was born and raised in Suquamish territory and have been active in my community from a young age. As a teenager, I served on the Suquamish Youth Council and United Natives of North Kitsap High School Youth Council. I attended Haskell Indian Nations University, The Evergreen State College's Reservation-Based/Community-Determined program, and graduated from Eastern Michigan University with a Bachelor of Business Administration majoring in Management.

4. I have been elected three times to the Suquamish Tribal Council and currently serve as the Suquamish Tribal Council Secretary. I have served on the Board of Directors of Port Madison Enterprises, the business arm of the Suquamish Tribe that oversees the Clearwater casino

as well as many other ventures. I am currently employed by the Suquamish Tribe as the Director of the Marion Forsman-Boushie Early Learning Center.

5. I started to paddle in traditional race canoes when I was 10 years old. We would travel from tribe to tribe, all over Washington and southern British Columbia (B.C.), competing in inter-tribal races. That same year, 1989, I attended "Paddle to Seattle" an event celebrating the Washington Centennial while including a Tribal perspective. During Paddle to Seattle, the Heiltsuk Nation had paddled from their hometown of Bella Bella, B.C. and they challenged to host another gathering of canoe tribes and First Nations to travel by canoe to Bella Bella in 4 years' time. Since then, these events have become annual Tribal Canoe Journeys with different tribes hosting each year, in a different location using ocean-going canoes.

6. When I was 14, I went on the Tribal Canoe Journey to the "Qatuwas Festival" in 1993, hosted by the Heiltsuk Nation. The round trip Journey was two months, 1,200-miles from Suquamish to Bella Bella, B.C. and back. This journey's route brought us through the Puget Sound, the Strait of Juan de Fuca, the Strait of Georgia and the Queen Charlotte Strait. We also refer to these bodies of water as our "Ancestral Highways," since our ancestors have travelled them for thousands of years. We paddled next to orcas, eagles, ravens, porpoises and gray whales.

7. Experiencing the Tribal Canoe Journeys gave me the chance to connect with our culture and had a huge positive impact on me that continues to this day. Participating in the Tribal Canoe Journeys allows me to learn more about the Salish Seas, our culture and traditional knowledge travelling by water. After many years of paddling on Tribal Canoe Journeys, I was asked to be the skipper of the Suquamish Youth Canoe. This allows me to pass on my teachings to the next generation.

8. The Heiltsuk Nation of Bella Bella, B.C. once again hosted the Tribal Canoe Journey in 2014. Once again we got to paddle through the same waters alongside orcas and gray whales. The sense of awe and wonder that I experience when seeing these huge mammals is inspiring.

9. The 2017 Tribal Canoe Journey to Campbell River, British Columbia, Canada occurred on July 21th. We paddled for 16 days and our route from Suquamish to Tulalip, Washington, then to Swinomish, Washington, through the San Juan Islands to Vancouver Island, and then north to Campbell River. I saw a few Southern Resident Killer Whales along this journey.

10. The annual Tribal Canoe Journeys are our way of traveling along our ancestors' highways and connecting with their teachings. Canoes are literally and figuratively the vessels carrying our culture and customs from generation to generation. On the water, we continually learn and teach newcomers about our culture and our place in our environment. The Suquamish canoes were carved from a Western Red Cedar log that was split in two, making two (2) canoes. While the canoe that I skipper was being carved, a pod of orcas came and swam in the bay in full view of the carvers. Witnessing an event like this is seen as a good sign. The carvers chose to name this canoe Qal-Qal-Ah-Haitch, which in our Lushootseed language means Killer Whale, Orca, in honor of this event. We feel that the canoe embodies a lot of the qualities of an orca, like strength, protection, and intelligence.

11. As just one example, in September of 2013, we paddled to Seattle for the annual Salmon Homecoming Pow-wow along with 10-12 other tribal canoes. After the landing ceremony, we were still on the water just off of Seattle on our way back home when we were visited by dozens of Southern Resident Killer Whales. Within minutes, the whales were all around our canoes and it seemed that all you could see for miles were dorsal fins. As a group of singers traveling with us

began to sing to the whales, they drew closer, spyhopping, breaching, and surfacing closer to our canoes. This was an amazing and awe-inspiring experience for me. It is always special to be visited by killer whales on the water, but this was an especially powerful experience for me. I believe that these killer whales were sent by our ancestors as a sign that our ancestors see us, that they recognize the positive things we're doing for the people, and that they want us to keep up the good work.

12. Around this same time, many of our artifacts held by the Burke Museum were being brought back to our custody to be housed in our Suquamish Museum. Many of our Tribal Elders, Leaders and members were on the Washington State Ferry from Seattle to Bainbridge Island bringing the artifacts home when a pod of orcas were seen beside the ferry. To many on board the ferry, it seemed that the orca were escorting our artifacts home. With both of these events happening so close together, we chose to make Honoring the Killer Whales the theme of the 2014 Tribal Journey to Bella Bella, British Columbia. The day before we embarked on that year's Tribal Journey, we had a dedication ceremony with a viewing of some of the artifacts.

13. These experiences depend on a healthy Salish Sea -- with clean water and the full array of species that also call these waters home, including the Southern Resident Killer Whales that have fished for salmon alongside the Suquamish people since time immemorial.

14. Experiences like these are a major reason that Tribal Canoe Journeys are such a powerful way to connect with our culture and way of life. Even when we are not so lucky to encounter the whales on our journeys, just knowing that the killer whales are out there is an irreplaceable part of the experience for me. Southern Resident Killer Whales are part of the very fabric of the Suquamish people's culture. They are also an irreplaceable part of the Salish Sea. My ability to fully connect to our history and culture through canoe journeys and other experiences in

the Salish Sea is undermined by the current low numbers of Southern Resident Killer Whales; it would simply disappear without them. Paddling a canoe through these waters is not the same experience without the chance that I will be able to catch even a glimpse of the whales that share our home. I am deeply troubled by the continued decline of these killer whales and believe that we should be taking every precaution, doing all we can, to ensure that my children and generations to come can have these same experiences and know what it is like to grow up in a world with a resident orcas in the Salish Sea.

15. While I understand that Southern Resident Killer Whales are harmed by many human activities, the impacts from oil tankers and other large commercial vessel traffic are among those that I witness and experience most frequently on the water. Traveling in a human powered dugout canoe, we see several oil tankers and other large commercial vessels and it gets very difficult to stay out of their way while we cross major bodies of water like the Strait of Juan de Fuca and the Georgia Strait. We are always afraid that even if they do see us, they'd think we were seagulls on a log of driftwood

16. As more and more large vessels pass through these shipping lanes in our ancestral waters, the risks of oil spills or other accidents increase. A large oil spill in the Salish Sea would be catastrophic for all marine life, especially Southern Resident Killer Whales. These endangered whales are faring poorly enough that even smaller oil spills could have a huge effect – a kind of death by a thousand cuts. I am also informed that the collective noise from these large vessels can affect these orcas' ability to hear each other and to find food.

17. I believe that current levels of oil tanker and other vessel traffic in these waters cause or threaten unacceptable harm to Southern Resident Killer Whales. But those risks are even higher the Trans Mountain Pipeline Expansion Project. This Project will add more than another 400 oil

tankers a year to the already busy waters and shipping lanes in the Strait of Juan de Fuca and around the San Juan Islands. The Project poses an increased risk of an oil spill and approving it means there will be additional harm to the Southern Resident Killer Whales, and all of us who inhabit and depend on the Salish Sea for cultural and spiritual well-being.

I declare under the penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

Signed this 4th day of December, 2018, at Sugvamish, Washington.

<Original signed by>

Nigel Lawrence

Exhibit 10

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IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT – RECONSIDERATION

DECLARATION OF RAY FRYBERG ON BEHALF OF THE TULALIP TRIBES

RAY FRYBERG makes this declaration on behalf of the Tulalip Tribes, an intervenor in the above proceedings, and declares as follows:

1. My name is Ray Fryberg. I am the Natural and Cultural Resources Director for the Tulalip Tribes. In this position, I oversee management of the Tribes' fish and shellfish program. I have served in this role for ten years.

2. I offer this testimony in my official capacity as a representative and official of the Tulalip Tribes, and as a member of the Tulalip Tribes. I am personally knowledgeable about the matters discussed in this declaration.

3. The Tulalip Tribes is the successors-in-interest to the Snohomish, Snoqualmie, Skykomish and other allied tribes and bands signatory to the 1855 Treaty of Point Elliott with the United States government. We exercise inherent sovereign authority over our people, lands, and resources. Our tribal population is about 4,300 and growing, with 2,600 members residing on the 22,000 acre Tulalip Indian Reservation located north of Everett, Washington on the mouth of the Snohomish River and Port Susan and Port Gardner. The reservation includes 16 miles of marine shoreline along the Salish Sea, reflecting our heritage and culture as a marine tribe.

4. As a Coast Salish nation, the Tulalip Tribes has looked to the Salish Sea as an economic, cultural, and spiritual resource since time immemorial. We share the Salish Sea with all Coast Salish nations throughout Washington State and British Columbia. The border between

Canada and the United States does not inhibit the cultural, spiritual, and ecological connectedness between our indigenous nations. Our Coast Salish people paddle the same waters, share the same longhouses, and live the same cultural lifeways as our relatives in British Columbia.

5. There are approximately 60 employees of the Tulalip tribal government that are devoted to the management and protection of natural resources, reflecting the importance of these considerations to the Tribe.

6. The Salish Sea ecosystem, including the fishing and shellfishing it provides, is very important to the Tribe economically, culturally, and spiritually. Tribal fishers are engaged in the harvest of all commercially valuable species, including salmon, Dungeness crab, geoduck and spot prawns. However, the Tribes have also harvested many other species (for example, clams, sea cucumber, shrimp, halibut, dogfish, lingcod, skates, black cod, and flounders) in the commercial fisheries in different proportions in different years. Also, the tribal membership engages in ceremonial and subsistence harvest for many commercial and non-commercial finfish, shellfish, wildlife and plant species in the marine environment. These make up key parts of the traditional diet of the Tulalip tribal members. A 2013 study by the United States Environmental Protection Agency documented fish consumption rates of Tulalip Tribal members that was 5 times higher than the average fish consumption rate of the general population in the United States.

7. It is not possible to overstate the central cultural and spiritual importance of these activities or how much they depend on the health of the Salish Sea. Although the economic benefits of fishing to the Tribe are very significant, it is critical to understand that their value is more than monetary—the loss of these resources cannot be mitigated through money or any

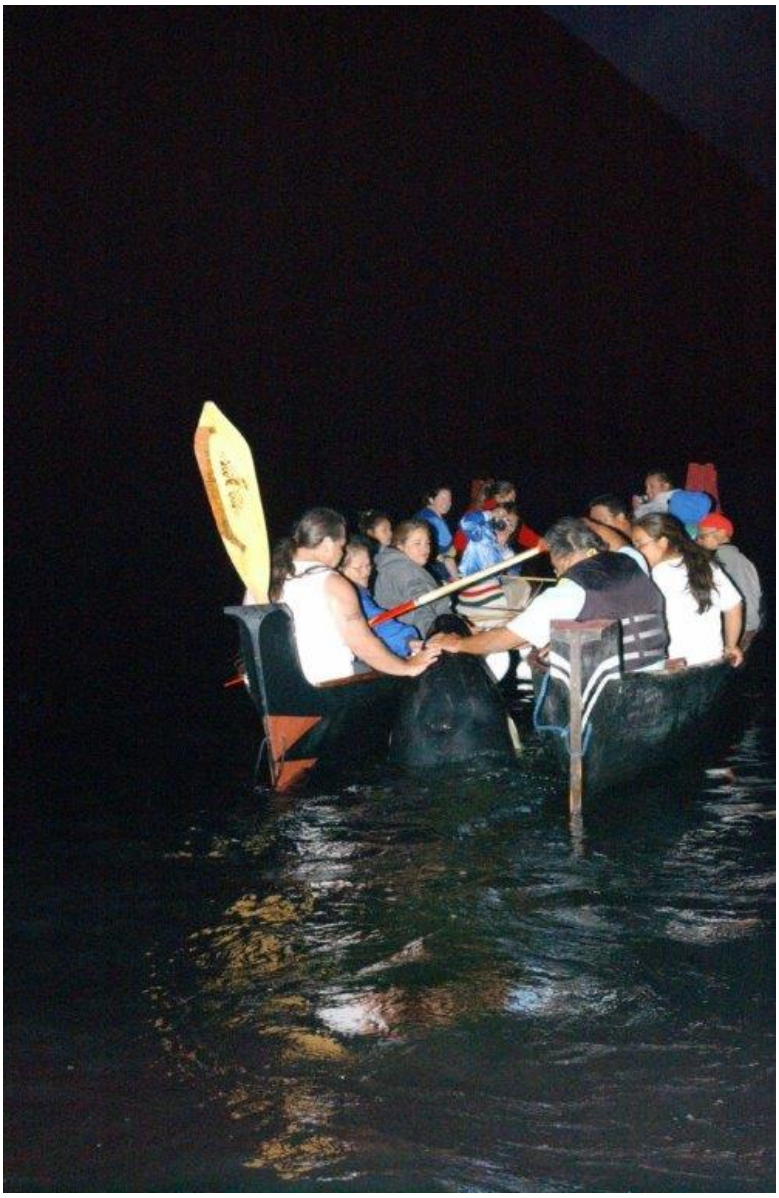
other means. Fishing represents the continuation of our culture, spirituality, and way of life since time immemorial. While the rules and structures of fishing have changed in modern times, fishing is an integral part of our culture. For thousands of years, our people have lived on the marine waters of the Salish Sea harvesting salmon, many other fish species and shellfish. Fishing constituted our economic base prior to European contact, through both trade and sustenance, and continues to this day.

8. The Tribes share fishing and shellfishing territory with many other species in the Salish Sea. While each of these are important to us and to the marine environment (which include our fisheries), the Southern Resident Killer Whales are of particular and deep importance to the Tribes' cultural and spiritual well-being. Like us, these whales rely on salmon to sustain them. Our health and welfare and the Southern Resident's health and welfare are both linked to salmon, and to the clean waters that support them. The health of the whales tells us whether the rest of the Salish Sea is healthy. What happens to them will happen to us.

9. We have fished the waters of the Salish Sea for salmon together with the Southern Resident Killer Whales since time immemorial. That connection is reflected in our culture. The killer whale is held in high honor and respect and is the animal that represents the Tulalip people. The killer whale is our symbol and appears on our flag. In our oral history, the killer whale is known for saving the Tulalip people from starvation. We have watched the whales fish and we have learned from them. Our stories and legends say that the Tulalip people are brothers of the killer whales. The Tulalip people take very seriously their responsibility to be a voice for the Southern Resident Killer whales. We need to say what we can on their behalf.

10. Like many members of the Tulalip Tribes, I have encountered the Southern Resident Killer Whales many times in my years working, fishing, and traveling throughout the

Salish Sea. The most powerful encounter I have had with the Southern Residents took place in 2004 in Nootka Sound. I was invited to the area by the Mowachaht First Nations people after hearing of a remarkable event. An older chief of the Mowachaht told his son that when he passed away, he would return as a killer whale. When the man died in 2001, a killer whale appeared one week later. When I inquired about this story, Chief Kelly John invited me and my family to come to Nootka Sound. As we paddled several canoes and as the Mowachaht began to sing the old chief's songs, a killer whale appeared and shot toward our boats like a torpedo. The whale, known Tsu'xiit (or Luna or L98 to whale researchers) here appeared between the boats and spy-hopped so it could take us in. I was introduced to the whale using my Indian name. The whale looked me right in the eye and held my gaze, never looking away. Tsu'xiit responded with a series of clicks emitted from his blowhole, exhaled right in my face, and soon began making high-pitched calls as he lay alongside the boat; belly to-belly with our canoe. For several more minutes, he swam around and under our canoe – occasionally lifting it from underneath – and running his pectoral fin alongside before we paddled back to shore. This is a photo from that encounter – my family and canoe are on the left:



11. This was the most powerful spiritual experience I have had in my life. I have been a hunter and a fisher all my life. I have worked with animals in my position as Natural Resources Director, but I have never felt like that. In the moments that Tsu'xiit held my gaze another being was looking back at me. I knew that what I'd heard in legends and tales was true. It validated my beliefs and my culture. My young grandson, then about 3 years old, was with me in that canoe and I know that when he is an old man, he will tell his family what we saw and what we did that day.

12. Tulalip tribal fishers, including me, regularly fish a large portion of the Salish Sea; from Seattle in the south, to the Canadian border in the north, to Dungeness spit in the west. I have fished alongside the Southern Residents in many parts of the Salish Sea. I have learned from them and they have often helped me. For example, I have had several lucrative sets when salmon fleeing the Southern Resident Killer Whales have filled my net. Even fishing from shore, I have learned to watch for the killer whales, as they will drive fish into the shallows where they are easier to catch.

13. All of the experiences – and the powerful spiritual and cultural lessons the whales have taught me – depend on a healthy population of Southern Resident Killer Whales. Even when I am not lucky enough to see the whales as I fish or travel these waters, just knowing that the whales are around is enough. It pains me to know that they are critically endangered. They need more Chinook salmon to eat. They need humans to stop releasing poisons into their waters. I consider it my responsibility to be a voice for the whales whenever I can.

14. The San Juan Island waters adjacent to the shipping lanes and the Canadian border are a particularly important area for the harvest of sockeye salmon for the Tribes. These valuable sockeye runs travel across the marine shipping lanes in route to the Fraser River. These waters are also home to the Southern Resident Killer Whales for much of the spring, summer, and fall months as they forage for salmon. Our fishers encounter not only the Southern Residents in these areas, but also large shipping traffic, including oil tankers and other large commercial vessels. Each of these vessels transiting these waters today carries with it the risk of an accident and the release of oil or fuel. As we have learned with a spill like that from the Exxon Valdez, the risk is especially pronounced with oil tankers but is also present for any large shipping vessel

carrying necessary large amounts of marine fuel. A large oil spill, especially in the waters between Dungeness spit and the Canadian border would be catastrophic for the Southern Resident Killer Whales. It would also be catastrophic for our fisheries. Even smaller spills, such as these possible while bunkering or from accidents pose a threat. Whether the oil comes in small drips or all at once, any spilled into the Salish Sea threatens the Southern Residents, and all of us who rely on the clean and healthy Salish Sea.

15. Oil spills are not the only risk posed by oil tankers and other large shipping traffic. As much as shipping traffic can pose a hazard and a nuisance for those of us on the surface – especially tribal fishers who must remain constantly vigilant for approaching larger vessels in the shipping lanes – it interferes with life below the surface as well. I am aware of information showing that the low, constant background noise from the frequent passage of large ships can make it hard for Southern Residents to use their echolocation and calls to find prey and to communicate with each other. It forces them to spend more effort and energy foraging and communicating, and is just one more stress the whales don't need.

16. In addition to existing shipping traffic, I understand that the Canadian Trans Mountain pipeline expansion means that we would see a dramatic increase in the amount of oil tanker traffic in or near the Tribes' historic and current fishing areas and in the home waters of the Southern Resident Killer Whales. The additional 400 oil tankers per year that this pipeline will bring through the Coast Guard's shipping lanes in these waters and will only increase the risk of damaging oil spills or marine fuel and will add further noise and disruption to the Southern Resident's habitat. This activity represents a significant threat to the economic, cultural, and spiritual welfare of the Tribe, including through the potentially devastating risks this traffic poses to the already-struggling Southern Killer Whales.

I declare under the penalty of perjury that the foregoing is true and correct to the best of my knowledge and will adopt this written evidence in an affidavit by January 17, 2019.

Ray Fryberg

Exhibit 11

Hearing Order MH-052-2018
File OF-Fac-Oil-T260-2013-03 59

IN THE MATTER OF
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT – RECONSIDERATION

DECLARATION OF ROBERT PURSER, JR. ON BEHALF OF THE SUQUAMISH TRIBE

ROBERT PURSER, JR. makes this declaration on behalf of the Suquamish Tribe, an intervenor in the above proceedings, and declares as follows:

1. My name is Robert Purser, Jr. I am an enrolled member of the Suquamish Tribe, a federally recognized Indian tribe. I am a descendant of seven treaty chiefs, including Chief Kitsap and Chief Chico. I have lived within Suquamish's territory for my entire life and have served as an elected official on the Suquamish Tribal Council.

2. The Suquamish Tribe is a signatory to the 1855 Treaty of Point Elliot with the United States, one of the Stevens Treaties. The Suquamish Tribe is located on the Port Madison Indian Reservation in Suquamish, Washington in Kitsap County. There are approximately 1,100 enrolled Suquamish Tribal members. Because there are no large rivers in Suquamish's territory, the Suquamish Tribe is one of the few Coastal Salish Tribes who historically covered, and currently still cover, a vast territory—by fishing all areas within Puget Sound, Washington and well documented to the Frasier River in Canada.

3. I am currently employed by the Suquamish Tribe as the Director of the Fisheries Department. I have served as the Tribe's Director of Fisheries since 2000. Since 1979, I have also served on the Tribe's Fish Committee helping to set policies for Suquamish fisheries. I oversee the Tribe's finfish and shellfish resources and program management throughout the

Tribe's adjudicated usual and accustomed fishing area (U&A) that extends from the northern tip of Vashon Island, Washington to the Fraser River in Canada and west through the Straits of Juan de Fuca. Suquamish tribal fishers exercise their treaty fishing rights in all marine waters of the Tribe's U&A, including within the marine shipping lanes.

4. I am also involved in intergovernmental fisheries management organizations. I am a Commissioner in the Northwest Indian Fish Commission. I represent the Suquamish Tribe for the Pacific Salmon Commission Fraser River Panel, which includes both U.S. and Canadian representatives, and the North of Falcon Process, which includes preseason planning and management process for annual harvesting fin fish in Washington State.

5. I am a licensed tribal fisherman and fish commercially and exercise my treaty fishing rights all year round when our fisheries department opens areas to treaty fishing. I began fishing in 1974 and am a third generation subsistence and commercial tribal fisherman within the Suquamish Tribe's U&A. I have also commercially fished from Alaska to California.

6. The importance of the health of the Salish Sea to the Suquamish people cannot be overstated. Like other Coast Salish Tribes, Suquamish relies on salmon as a food staple. Suquamish tribal fishers harvest all species throughout its U&As, including but not limited to steelhead, cod, flounder, perch, trout, herring, rock cod, Ling cod, black cod, sturgeon, skate, dogfish. The Tribe harvests shellfish, including but not limited to crabs, clams, cockels, mussels, barnacles, geoduck, oysters, scallops, shrimp, red and green sea urchins, and sea cucumbers. Historically tribal fishers also harvested dahl porpoise, seals and sea lions, octopus, china slippers, marine and freshwater birds (ducks), and other marine mammals. These resources are harvested for subsistence, ceremonial, and commercial purposes. The

Tribe's treaty reserved right to access fishing grounds and harvest natural resources is central to the Tribe's way of life.

7. The Suquamish fishing fleet has maintained an average of 50 boats that includes an average length under 30 feet. A few boats are over 50 feet. Tribal fishers harvest finfish using purse seines, drift gillnets, and set gillnets that are approximately 1800 feet. Shellfish are harvested by diving (geoducks, sea cucumber and sea urchins), pots and dragging (crab, shrimp), and digging (clams and other bivalves). Fishing is spread throughout the year, with the largest concentration occurring in July through September. There are other fisheries that occur such as crab, shrimp, steelhead, geoduck, and blackmouth salmon.

8. Since time immemorial, the Salish Sea's Southern Resident Killer Whales have maintained a strong presence in the Tribe's fishing territory and are interwoven into the Tribe's treaty resource harvesting, cultural, and spiritual practices. I and other Suquamish fishermen observe and interact with Southern Resident Killer Whales regularly. I and other Suquamish fishermen understand the link between a healthy population of Southern Resident Killer Whales and healthy, functioning marine environment throughout the Salish Sea. The Southern Resident Killer Whales area also called "blackfish" and feed on salmon for their health and survival. They are often hunting for salmon in the same areaa waters where we exercise our treaty fishing rights. If there's no fish, there's no blackfish. Salmon are the cornerstone species for tribes and blackfish. In this and many other ways, the health of the Southern Resident Killer Whale population indicates the health of the Salish Sea and those of us whose physical, cultural, economic, and spiritual health and well-being depend on it and its resources.

9. In my years fishing the waters of the Salish Sea, I have seen and experienced the Southern Resident Killer Whales many times. Because the whales follow the main schools of fish, it tells me and other tribal fishermen where the fish are and that they won't be out in the deep water. At a minimum, I usually see Southern Resident Killer Whales several times a year when I'm fishing in the Salish Sea. It's always a blessing when you see them for several reasons. You know there are fish around. Tribal elders say that their presence shows us that our ancestors are paying a visit. I feel honored in their presence. I have seen and caught a lot of fish when the Southern Resident Killer Whales are present. All they have to be present and the fish move against the rocks. They try to avoid being caught and they jump up on the rocks. I fish right next to rocks parallel to the beach and it's an easy harvest. The fish also swim in the shallow areas where they know the whales can't reach them. I also harvest fish in the shallow areas when this happens. Overall, when Southern Resident Killer Whales are around it does help me and other tribal fishermen to find fish.

10. Suquamish Tribal members, including me, also understand and feel our connection to the Southern Resident Killer Whales in other ways. For example, on October 29, 2013, three dozen Southern Resident Killer Whales surrounded a Washington State ferry that was transporting 500 artifacts, many up to 2,000 years old, that were taken nearly 60 years ago from Old Man House, once the largest Longhouse in Puget Sound and the home of Chief Seattle. The orcas surrounded the ferry as it pulled into the ferry terminal on Bainbridge Island, Washington, while these artifacts were being returned to the Suquamish Museum after being temporarily held at the Burke Museum at the University of Washington. The Suquamish people believe the orcas were welcoming the artifacts home as they made their way back to the Port Madison Indian Reservation. See Attachment A.

11. The Suquamish Tribe's U&A and other tribes' U&As are in areas that include shipping traffic, including in the waters in the international shipping lane in the Strait of Juan de Fuca. For example, the gillnet fishery occurs within these shipping lanes using 1800-foot-long nets. When the nets are loaded with fish, it can take on average 10 hours and up to 20 hours to pull in the drift net and retrieve fish, depending on the circumstances. During that time, fishing boats drift in and out of the shipping lane while the web of the fishing net is still in the water. You cannot maneuver the net with any speed due to the volume of the loaded net. Fishing occurs at all hours of the day and night. The number of sets performed by a fisher depends on volume of fish intercepted. In other words, it could be that one set meets the fleet's target or it may require a number of sets by each fisher.

12. The 1855 Treaty of Point Elliot predates the establishment of marine shipping lanes. Tribes historically fished in the areas of the shipping lanes and have a treaty-reserved right to continue to fish in the shipping lanes. Existing inbound and outbound shipping traffic (non-tribal) already causes interference with tribal fishing activities. The types of interferences with shipping traffic and tribal fishers occur when ship traffic passes through the Tribe's fishing grounds and damage tribal gill nets. This causes net damage and/or net loss and loss of fish, along with creating serious safety and health hazards on the water. I have first-hand experience of this increase in shipping traffic and its interference with tribal fishing fleet in the Tribe's U&A. These interferences cause economic hardship to tribal fishers due to loss of gear and loss of fish. This further impacts the Tribe's ability to carry on its time immemorial ceremonial, subsistence, and commercial practices.

13. In addition to these direct impacts on treaty fishing and other uses of these waters, shipping traffic also poses risks to the Salish Sea ecosystem that both the Tribe and

Southern Resident Killer Whales rely upon. There has been a steady increase in the amount of vessel traffic through Suquamish's U&A over the past decade, posing a risk of an oil spill or other harms from a large or small accident. While a catastrophic oil spill would devastate the Salish Sea ecosystem and the Southern Resident Killer Whales, even smaller spills harm the marine ecosystem and the Southern Resident Killer Whales. Suquamish has first-hand experience of the range of impacts to its tribal members, the environment, natural resources, and fish, shellfish, marine mammals, and other wildlife from an oil spill that originated at the Point Wells and landed on Doe-Keg-Wats—a salt water marsh, estuarine, tidal, sub-tidal and beach property of cultural importance to the Tribe. In fact, Doe-Keg-Wats was the largest pristine saltwater marsh in the State of Washington.

14. In addition to the existing shipping traffic, I understand that the Trans Mountain Pipeline Expansion Project will provide a seven-fold increase in oil transport through the Salish Sea, plus it will cause an increase in the amount of bunkering at Vendovi Island, Washington, a location in the heart of tribal fishing grounds and designated critical habitat for Southern Resident Killer Whales. Marine shipping tied to the Trans Mountain Pipeline Expansion Project can only increase the risk of catastrophic oil spills and smaller spills. In addition to the increased risk of oil spills and the harm they cause to Southern Residents and the Salish Sea ecosystem, this increased vessel traffic will have additional long-lasting impacts to Suquamish by interfering with the ability to harvest fish and shellfish as reserved under the 1855 Treaty of Point Elliot for ceremonial, subsistence, and commercial uses.

15. There's no guarantee that a devastating catastrophic oil spill and/or the death by a thousand cuts caused by many smaller spills will not negatively affect the health of the Salish Sea, the health of the orcas, and in turn negatively affect the traditions and customs of

the Suquamish Tribe and other aboriginal Coast Salish Nations throughout the Salish Sea that have existed since time immemorial. The Coast Guard and other federal agencies should be doing everything they can to prevent these kinds of accidents and to otherwise mitigate the risks and harms to the Salish Sea ecosystem (including its endangered orcas) caused by the passage of oil tankers and other large commercial vessels through these shipping lanes.

16. The Tribe reserved its treaty rights when we signed the Treaty of Point Elliot in 1855. That is the Tribe's right, our heritage, our culture, and our identity.

I declare under the penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

Signed this 3rd day of December, 2018, at Suquamish, Washington.

<Original signed by>

Robert Purser, Jr.

ATTACHMENT A

To Declaration Of Robert Purser, Jr.

On Behalf Of The Suquamish Tribe

Puget Sound orcas circle ferry carrying artifacts

seattletimes.com/seattle-news/puget-sound-orcas-circle-ferry-carrying-artifacts/

By DOUG ESSER Originally published October 31, 2013 at 2:28 pm *Updated November 1, 2013 at 11:10 am*



A large pod of orcas swam around a Washington state ferry in an impressive display as it happened to be carrying tribal artifacts to a new museum at the ancestral home of Chief Seattle, and some people think it was more than a coincidence.

Killer whales have been thrilling whale watchers this week in Puget Sound, according to the Orca Network, which tracks sightings.

But they were especially exciting Tuesday when nearly three-dozen orcas surrounded the ferry from Seattle as it approached the terminal on Bainbridge Island. On board were officials from The Burke Museum in Seattle who were moving ancient artifacts to the Suquamish Museum.

The artifacts were dug up nearly 60 years ago from the site of the Old Man House, the winter village for the Suquamish tribe and home of Chief Sealth, also known as Chief Seattle. The Burke, a natural history museum on the University of Washington campus, is known for Northwest Coast and Alaska Native art.

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Also on board the state ferry was Suquamish Tribal Chairman Leonard Forsman who happened to be returning from an unrelated event. As the ferry slowed near the terminal, it was surrounded by the orcas, Forsman said Wednesday.

“They were pretty happily splashing around, flipping their tails in the water,” he said. “We believe they were welcoming the artifacts home as they made their way back from Seattle, back to the reservation.”

The killer whales have been in Puget Sound feeding on a large run of chum salmon, he said.

“We believe the orcas took a little break from their fishing to swim by the ferry, to basically put a blessing on what we were on that day,” he said.

Forsman believes there’s a spiritual tie between the tribe and the orcas. “They are fishermen like we are,” he said.

It was an auspicious arrival for about 500 artifacts that The Burke Museum had held for nearly 60 years, Suquamish Museum Director Janet Smoak said.

They include tools, decorative items and bits of bone and rock that date back 2,000 years.

The Old Man House — the largest known longhouse on the Salish Sea — was located at Suquamish on the shore of Agate Passage, about 13 miles northwest of Seattle. Chief Sealth, for whom Seattle is named, is buried there.

The longhouse was burned down by the U.S. government in the late 1800s. The artifacts were collected by a University of Washington archaeological investigation in the 1950s, according to the Burke museum.

In 2012, the tribe completed its new museum, which includes a climate controlled environment. The artifacts will be displayed to illustrate Suquamish culture in an exhibit called Ancient Shores Changing Tides.

Everyone was talking about the orcas at the Tuesday museum blessing ceremony and feast, Smoak said.

“Everyone was really excited and moved by the event,” she said.

The orcas, identified from their markings as members of the J and K pods, were seen this week along several routes between the Seattle area and the west side of Puget Sound, according to Howard Garrett of the Orca Network at Freeland.

He thought their intersection with the ferry carrying tribal artifacts was uncanny.

“I can’t rule out somehow they could pick up on the mental energy that there is something special there. Or it could be a coincidence,” he said. “I don’t know.”

Exhibit 12

Search

Environment

2 more Puget Sound orcas predicted to die in critically endangered population

Originally published January 2, 2019 at 3:09 pm *Updated January 3, 2019 at 10:54 am*



1 of 2 J17 rolls on her side, showing the dramatic constriction in the shape of her neck, which should be a smooth line. The condition, known as peanut head, is a sign of starvation in killer whales. (Center for Whale Research under DFO SARA permit 388)

Two southern resident killer whales are ailing and are not expected to live, according to the lead demographer of the orca population that frequents Puget Sound.

By Lynda V. Mapes

Seattle Times environment reporter

Two more orcas are ailing and probably will be dead by summer, according to the region's expert on the demographics of the critically endangered southern residents.

Ken Balcomb, founding director of the Center for Whale Research, said photos taken of J17 on New Year's Eve showed the 42-year-old female has so-called peanut head, a misshapen head and neck caused by starvation. In addition K25, a 27-year-old male, is failing, also from lack of sufficient food. He lost his mother, K13, in 2017 and is not successfully foraging on his own.

"I am confident we are going to lose them sometime before summer," Balcomb said.

Drone photography this past summer showed K25 to be noticeably thinner, and photos taken of him again in this winter show no improvement, Balcomb said.

Hostile Waters: Orcas in Peril



PART I | Orcas thrive in a land to the north. Why are Puget Sound's dying?

PART II | How a generation of killer whales was taken from Puget Sound

FAQ: A primer on the critically endangered killer whales

ABOUT THIS SERIES *In the weeks and months ahead, The Seattle Times' "Hostile Waters" series will continue to explore and expose the plight of the southern resident killer whales, among the most-enduring symbols of our region and most-endangered animals. We'll examine the role humans have played in their decline, what can be done about it and why it matters.*

Several whales were documented to be pregnant back in September, but so far there has been no sign of any babies. The southern residents have not had a successful pregnancy in three years.

The troubling news comes on top of a grim year in 2018 for the southern residents, the J, K, and L pods of fish-eating orcas that frequent the Salish Sea, which includes Puget Sound and the transboundary waters of the United States and Canada, as well as the West Coast of the United States.

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The southern resident population is at a 35-year low after three deaths this past year in four months. There are only 74 left. “I am going to stop counting at 70,” Balcomb said. “What is the point?”

Losing J17 would be a blow to the southern residents because she is a female still of reproducing age, said Deborah Giles, research scientist for University of Washington Center for Conservation Biology and research director for nonprofit Wild Orca.

Giles said she was not surprised to hear about K25. The social dynamics of the southern residents, in which older females help their pod, and especially their sons by sharing food, is both a blessing and a curse if that female dies, Giles said.

“These large, adult, hungry males benefit by the females in their family,” Giles said. “There probably is still family foraging going on, but not like he had when his mom was alive.”

As for J17, “that is the worst of those two, the thought of losing her, she is such an important member for the southern resident community,” Giles said.

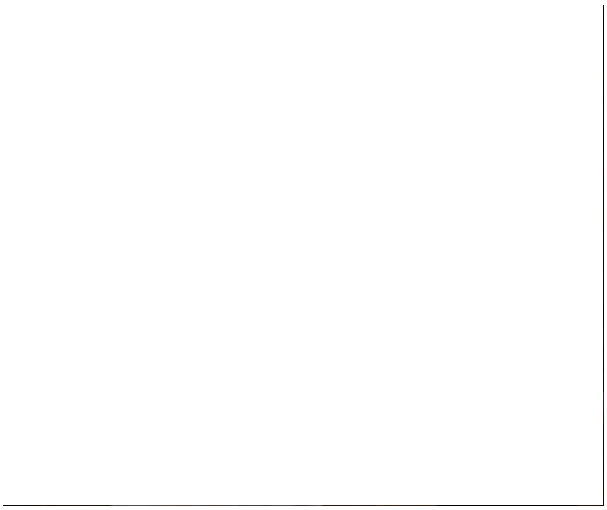
J17 is the mother of J35, or Tahlequah, who moved people around the world when in 2018 she carried her dead calf that lived for only one half-hour on her head for more than 1,000 miles over the course of 17 days.

The family already has been through a lot.

“We have no idea what that grandmother went through, watching her daughter carry around that baby as long as she did,” Giles said. “What would that have been like. To watch your daughter go through that grief and not have much you can do about it.”

The same family in 2016 also lost J54, a 1-year-old whale the whole family tried to support, especially his sister, J46, feeding him, and lifting the baby whale up with their teeth every time he started to sink. “The other whales were trying to support him,” Balcomb said. “He had tooth rakes all over his body, but it wasn’t malicious, he was sinking.”

It is hard to confront a new year with two whales already failing, Giles said. “It is this anticipatory grief. I am worried. And I am afraid.”



Drone photography taken this past September showed the southern residents went into the winter thinner than they were when the whales arrived in the San Juan Islands last summer. They also are thinner than the northern residents, which have been steadily growing in population for the past 40 years in their home waters primarily in northern B.C. and southeast Alaska, where they have access to more fish, and cleaner and quieter water. The northern residents gave birth to 10 new calves last year.

The southern residents look particularly thin next to the seal-eating transient, or Bigg’s, killer whales.

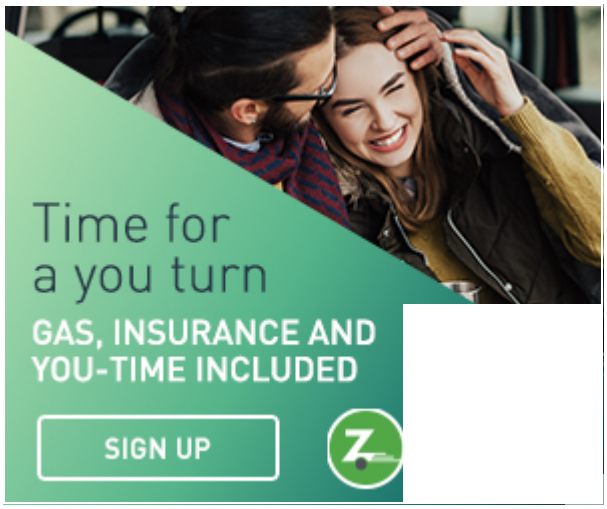
“They are like marshmallows,” Balcomb said.

The coming year is not looking any easier for the southern residents in terms of their food supply. The whales mostly eat chinook salmon.

Ocean conditions and poor river migration, with warm water and low flows, have hurt chinook salmon returns in the past several years. Even Columbia River fall chinook, a bright spot by comparison in the region, came back to the river in such low numbers

last summer that a rare emergency fishing closure was enacted on the river from the mouth all the way to Pasco.

Only 186,862 fall chinook made it back below Bonneville dam in 2018, 65 percent below the 10-year average. Returns over Bonneville of jacks, or immature chinook, which can be a reliable predictor of this year's return, were down to 61 percent below the 10-year average.



Columbia River chinook are important to the whales because they are among the biggest, fattiest fish of all. The whales also target chinook returning to rivers in Puget Sound, and in the summer, to the Fraser River. Those runs have been declining as well.

The whales' behavior is changing as their food sources dwindle. They are arriving later and later in the San Juan Islands, because the Fraser River chinook runs they seek in those waters have so declined. The southern residents also are no longer often seen in large groups, in a pattern of feeding, then socializing, then resting before going on to a new spot.

"They do not have enough fish to feed them, they are spread out all over, we never seem them like it was 30, 40 years ago, when they would travel and find fish, then be playful, then rest, then travel again, that was the pattern," Balcomb said.

"You don't see them resting any more, they have to work all the time, every day."

He said proposals put forward for the whales in the governor's $1.1 billion budget for orca recovery, including a temporary ban on whale watching of the southern residents don't go far enough.

"We need bold action," Balcomb said. "Natural rivers and more chinook salmon."



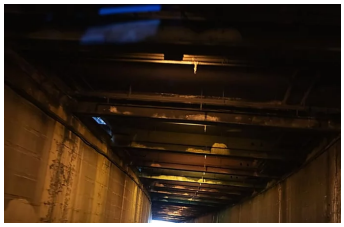
***Lynda V. Mapes**: 206-464-2515 or lmapes@seattletimes.com; on Twitter: @LyndaVMapes. Lynda specializes in coverage of the environment, natural history, and Native American tribes.*

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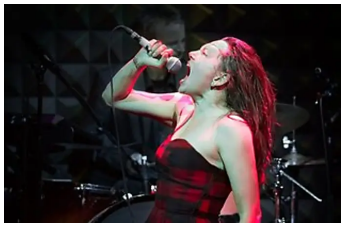
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Around the Web

Exhibit 13

2018



Southern Resident Orca

Task Force

Report and recommendations
November 16, 2018

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CASCADIA CONSULTING GROUP

Cover photo credit: Monika Wieland Shields

Co-chair letter of transmittal

Governor Jay Inslee
Office of the Governor
Olympia, WA 98504

Dear Gov. Inslee,

Thank you for the opportunity to serve on behalf of the Southern Resident orcas, fellow creatures that are deeply meaningful to us and critically important to the well-being of Washington's marine ecosystem. Thank you, too, for your leadership in establishing the Southern Resident Orca Task Force. As co-chairs of the task force, we are submitting an ambitious package of science-based recommendations for your consideration. If enacted, these recommendations will make significant progress toward recovering our Southern Residents.

In 2018, we tragically lost three Southern Residents — Crewser (L92), Scarlet (J50) and the newborn calf of Tahlequah (J35) — bringing the number of Southern Residents to just 74. Perhaps the most heart-wrenching was that of J35's calf. The world watched as Tahlequah swam 1,000 miles with her dead calf, supported by her J-pod family, finally letting the body go after a 17-day vigil. We all grieved, and collectively realized our kinship with these highly sophisticated and emotionally intelligent mammals.

This fall, we learned that there is at least one pregnant female in each of the Southern Residents pods. This good news offers hope for the future while underscoring the need to take action immediately to give them the best chance of survival.

From the start, our goal has been to do what is best for the Southern Residents and recommend actions that are feasible, that will improve conditions in the short run while providing the basis for long-term recovery, and that draw on contributions from all. Through our deliberations, we have learned that there are no quick and easy fixes and that successful recovery will require comprehensive, collective action by all of us.

We are pleased to report that this package represents a consensus of and is supported by an overwhelming majority of the task force, with minority opinions provided where differences exist on specific actions. We believe that implementing these recommendations will lead to an increase in Chinook salmon from Puget Sound, the Columbia River and the Washington coast to provide the food that the Southern Residents desperately need. Toxic contaminants will be reduced, improving salmon and orca health and survival. And vessel noise and other disturbances will be lessened, improving the orcas' ability to forage and communicate.

Success in this endeavor will require significant investment from the state and our many regional partners as well as legislation to enact recommended policies into law. We look forward to working with your administration and the Legislature to secure these resources and outcomes. In Year Two, the task force will monitor progress on implementation and orca health and address other pressing

issues such as the impacts of climate change and human population growth on the Southern Residents.

We wish to thank members of the task force, who all contributed their expertise and time and earnestly worked through their differences to come to agreement on this package. We particularly appreciate the participation of tribal leaders, who as representatives of their sovereign nations joined in our discussions and contributed their spirit and wisdom. We also wish to express our deepest gratitude to the members of our three working groups, who contributed their knowledge, scientific expertise and countless hours to identify and analyze the myriad options to address threats to Southern Residents and put forward recommendations for task force discussion. We could not have done this work without all of them.

Finally, we wish to express our heartfelt appreciation for the many members of the public who care so deeply about the Southern Residents and who fervently asked that we get this right and commit to the actions necessary to protect the orcas. We received over 18,000 written public comments and were personally moved by the presence and words of the hundreds of individuals who attended and spoke at our meetings. Their passion and concern inspired all of us to redouble our efforts to find consensus on actions that can truly make a difference for our Southern Resident orcas.

Sincerely,

Les Purce and Stephanie Solien



Executive summary

Executive order

On March 14, 2018, Gov. Jay Inslee signed Executive Order 18-02: Southern Resident Killer Whale Recovery and Task Force. Through this executive order, the governor directed state agencies to implement nine immediate actions to benefit Southern Resident killer whales (hereafter in this report "Southern Resident orcas"). He also established the Southern Resident Orca Task Force to identify, prioritize and support the implementation of a long-term action plan for the recovery of Southern Resident orcas to ensure a healthy and sustained population for the future. The new task force had nearly 50 representatives from diverse sectors, including tribal, federal, local and other state governments, state agencies, the Washington State Legislature, the private sector, nonprofit organizations and the Government of Canada. The governor charged the task force with preparing this comprehensive report which identifies needed policies and programs, recommends priority actions to support recovery efforts, highlights budget needs and recommends legislation necessary to support the recovery of Southern Resident orcas. The task force will continue its work in 2019 and produce a second report by October that will outline progress made, lessons learned and outstanding needs.

Urgency

The Southern Resident orca population travels in pods from central Southeast Alaska to central California, spending most of the year in the Salish Sea near the San Juan Islands, on the outer coast of Washington and along the outer coast of southern Vancouver Island. The Southern Resident orca was classified as endangered in Canada under the Species at Risk Act in 2003 and in the United States under the federal Endangered Species Act in 2005. Washington state classified orcas as endangered in 2004.

Since Executive Order 18-02 was signed, the population of Southern Resident orcas has dropped to 74, the lowest number in more than 30 years. The orcas are struggling to find food and raise calves.

None of the Southern Resident calves born between 2015 and 2018 has survived. In 2018, tragedies in the Southern Resident population put an even brighter spotlight on the need for urgent and effective action. Tahlequah, or J35, carried her deceased newborn for 17 days in late July and early August more than 1,000 miles in what was widely seen as a display of deep mourning. Three-year-old Scarlet, or J50, was presumed dead in September after showing signs of severe emaciation.

The extinction of these orcas would be an unacceptable loss. These orcas are beloved and hold significant value as an iconic and treasured species in Washington and throughout the Pacific Northwest, particularly for tribal communities. They also serve as an indicator of the health of our waters. Action is required immediately to help the orcas and the entire ecosystem we depend upon.

The task force's ultimate goal is to ensure a healthy and resilient ecosystem that supports a thriving Southern Resident orca population and prevents its extinction.

Key threats

The task force focused on the three major threats to Southern Resident orcas identified in the 2005 listing under the Endangered Species Act and in Gov. Inslee's executive order:

- **Lack of prey**. The Southern Resident orca diet is composed primarily of Chinook salmon. Several runs of Chinook salmon that could provide important prey for Southern Resident orcas are listed as threatened or endangered under the Endangered Species Act. To be abundant, diverse and sustainable, Chinook need productive and protected habitat as well as a reliable supply of forage fish to feed on. Development activities and fish passage barriers such as impassable dams, tide gates and culverts have led to habitat loss for both salmon and forage fish. Predators such as sea lions, harbor seals, fish and birds consume Chinook and reduce the number available to the orcas where their foraging areas overlap. Salmon harvesting in fisheries in Alaska, British Columbia, off Washington's coast or in Washington's inland waters can further reduce the number of Chinook available for the orcas. Hatchery production could play an important role in increasing prey abundance for Southern Residents but also poses genetic and ecological risks to wild populations if not managed carefully. Addressing lack of prey therefore requires addressing all these issues: habitat, forage fish, hydropower, predation, harvest and hatcheries.
- **Disturbance from noise and vessel traffic**. Vessels transiting near Southern Resident orcas can produce underwater noise that masks or impairs orca communication and echolocation (the method orcas use to find their prey). This makes it harder for orcas to find food and reduces the time orcas devote to foraging by almost 20 percent, reducing their potential prey intake and increasing their energy expenditure.
- **Toxic contaminants.** Southern Residents and their prey are exposed to an ever-increasing mixture of pollutants in the marine environment, particularly in the Salish Sea. Many of the pollutants are poorly metabolized, persist in the environment and bioaccumulate and bio-magnify in the food web. These toxics can reduce salmon survival by making them more

susceptible to disease, which in turn means less food is available to the orcas. The toxic contaminants can also reduce immunity and cause reproductive disruption in orcas.

In addition to these three key threats, climate change and ocean acidification are overarching threats that will exacerbate current stresses on the Southern Residents, primarily through the food web as warmer stream and ocean temperatures, lower summer stream flows, heavier winter rainstorms and sea-level rise impact salmon, forage fish and the entire ecosystem that orcas rely upon.

Process

The task force held six meetings from May through November 2018 throughout the state of Washington. Working groups composed of relevant subject matter experts and stakeholders supported the task force throughout the process using the best available science to identify, research and analyze potential actions. The 18,000 comments received from the public were also a key element informing this process and task force decisions.

Recommendations

The task force focused on developing a package of recommendations that, if implemented, would collectively have the impact needed to achieve the vision of a thriving and resilient Southern Resident orca population.

The recommendations support four goals:

- **Goal 1:** Increase Chinook abundance.
- **Goal 2:** Decrease disturbance of and risk to Southern Resident orcas from vessels and noise, and increase their access to prey.
- **Goal 3:** Reduce the exposure of Southern Resident orcas and their prey to contaminants.
- **Goal 4:** Ensure that funding, information and accountability mechanisms are in place to support effective implementation.

Recommendations and associated implementation details are described in the report.



Vision

> *We envision a thriving and resilient population of Southern Resident orcas, living in healthy waters and inspiring our descendants with their majesty.*

Goals

Our ultimate goal is to ensure a healthy and resilient ecosystem that supports a thriving Southern Resident orca population. We seek to protect the Southern Resident orcas from extinction.

We align ourselves with the Recovery Plan for Southern Resident Killer Whales (Orcinus orca) prepared by the National Marine Fisheries Service (2008) and its goal of an average population growth rate of 2.3 percent per year for 28 years.

Between now and 2022, our goal is to witness evidence of consistently well-nourished whales, more live births and the survival of several thriving young orcas. By 2028, our goals are to see the primary indicator of body condition of the whales (the ratio of head width to body length in adults) remain high and stable between seasons and across years and to see an increase in the population to 84 whales (10 more whales in 10 years).

To achieve our goals, we commit to:

- Restoring sustainable, harvestable Chinook populations in healthy habitats across Washington state, supporting and accelerating implementation of the federally approved salmon recovery plans.
- Reducing the impacts of vessel noise and disturbance so the Southern Residents can effectively forage, rest and socialize.
- Reducing the toxicity of the ecosystem to improve the health of whales and their prey.
- Using the best available science to develop and implement a plan to realize our vision.

Introduction

Executive order

On March 14, 2018, Gov. Jay Inslee signed Executive Order 18-02: Southern Resident Killer Whale Recovery and Task Force (see Appendix 1 for the full text). Through this executive order, the governor directed state agencies to implement nine immediate actions to benefit Southern Resident orcas (refer to the "Ongoing and Immediate Actions" section of this report for details). He also established the Southern Resident Orca Task Force to identify, prioritize and support the implementation of a longer-term action plan for the recovery of Southern Resident orcas so that Washington has a healthy and sustained population of Southern Residents in the future.

The governor charged the task force with preparing a comprehensive report with recommendations for recovering Southern Resident orcas. The executive order outlines prey abundance, toxic contaminants and disturbance from noise and vessel traffic as the major threats that must be addressed. The governor directed the task force to identify needed policies and programs, recommend priority actions to support recovery efforts, highlight budget needs and recommend any legislation necessary to support the executive order. To inform the development of legislative and budget proposals for the 2019–21 biennium, the governor directed the task force to submit its first comprehensive report and recommendations for recovering Southern Residents by November 2018 and a second report by October 2019. The second report will outline progress made, lessons learned and outstanding needs.

The range of the Southern Residents

The Southern Resident orca population is composed of the J, K and L pods. Travelling in these pods of extended family members, orcas range from central Southeast Alaska to central California but spend most of the year in the Salish Sea near the San Juan Islands, on the outer coast of Washington and the outer coast of southern Vancouver Island. In pursuit of migrating salmon, Southern Residents are known to forage farther south in Puget Sound during the fall and spend time near the Columbia River mouth in winter [1].

The task force recognizes that U.S. and Canadian marine waters and Chinook from Canadian rivers are important for the health and recovery of the Southern Resident orcas and recommends that Washington continue to work cooperatively with Canada on transboundary efforts to improve conditions related to prey, contaminants and vessel disturbance. It will also be important to work with other states and across all levels of government within the U.S. to address the threats to the Southern Residents.

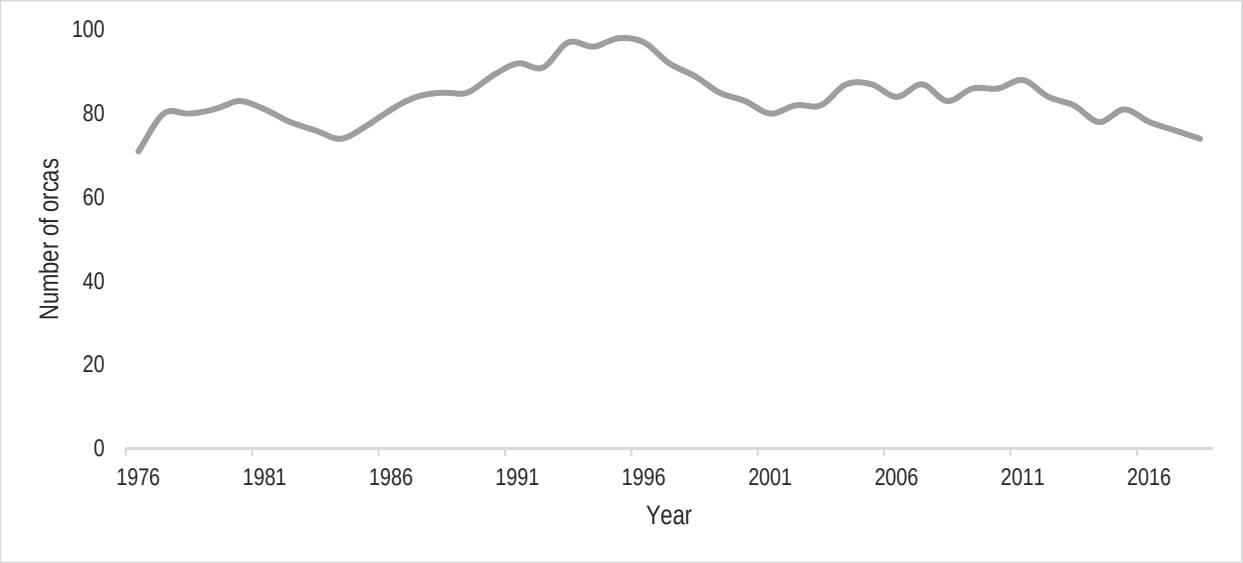


Urgency

The first Southern Resident orca population census in 1973 identified 66 orcas. It included reductions due to captures for marine parks between 1965 and 1975. As shown in Figure 1, since 1975 the population has experienced periods of growth, and in 1995 increased to a high of 98 orcas. However, between 1995 and 2003, the population dropped by 16 percent, down to 82 orcas, which prompted their listing as an endangered species [2]. Southern Resident orcas were classified as endangered in the United States under the federal Endangered Species Act in 2005 and in Canada under the Species at Risk Act in 2003. Washington state classified orcas as endangered in 2004. In response, the National Marine Fisheries Service Northwest Regional Office prepared the 2008 Recovery Plan for Southern Resident Killer Whales. The plan details and analyzes potential threats affecting Southern Residents and outlines an adaptive management approach to recovery strategies addressing each threat, based on the best available science.

Since Executive Order 18-02 was signed in March of 2018, the population of Southern Resident orcas has dropped to 74, the lowest number in more than 30 years. Experts believe that, overall, the orcas are in poor condition and struggling to raise calves. In a study published in 2018, researchers from the Center for Conservation Biology at the University of Washington, the National Oceanic and Atmospheric Administration's Northwest Fisheries Science Center and the Center for Whale Research noted that up to two-thirds of Southern Resident orca pregnancies from 2007 to 2014 failed [3]. In addition, none of the Southern Resident calves born between 2015 and 2018 has survived. In the past two decades, there have also been more male calves than female calves, raising concerns about the population's reproductive potential even when the calves survive [4].

Figure 1: Southern Resident orca population trend [5]



As the task force convened in 2018, tragedies in the Southern Resident population put a spotlight on the urgency of taking effective action. Crewser, or L92, was not with his pod when it returned to Puget Sound in June and was presumed dead. Tahlequah, or J35, had a calf that lived for only a half hour; she carried her newborn for 17 days more than 1,000 miles in what was widely seen as a display of deep mourning. Three-year-old Scarlet, or J50, was presumed dead in September 2018 after showing signs of severe emaciation; the National Oceanic and Atmospheric Administration, tribes and other partners had worked to diagnose and treat her but were unsuccessful. Despite best efforts, the underlying cause for her condition was never identified. In the fall of 2018, scientists noted that there was at least one pregnant female in each of the three Southern Resident pods. It will be critical that they get the food they need to bring those pregnancies to term and ensure the calves are strong enough to survive.

The extinction of these orcas would be an unacceptable loss. They are an essential component of our broader marine ecosystem, serving as an indicator of the health of our waters. If these creatures — the mammals who inhabit the top of the food chain — are unable to survive, it portends trouble for the rest of the inhabitants of this region. Their extinction would also be an irreplaceable cultural loss as these orcas are beloved and hold significant value as an iconic and treasured species in Washington and throughout the Pacific Northwest. The orcas have vital cultural and spiritual importance to many sovereign tribal nations. Inaction is not an option. Swift and bold near-term actions and effective long-term actions are urgently needed to not only help secure a healthy and sustained Southern Resident orca population, but also the entire ecosystem we depend upon. The overarching threat of climate change only adds to the urgency. Action to recover the Southern Residents must be taken at all levels across boundaries and including governments and individuals throughout the region.

Process

This section describes the process undertaken to create the task force and ensure that it had the support, information and public input needed to develop recommendations to the governor.

Creation of the task force

The governor invited members of the Legislature and the Government of Canada and representatives from tribal, federal, local and other state governments, state agencies, the private sector and the nonprofit sector to participate in the task force (refer to Appendix 2 for a full list of task force members). The task force held six meetings from May through November 2018 throughout the state of Washington in Olympia, Wenatchee, Anacortes, Tacoma and Puyallup.

Through these meetings, the task force worked toward three goals outlined in the executive order:

- Monitor and evaluate the immediate actions undertaken by state agencies and build upon the progress and effectiveness of that work.
- Identify, prioritize and support the implementation of a longer-term action plan needed for the recovery of Southern Resident orcas.
- Where available and applicable, build upon state, tribal, regional and federal salmon and orca recovery plans.

Working groups

To help the task force complete its work, the task force established three working groups. The Prey, Vessels and Contaminants working groups were composed of relevant subject matter experts and stakeholders. Each working group had 20–35 members and one to two state agency leads (refer to Appendix 2 for a full list of working group members). The working groups supported the task force using the best available science and personal knowledge or experience to identify, research and analyze potential actions and formulate recommendations for task force consideration. Each working group met one to two times per month from May through November 2018 at several different locations throughout the state, including Ridgefield, Tacoma, Olympia, Ellensburg and Seattle, and sometimes by phone.

Working groups developed lists of potential actions for task force deliberation and analyzed those potential actions using considerations such as:

- Effectiveness in improving Southern Resident orca survival and/or ability to reproduce.
- Timeline for benefits to Southern Residents once the action is implemented. Rating options were "immediate" (zero to three years), "intermediate" (three to 10 years) and "long term" (more than 10 years).
- Ease of implementation, including technical, political/social and regulatory feasibility, and the degree to which it reinforces or leverages current efforts.

- Estimated cost to implement. Actions were rated "high" for affordability if they cost less than $30 million, "medium" if the estimated cost was $30 million to $100 million and "low" if the estimated cost was more than $100 million.

Working groups also provided additional information related to:

- Social/cultural, community and environmental costs and benefits of actions.
- Climate change considerations.
- Potential ways to ameliorate any negative impacts and equity concerns.
- Where and when to implement each action.
- Links to current programs.
- Current and potential funding sources.

These details were provided to task force members to inform their decisions. The task force responded to the working groups with questions, feedback, new action ideas and requests for wording changes. The working groups used task force inputs to refine the draft list of recommendations. The task force then deliberated and made final decisions during its final meeting of 2018.

Steering committee

In addition to the working groups, the task force was supported by a steering committee charged with ensuring and enabling a smooth and effective process that meets the goals and timeliness of the governor's executive order. The steering committee consists of the task force co-chairs and representatives of the Governor's Office, Office of Financial Management, Department of Fish and Wildlife, Puget Sound Partnership, Department of Ecology and the Recreation and Conservation Office, which houses the Governor's Salmon Recovery Office.

Information

Five webinars were conducted in 2018 to educate task force members — many at their request — on issues where they felt they needed more information to make well-informed decisions, including topics emphasized in public comments. The public was invited to attend these webinars, with topics covering climate change and ocean acidification, the Lower Snake River dams, spill over the Columbia and Snake River dams, the relative importance of the different threats to the Southern Resident orcas and the economic value of Southern Resident orcas. Peer-reviewed journal articles, briefing memos and discussion guides also provided task force members with background on issues they may not have been deeply familiar with at the outset.

Communication

Individual actions taken by members of the public will be a critical part of recovering the Southern Residents. Public awareness is therefore essential. The executive order mandated that the Puget Sound Partnership, the Department of Fish and Wildlife, the Department of Licensing, State Parks and Recreation Commission and the Governor's Salmon Recovery Office collaborate with the Governor's Office to inform and educate the public. These agencies also agreed to provide public outreach in support of the task force public process. Communication staff from the Department of Ecology and the National Oceanic and Atmospheric Administration volunteered to participate in the public outreach effort as well. Communication directors from the agencies named in the executive order and from NOAA West Coast Fisheries have been meeting twice monthly with the governor's communication staff to align communication efforts and support the communication needs of the task force co-chairs.

This interagency communications group developed a collaborative communications plan to help guide and shape collective communication efforts. Much of the initial outreach focused on social media and websites. The interagency communications group also undertook two event-specific campaigns. At the request of the task force co-chairs, the group collaboratively developed educational flyers to raise awareness among boaters about behaviors that help protect the orcas. The flyers were distributed at ports and marinas throughout Puget Sound and on Washington State ferries. In October 2018, the group worked with the Puget Sound conservation districts to amplify Orca Recovery Day events, helping to promote the day to the media, agency staff and partners, as well as to the public.

This group also meets periodically with nongovernmental communicators who are interested in helping to educate and inform the public about Southern Resident orcas. The purpose of these meetings is to:

- Identify resource-sharing opportunities.
- Exchange ideas and insights.
- Request sharing of communication initiatives and resources.
- Develop strategies for funding communication campaigns.
- Collaboratively develop and implement communication campaigns.

Continued communication will help to ensure broad support for implementation of task force recommendations as well as an understanding of the science and rationale behind the recommendations and who is most affected by the actions.

Public comment

Along with a review of the best available science and input from experts, public input is a key element informing this process and task force decisions. Oral and written public comments were accepted throughout the first year of task force work and public comment was heard at all task force meetings. As interest in the task force and the urgency of orca recovery efforts grew, public attendance at task force meetings increased. The task force moved to larger venues and adjusted its agendas, extending the length of its meetings and the time allocated for public comment.

Written public comments were also accepted via the comment portal on the governor's Southern Resident Killer Whale Recovery and Task Force website. Individuals and organizations submitted more than 18,000 written comments to the task force between May and November 2018 (refer to Appendix 6 for detail). Members of the public expressed their concerns and ideas on a wide range of issues, including salmon recovery, habitat restoration, salmon harvest, boating restrictions and the removal of the Lower Snake River dams. Special public comment surveys were also set up to gather public feedback on the draft report and recommendations. Public comment will continue to be accepted through the end of the task force process in late 2019.



Key threats

The task force focused on three major threats to Southern Resident orcas identified in the 2005 Endangered Species Act listing and Gov. Inslee's executive order: lack of prey, disturbance from noise and vessel traffic and toxic contaminants. Each of these threats is summarized in turn below.

In addition, it is important to recognize the direct contribution of rapid population growth as an increasing threat to the state's natural environment. In 1950 the population of Washington state was approximately 2.38 million. Today it is 7.43 million and by 2040 it is expected to reach 9.24 million people [6]. The growth of Washington, neighboring states and Canadian provinces will continue to magnify threats to Southern Resident orcas.

Climate change is another overarching threat that exacerbates other risks to Southern Resident orcas and, if not addressed swiftly and effectively, could undermine recovery efforts for orcas and our marine ecosystem. Additional detail on climate change impacts to orcas and their prey is provided at the end of this section.

Prey

The Southern Resident diet is composed almost entirely of salmon, with adult male orcas needing approximately 325 pounds of Chinook to meet their daily prey energy requirements.[1] Although their diet tends to vary slightly throughout the year, feeding on smaller amounts of salmon species such as coho, chum and steelhead, about 80 percent of their total diet comes from Chinook salmon [7]. Although Chinook are dense in calories and the largest of the Pacific salmon species, they are also the least abundant and many populations are experiencing long-term reductions in size [1]. Several runs of Chinook salmon are listed as threatened or endangered under the Endangered Species Act. In addition, recent studies have shown that wild and hatchery Chinook are becoming smaller throughout most of the Pacific coast [8].

The abundance of salmon declined significantly in the late 1800s and early 1900s when techniques to harvest salmon became very effective. Low abundance was compounded by the effects of logging, agriculture, passage barriers, human development and water withdrawal. These activities reduced the number of salmon so significantly that hatcheries were constructed to artificially produce salmon to the levels the natural environment historically produced. Today, native and nonnative salmon-eating predators that benefit from artificial habitats can also have significant negative effects on local salmon populations. In addition, several forage fish stocks, which are critical prey for both juvenile and adult Chinook and serve as a buffer from salmon predators, have diminished in recent years [9, 10, 11].

[1] This estimate is based on maximum daily prey energy requirements for adult male orcas of 269,458 kcal/day [157], total energy per Chinook of 13,409 kcal/fish, and average mass of Fraser River Chinook of 8,655g [158].

Efforts to restore salmon populations are done in an integrated manner, commonly referred to as an all-H approach (habitat, hatcheries, hydropower and harvest). The Prey working group and task force also considered predation and forage fish in its efforts to explore actions to increase abundance of prey for Southern Resident orcas. Reversing the decline of salmon and improving their status will require commitment, sacrifice, significant investments and time. Immediate actions to increase salmon for orcas are necessary but should also be viewed in the context of longer-term salmon recovery. Successfully increasing prey abundance to the sustainable levels needed for Southern Resident and salmon recovery will require adequately considering and addressing all these factors, described in more detail below.

When salmon and steelhead were listed under the Endangered Species Act, the state of Washington developed a statewide strategy – Extinction is not an Option – that Gov. Locke and the Legislature approved in 1999. The strategy called for creation of an effective network of organizations and governments committed to recovering salmon and steelhead and the habitats upon which they depend.

To meet the needs of people and salmon across the state, recovery was organized by seven salmon recovery regions. The recovery organizations in each of those regions wrote and are now coordinating the implementation of federally approved salmon recovery plans. The organizations are directed by county, city, tribal and citizen representatives and advised by state and federal agency scientists. Regional organizations fill many salmon recovery needs but noteworthy is their resiliency, durability and credibility spanning local, state, tribal and federal governments over the last nearly 20 years in the face of the significant challenges that they and our salmon face. It is an unprecedented, locally led, statewide approach to recover endangered species.

State, regional and federal funding sources have provided significant project funding, but the amount has been only about 15 percent of what is needed to implement those plans. These organizations know what needs to be done to recover salmon and they have developed partnerships to make it happen. As challenges mount, including those related to the survival of the Southern Resident orcas that are so dependent upon the salmon we are working to save, we must ensure that the government's commitment is equal to the commitment of its citizens [12].

Habitat

Productive and protected habitat is critical for naturally spawning salmon to be abundant, diverse and sustainable. Adequate and functional habitat is also essential for supporting young hatchery salmon. Threats to healthy salmon habitat include:

- **Development**. As the human population grows, land use policies that allow development in or near floodplains and along shorelines can lead to degradation and loss of functioning habitat necessary to support salmon. Habitat is directly lost through the conversion of habitat to homes, buildings or other structures. Habitat is indirectly lost through non-point impacts from contaminated stormwater, groundwater withdrawal and alteration in stream flow due to water running off of impervious surfaces quickly, as opposed to infiltrating

slowly through the soil. Structures built to protect or support development such as dikes, bridges, bulkheads, culverts and stormwater systems often further impact salmon habitat. In particular, docks and shoreline armoring lead to destruction of important juvenile salmonid migratory corridors and nearshore forage fish spawning habitat.

- **Habitat loss and degradation.** In addition to effects of urbanization, transportation, agriculture, logging, mining and other forms of land use, many rivers have been straightened, diked and cleared of complex habitat features. Converting natural habitats into lands and rivers that support human uses often degrades the health of the habitat and the salmon that depend upon it.
- **Fish passage barriers.** Human-made barriers such as culverts, dams, bridges, fords, levees, erosion control structures, tide gates, flumes and pipeline crossings limit a salmon's ability to swim upstream into cool, productive spawning and rearing habitat [13]. Structures that impound water, divert water under a road or into a pipe or canal, or otherwise alter the natural flow of water (river or tidal zone) can negatively affect streambed movement and large wood movement, prevent fish from moving up or downstream, concentrate predators, impact water temperature and have a whole suite of other effects to natural ecological functions. In some cases, the effects associated with barriers can be as impactful as the barrier itself.
- **Water withdrawals.** Water withdrawals can reduce the amount of useable habitat for salmon. In addition, unscreened withdrawal points can trap small wild salmon in the conveyance structures that pump water from its source to its final destination.
- **Marine water quality.** Water quality is an essential component of functioning ecosystems that support the complex food web orcas depend upon. Emerging science shows reduced dissolved oxygen levels in Puget Sound caused by excess nitrogen in stormwater runoff could be negatively affecting the food web. Stormwater runoff is addressed in more detail in the "Contaminants" section of this report.

Although the threats to habitat described above affect all salmon species, additional threats specifically affect Chinook salmon habitat. Chinook salmon typically spawn in larger rivers and their tributaries, using deeper water and larger gravel for egg burial. They have highly variable life history strategies, reflected in their body size and timing of outmigration from rivers to salt water. Adult Chinook return to their natal rivers and tributaries to spawn after an average of three to four years in the ocean. However, only a small percentage of eggs produced by Chinook complete a full lifecycle and return as adults to their natal rivers [14].

Ocean-type Chinook out-migrate from their freshwater habitat on their way to the ocean at smaller sizes and as such, are most dependent on estuarine and nearshore habitat for rearing. By contrast, stream-type Chinook feed, grow and seek refuge in natal freshwater streams for up to a year before out-migrating to the ocean [15]. Increasing spawning capacity and survival from egg to smolt outmigration is critical for Chinook recovery and is accomplished by restoring fish passage to areas that have been made inaccessible and restoring habitat. While young Chinook remain in natal streams, they depend on clean, cool water and complex habitat with multiple channels, large wood,

boulders, side channels, healthy riparian area and connected floodplains. Floodplains provide refuge from high stream flow, calm feeding waters and space for Chinook to avoid predators. Chinook that rear in rivers with ample floodplains are larger than those that rear in rivers with no floodplain habitat and have higher survival rates [16].

For both ocean-type and stream-type Chinook, tidal wetlands found in both natal and non-natal river deltas and marine shorelines provide refuge from predation, feeding opportunities and brackish habitats that facilitate the physiological transition from fresh to saline waters [15]. Puget Sound has experienced 77 percent loss of vegetated estuarine tidal wetlands from natal Chinook deltas. Many of the large deltas in Puget Sound have lost freshwater tidal wetland habitat at disproportionate rates, with some areas having lost nearly 100 percent [17]. The lower Columbia River has lost 68–70 percent of its tidally influenced floodplain wetlands that provide critical foraging and rearing habitats for migratory Chinook [18].

Restoring fish passage, estuarine, nearshore, floodplain, instream flow and riverine habitat in concert with other actions will increase abundance, survival, productivity and distribution of salmon across the state. However, the degradation of habitat has occurred over the past 100 years and it will take decades to restore and protect it so it is properly functioning and able to sustain our salmon, buffer against climate change, improve water quality and quantity and ensure a healthy ecosystem.

Hatcheries

Hatchery production could play an important role in increasing prey abundance for Southern Resident orcas, especially in the intermediate term (three to 10 years), as increasing natural Chinook stocks will take more time. Although hatchery salmon production can be beneficial for increasing prey abundance for orcas, hatcheries can also pose genetic and ecological risks to wild salmon populations if not properly operated, for example:

- Hatchery fish often have lower reproductive fitness than wild fish. As such, when adult hatchery fish interbreed with wild fish it can lower the overall reproductive success of the wild population. To minimize this risk, fishery managers use methods such as weirs or mark-selective harvest to remove excess hatchery fish before they reach spawning grounds.
- Hatchery fish can decrease genetic and life history diversity (for example, run timing) in wild populations, in turn decreasing population resiliency and depressing wild population growth rates.
- Hatchery salmon can compete with juvenile salmon for food or habitat resources in rivers, estuaries and nearshore marine environments. The Independent Scientific Advisory Board report on density dependence from 2015 demonstrates the risk to wild salmon when habitat is insufficient to support both hatchery and wild salmon [19].

Releasing exceptionally large volumes of juvenile hatchery salmon near to wild populations can exacerbate these effects and decrease juvenile survival or population growth rates. Hatchery release strategies or timing can inadvertently attract predators and increase predation rates on both hatchery and wild fish, especially if hatchery releases are large, releases are compressed over a short period of time and predators have been behaviorally conditioned [20]. Hatcheries can also provide a false

sense of accomplishment, which may decrease public support and resources for natural fish recovery.

Decades of research and monitoring have identified the general risks to natural salmon production due to hatchery programs described above. The specific risks need to be evaluated on a case-by-case basis for individual hatchery programs. These risks vary across programs depending on hatchery size, location, operation and release strategies, as well as the underlying habitat condition and health of the affected wild populations. As a result, general risks are roughly proportional to the number of fish released, so the risks to wild salmon will generally increase with larger hatchery releases [21].

Reductions to hatchery production that have occurred over the years are mainly attributable to reforms in production plans and policies, lessons learned about optimizing hatchery production to yield more surviving adults and/or funding constraints. Future hatchery production can be closely monitored and adaptively managed to ensure progress is made on salmon recovery while the urgent prey needs for orcas are fulfilled.

Hydropower

Hydroelectric and water storage dams have significant but varied effects on fish that migrate up rivers from the sea to spawn, including Chinook. Dams can pose a threat to fish passage, slow the migration rate of juveniles and alter riverine ecosystems and function, which negatively affects salmon survival. When fish need to pass multiple dams on their way to the sea, it increases the likelihood of injury or death, especially if fish passage alternatives are limited. In particular, it can be difficult for juvenile salmon to pass dams to downstream habitat on their migration to the sea. When the current draws juvenile fish into a dam's turbines intakes, the majority of the fish are screened into bypass systems; however, fish that pass through the turbines could be exposed to pockets of low pressure, strike the turbine blades or find pinch points, all of which can injure or kill them.

In the Columbia River Basin, dams completely block passage to more than 55 percent of the spawning and rearing habitat historically used by Chinook [22]. Nearly all the blocked Chinook salmon habitat in the Columbia Basin is above Chief Joseph/Grand Coulee in the upper Columbia and the Hells Canyon complex in the middle Snake in Idaho. Many dams in Puget Sound, the Lower Snake River (Figure 2) and the Columbia River Basin (Figure 3) have made substantial progress increasing salmon survival rates over the past few decades by providing fish passage structures. Refer to the text box below for examples of these structures [23].

In addition to fish passage structures at dams to get juvenile salmon downstream, "spill" (water routed through spillways) is used to improve survival rates of migrating fish. Spill is generally acknowledged as the safest route past a dam for juvenile salmon because it allows fish to avoid dam powerhouses and bypass systems. This may result in lower direct mortality and decreased "delayed mortality," which occurs when fish have a weakened condition after traversing a river. Although spill can improve salmon survival, spilling water can also trap air that dissolves into the water below and saturates it with gases like oxygen and nitrogen. When water is supersaturated with dissolved gas, excess gas can build up in the bloodstream and tissues of fish, causing gas bubble trauma, which can in turn cause minor injuries or even death depending on the total dissolved gas concentration.

Figure 2: Status trend of total adult Chinook salmon in Snake River [24].

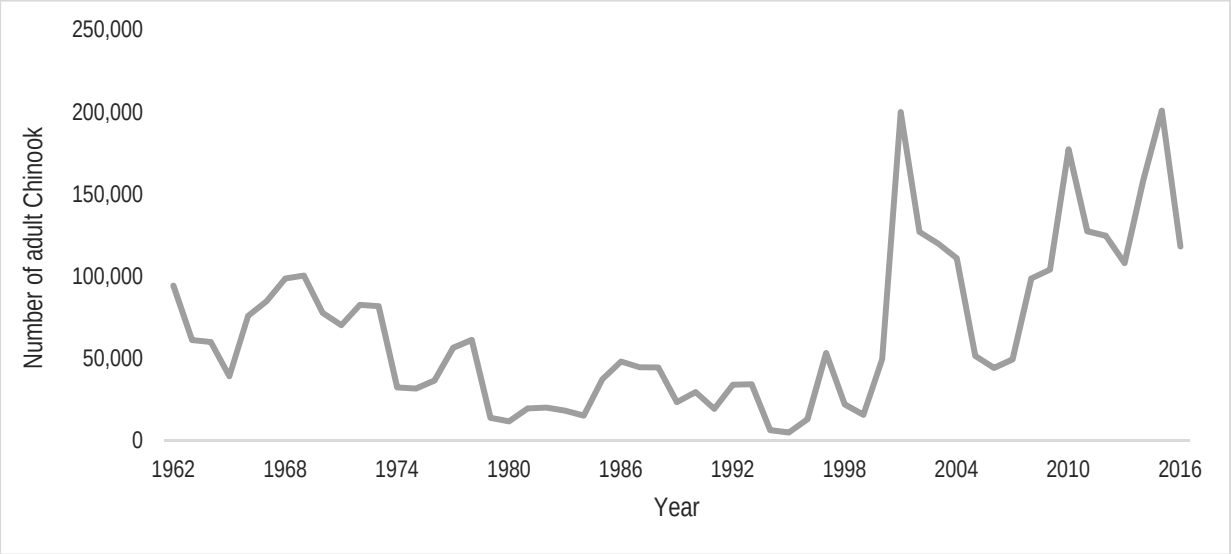
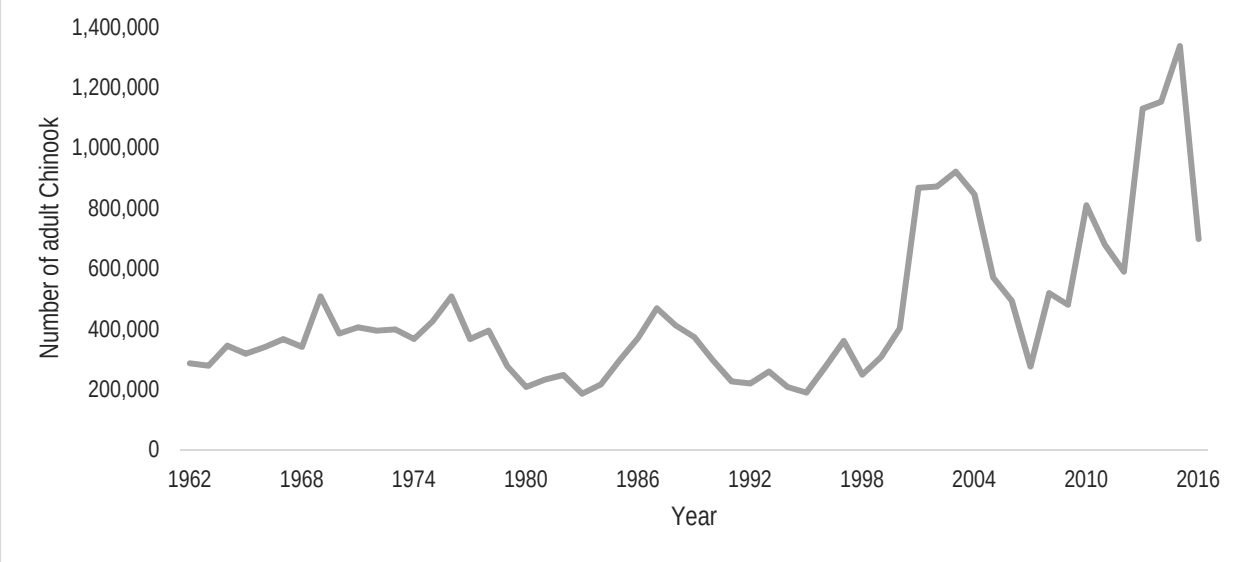


Figure 3: Status trend of total adult Chinook salmon in Columbia River [24].



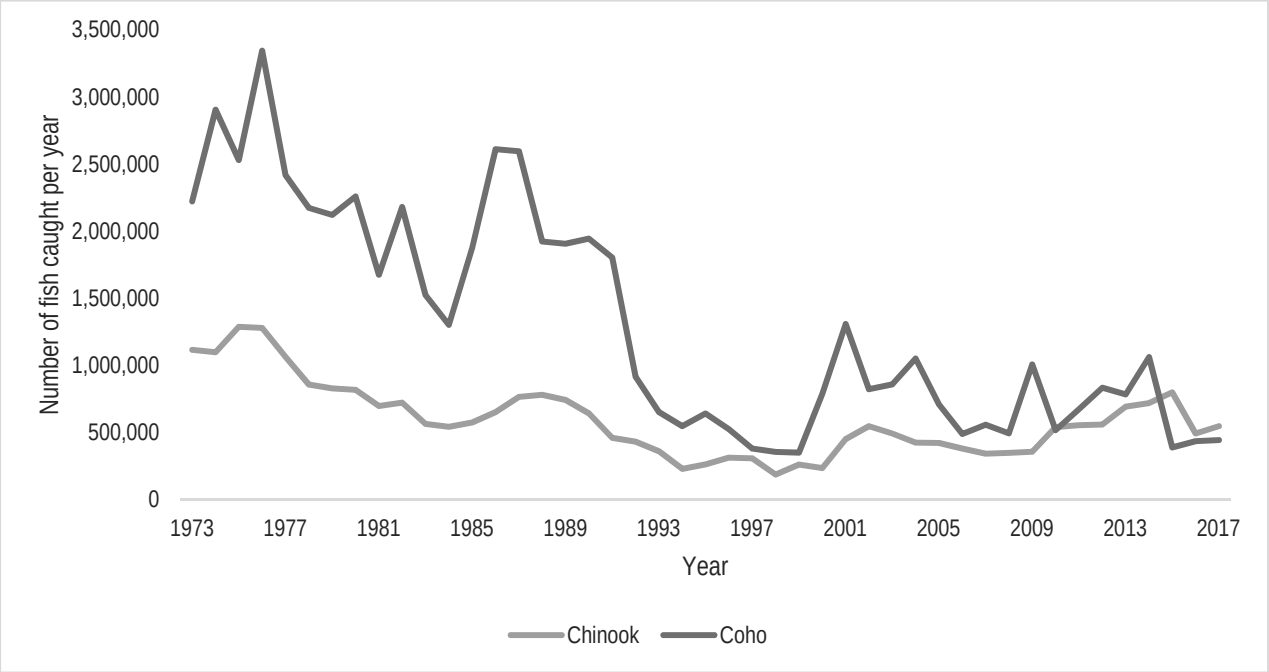
EXAMPLES OF FISH PASSAGE STRUCTURES INCLUDE:

- **Fish screens**. Fish screens allow water to flow from its source to its end destination while preventing fish from becoming trapped in pipes and other human-made structures.
- **Fish ladders**. Fish ladders resemble staircases filled with water that allow adult fish to 'climb' up and over the dam step by step. Water currents flowing from the fish ladder attract migrating salmon to the base of the stairway.
- **Trap and haul**. Migrating salmon climb a small fish ladder into a holding pool/tank where fish are 'trapped'. Vehicles then 'haul' and release the fish upstream to the other side of the dam.
- **Floating surface collectors**. Floating surface collectors have pumps that attract fish and nets that guide the fish towards the collection entrance. Once fish enter the collector, they are piped out of the dam downstream or trapped and hauled.
- **Spillway weirs**. Spillways control the flow release from dams and can be a safe exit for juvenile fish. Raised weirs draw water from the surface and make spillways easier for fish to find and navigate.
- **Fish-friendly turbines**. Improved turbine design allows for safer fish passage with curved walls and edges, fewer gaps for fish to get wedged into, reduced turbulence and blades that reduce strikes.
- **Juvenile bypass systems**. Juvenile bypass systems use fish screens to discourage juvenile fish from approaching conventional turbines and direct them instead into dam gatewell pipes that carry fish into collection channels where they can safely exit the dam.
- **Improved culverts**. Culverts are large pipes that allow water to pass under roads. Fish-friendly culverts have lower water level entrances and larger upstream openings, making it easier for fish to enter and exit than conventional culverts. They also provide a less steep angle inside with deeper and slower moving water for fish to pass through.
- **Improved tide gates**. Tidelands drained for agriculture use tide gates to prevent water from flooding the area during high tide. Streams and marshes surrounding the tide gates provide habitat for small fish. Fish-friendly tide gates use floating mechanisms to hold the gates open, allowing fish to move freely between tide land and drained land.

Harvest

Harvest decreases the number of adult fish available to Southern Residents; reducing harvest or altering harvest methods in some areas may make more adult Chinook available to orcas. Chinook that originate in Washington may be harvested in fisheries in Alaska, British Columbia, off Washington's coast or in Washington's inland waters before they reach their natal spawning grounds. In recent years, however, fishing has been increasingly restricted in response to declining salmon abundances. Commercial, recreational and tribal salmon catches have decreased steadily in Washington's marine and freshwater areas since the early 1970s, particularly for Chinook and Coho salmon (Figure 4).

Figure 4: Total Washington Chinook and Coho salmon harvest [25].



To carefully manage for harvests of more abundant hatchery salmon while protecting wild stocks of conservation concern, the Washington Department of Fish and Wildlife has worked with tribal co-managers and National Oceanic and Atmospheric Administration Fisheries to develop an integrated harvest-management system that supports sustainable fisheries while protecting weak salmon populations. A milestone in that effort was the development of "mark-selective" recreational fisheries in the late 1990s, when WDFW began to restrict the catch to hatchery-reared salmon in specific areas. Mass-marking hatchery salmon with a fin-clip before their release has made them readily identifiable in recreational mark-selective fisheries. This strategy has allowed fisheries to continue even in areas where wild salmon populations have been listed for protection under the federal Endangered Species Act. In those areas, the inadvertent "take" of any listed fish is closely monitored to ensure compliance with strict federal conservation standards. These conservation measures have brought significant changes to Washington's salmon fisheries, reducing the annual catch in many areas.

Salmon fisheries are planned carefully each year to ensure biologically based conservation objectives (spawning escapement numbers and limits on mortality caused by fisheries) for salmon populations are met. Fisheries are planned through a combination of international and domestic management processes. For Washington fisheries, this process includes the Pacific Salmon Commission (U.S.-Canada Pacific Salmon Treaty), the Pacific Fisheries Management Council (fisheries off the west coast of the U.S.) and the North of Falcon (fisheries off the Washington coast and in inland waters) forums. State and tribal co-managers work together in each of these annual forums to plan and implement fisheries that will meet conservation objectives based on predicted abundances of returning salmon that year.

Ocean and inland marine harvest typically occur on mixed stocks of salmon. Fisheries managers account for effects on specific stocks in these fisheries to ensure conservation objectives for individual stocks are met. Terminal fisheries, where harvest occurs in marine and freshwater areas close to the spawning grounds of a particular salmon population, primarily harvest stocks destined for the local watershed, as opposed to the larger mix of stocks harvested in fisheries outside of the terminal areas. Effects in terminal fisheries are also accounted for to ensure management objectives for individual stocks are met. In some terminal fisheries, abundance of returning salmon may be estimated in-season and fisheries adjusted to ensure spawning escapement targets are reached.

An estimated 1,337,301 Chinook were caught in Pacific Salmon Treaty fisheries in 2017. Approximately 62 percent of these Chinook were taken in US fisheries and 38 percent were taken in Canadian fisheries [26]. This estimate includes Chinook caught in both marine waters and terminal or freshwater fisheries.

Predation

Predation affects the abundance of Chinook and other salmon available to the Southern Residents. Salmon predators can benefit from artificial habitat features that serve as advantageous resting and feeding structures, such as piers, pilings, buoys, boat docks, log floats and log rafts. Where artificial structures coincide with Southern Resident foraging hotspots or salmon "pinch points," predators may compete for the same prey the Southern Resident orcas depend upon. The salmon predators of most interest and/or study are:

- **Pinnipeds** such as sea lions and seals**.**
- **Fish** such as walleye, northern pikeminnow, northern pike, catfish and smallmouth bass**.**
- **Birds** such as cormorants and terns that feed on juvenile salmon**.**
- **Other Resident orcas** such as Northern Resident orcas and Southern and Western Alaska Resident orcas, which prey upon salmon stocks before they reach the range of the Southern Residents**.**

Pinnipeds

Since the adoption of the Marine Mammal Protection Act in 1972, west coast harbor seal and sea lion populations have increased and consumed more salmon. For example, throughout their range from Southeast Alaska to central Mexico, California sea lions have increased from 80,000 in the 1970s to 260,000 today [27]. California and Steller sea lions prey on adult salmon and steelhead before they move up the fish ladders at Bonneville Dam and areas downstream in the lower Columbia River. Both nonlethal and lethal control actions have been undertaken near Bonneville Dam since 2008. Even with these actions, pinnipeds at the dam consumed 6,663 salmonids per year on average between 2013 and 2017. This represents between 2.1 and 5.8 percent of the annual adult salmon run, but this estimate does not include predation that occurred in the estuary or in the 145 river miles before the dam [28]. Between 2010 and 2015, an estimated 20 to 44 percent of spring Chinook salmon that originated above Bonneville dam were lost between the Columbia River estuary and Bonneville Dam to sources other than harvest [29]. In 2015, when the estimated loss was 44 percent, this equated to 224,000 spring Chinook [29]. Sources of the unaccounted mortality include predation by pinnipeds, which is the most likely source, although losses from sampling or disease or straying into rivers below Bonneville Dam may be factors unaccounted for in the estimate [29]. The Independent Scientific Advisory Board noted that a life-cycle model by NOAA Fisheries predicted pinniped predation to be one of the top three factors affecting extinction probability for Upper Columbia River spring Chinook. Ocean conditions and hatchery effects were the other two factors [30].

Fewer datasets are available to evaluate the effect of seal and sea lion predation on salmonids in other geographic areas, particularly the Puget Sound, Strait of Juan de Fuca and outer coast. However, recent bioenergetics modelling work using information from the broader Salish Sea suggests the increase in abundance of harbor seals may also adversely affect Chinook, and consequently, Southern Residents [31]. Chasco, et al., 2017, report that between 1970 and 2015, the estimated annual biomass of Chinook salmon consumed by pinnipeds along the west coast has increased from 68 to 625 metric tons, or about double that of Southern Resident orcas and six times greater than the combined commercial and recreational catches. Both Canada and Washington are in the process of collating new pinniped population and diet information and updating models to determine more recent and geographically specific levels of Chinook consumption.

Transient or Bigg's killer whales prey upon a variety of marine mammal species, including pinnipeds. The increase in the harbor seal and sea lion populations has helped the transient orca population flourish and transient orcas are a key predator of harbor seals and sea lions in our region. Harbor seals represent at least half of the prey captured or attacked in British Columbia, Washington and Southeast Alaska [32, 33, 34, 35] and Steller sea lions and California sea lions are regular parts of the transient diet [33, 35, 36, 37]. The west coast transient orca population grew rapidly between 1975 and 1990 [35] and today numbers more than 500 animals [38]. A bioenergetic model of harbor seal consumption estimates 1,090 seals were consumed by transient killer whales in the Salish Sea in 2017 [39].

Fish

Northern pike are a nonnative invasive predator in Washington state that can restructure aquatic fish communities in some cases and lead to decimation of native fish communities including salmon and steelhead. Over the past several decades, illegal introductions of northern pike led to an expansion of their range. In Washington, they have been confirmed in the Spokane River, Lake Roosevelt and in the Columbia River upstream from Grand Coulee dam. They are not currently occupying salmon habitat, however, if they continue to increase in abundance in the blocked area above Chief Joseph and Grand Coulee Dams, they could expand their distribution into areas of the Columbia River where salmon and steelhead populations migrate up from the sea to spawn.

Northern pikeminnow, walleye and bass are also significant predators of salmon and represent a serious threat to salmon recovery. Northern pikeminnow, a native species, is managed for salmon recovery purposes under a sport reward program administered by the Bonneville Power Administration. Walleye and bass are nonnative to Washington. They prey on juvenile salmonids and compete for habitat in the Columbia River Basin and in most rivers in Puget Sound. A recent report estimated 24 million juvenile salmon are consumed annually by piscivorous fish between McNary Dam and Priest Rapids Dam on the Columbia River [40].

Birds

Artificial islands, piers, pilings and other features have led to high reproductive success and growing populations among predatory birds such as double-crested cormorants and Caspian terns. A variety of management actions have been implemented with the goal of reducing salmon predation by birds, including controlling the size of breeding populations on the lower Columbia estuary and some interior stretches of the Columbia River.

Other Resident orcas

In addition to the Southern Resident orcas, other distinct populations of fish-eating resident orcas inhabit the Northeast Pacific, including Northern Resident orcas, Southern Alaska Resident orcas and Western Alaska Resident orcas. Northern Resident orcas' core habitat is in the coastal areas of British Columbia. Southern Alaska Resident orcas inhabit the waters of Southeastern Alaska and the Gulf of Alaska. Western Alaska Resident orcas inhabit waters west of Kodiak Island to the Aleutian Islands and the Bering Sea [41]. Some of these populations have geographically overlapping ranges, but each is reproductively isolated [42].

Fish are the major dietary component for resident orcas, with observations indicating salmon are preferred as prey. In one study, salmon represented at least 97 percent of Northern Resident prey, with Chinook comprising 69 percent of prey [33, 43]. Studies show Northern Resident orcas also captured older and larger than average Chinook. Predation by more northern populations of resident orcas may have a negative effect on salmon available to Southern Resident orcas, placing them at a competitive disadvantage [44]. In addition to experiencing a higher encounter rate of Chinook salmon, these more northern populations may also have their choice of a greater size distribution of individual Chinook [44].

Marine productivity and forage fish

Forage fish such as sardines, anchovies, herring, smelt and sand lance, provide important food for Chinook as they grow in the marine environment. In Puget Sound, Chinook salmon target primarily herring and Pacific sand lance. Low abundance of forage fish not only limits the food available for salmon, but also predators such as pinnipeds, birds and piscivorous fish, increasing the likelihood of salmon predation. Factors affecting the abundance of forage fish include loss of submerged vegetation, shoreline hardening, predation, water quality degradation, contaminants, climate variability and change, noise and light. Nearshore habitat restoration and protection is crucial, and assessment work is required to inform these and other actions to address limiting factors [45].

Both herring and surf smelt are harvested commercially and recreationally in Puget Sound. Commercial harvest of both species is relatively well monitored, but the harvest rate of smelt is unknown because no estimate of smelt biomass exists. Recreational harvest of surf smelt does not require a license and is poorly monitored. The effects of herring fisheries on individual herring stocks have not been assessed because movement patterns of herring away from the spawning grounds are not well understood. Better understanding of the stock composition of herring encountered in fisheries and an assessment of recreational harvest of smelt would help determine the potential effects of these fisheries.

Healthy marine forage fish and salmon populations also require appropriate quantity and quality of zooplankton prey, which is dynamic in time and space. Zooplankton comprise the vast majority of juvenile Chinook salmon and herring diets. Monitoring zooplankton in Puget Sound is critical to identifying how marine and local waters are responding to changing ocean conditions and to illuminate any underlying patterns in prey base composition, abundance and nutritive value that drive forage fish population dynamics and thus influence other species higher up on the food chain such as salmon and orca. Puget Sound studies suggest direct correlations between zooplankton and early marine survival of some Chinook populations. This relationship can improve the ability to forecast salmon returns, critical to managing a highly variable fishery to ensure enough salmon for Southern Resident orcas. This critical link between zooplankton and salmon also provides an opportunity to understand and separate the role of local environmental effects inside Puget Sound, such as nutrients, from broader scale factors impacting salmon abundance, including ocean variability and climate change. Finally, it helps determine whether local habitat restoration or marine conditions are responsible for annual changes in salmon abundance.

The health of forage fish populations also depends on ocean conditions. Starting in 2014, unusually warm ocean temperatures in the eastern Pacific Ocean – referred to as "the blob" – brought a shift to more gelatinous zooplankton, which have less energy to transfer to the forage fish that eat them [46]. Although ocean temperatures in that region returned more or less to average in 2018, the blob has had a lingering effect on salmon growth, size and survival. Adult salmon returns are expected to remain low for a few years [47]. At the time this report was going to press, studies indicated the blob might be returning. The climate change section below provides additional discussion of the effect of warming ocean temperatures on orcas and their prey.

Vessels

Vessels transiting near Southern Resident orcas can disturb and displace them from preferred areas. Vessels emit noise that spreads underwater through propeller cavitation (the formation and collapse of vapor cavities or bubbles) and via their combustion engines. Underwater noise can mask or impair orca echolocation (the method orcas use to find their prey) and communication. Vessels — including virtually silent ones such as kayaks — can also reduce the time orcas devote to foraging by almost 20 percent, reducing their potential prey intake and increasing their energy expenditure [48, 49, 50]. Models suggest Southern Resident orcas lose several hours of foraging time per day from May to September due to vessel noise and avoidance behaviors associated with ships and boat presence [51]. Key sources of concern include ships, small vessels, echo sounders and oil spills, summarized below.

Ships

Large ships tend to produce intense low-frequency noise that interferes with Southern Resident orca communication. Orcas compensate for increased underwater vessel noise by making longer and louder calls [52, 53], which has been shown to have modest metabolic costs in dolphins [54]. Furthermore, in coastal areas near busy ports, such costs can magnify the adverse effects of prey scarcity on reproduction and lactation [54].

Ships also emit noise at higher frequencies that overlaps with Southern Resident orca echolocation [55]. Washington state ferries are a large contributor to the underwater noise levels across Puget Sound because of the sheer volume of multi-daily transits throughout the region. Due to the growth of ports in British Columbia, shipping traffic is on the rise and likely to climb further. A relatively small percentage of ships (about 15 percent) are responsible for about half of related noise near the San Juan Islands [56], leading to optimism that targeted mitigations for such vessels would be effective [57].

The Enhancing Cetacean Habitat and Observation program of the Vancouver Fraser Port Authority has led voluntary, targeted trials to slow down ships and shift them away from key Southern Resident orca foraging areas near the international shipping lanes to reduce the level of shipping noise. Transboundary participation and compliance in these efforts has been high. Washington state currently has no program like ECHO.

Small vessels

Small vessels include recreational boats and whale-watching vessels under 65 feet in length (consistent with U.S. Coast Guard regulations). Small vessels tend to produce underwater noise intermittently [58] that can mask echolocation and communication, making it more difficult for Southern Resident orcas to find and capture prey [53]. Southern Residents spend less time foraging when vessels are nearby [59], leading to the supposition that this reduces the amount of prey they capture. Acoustic masking due to vessels is also thought to impair the detection of prey to the side of the Southern Residents' path [60], a reduction in their peripheral sensory range. Reduced

foraging, evasive behaviors and the production of louder calls can have metabolic costs, taking extra energy while the orcas are simultaneously getting less food.

To reduce disturbance and noise, small vessels must keep a 200- to 400-meter buffer distance from orcas per state and federal law. However, concern about compliance by recreational vessels is on the rise, particularly because the incidence of boats speeding toward or away from the whales has recently increased [61]. Vessels operating at moderate to high speed produce greater masking effects [62, 63]. While faster speeds increase the intensity of noise and the risk of vessel strikes, slower speeds expose orcas to the noise for longer periods, thus raising the potential for longer masking periods.

Underwater noise from vessels may also have communication and social costs for orcas. Dispersed Southern Resident orca pod members use their vocalizations to coordinate their movements and communicate about feeding opportunities [64]. Orcas vocalize more often during active foraging [65]. Noise may diminish group cohesion and coordination, as it shortens the distances over which calls can be reliably heard by other orcas [66]. To date, most attention on the potential masking effects of noise on Southern Resident orcas has focused on frequency masking and mitigating the loudness and duration of exposure. Experts have recently advised that intermittent acoustic distractions and *informational* masking should be considered too [67]. In particular, the exchange of social information, including food-related signaling [68] and prey-sharing among Southern Residents, can be compromised over an even greater spatial range. Because individual orcas can be identified by the distinctive duration of certain elements of their calls, the finding that noise leads orcas to extend the duration of their calls [52] suggests vessel noise could make it harder for orcas to recognize each other.

Experts contend that the physical and temporal context in which marine mammals encounter noise is highly meaningful [69]. For example, the potential for underwater noise to reverberate and inhibit communication varies spatially. Even minor, but repeated exposures can lead to net chronic effects; dolphins, for example, have been shown to abandon areas due to tour boat activity [70]. In a similar vein, harbor porpoises avoid intermittent noise more than continuous noise [71]. Ayers et al. (2012) suggest Southern Residents may show a stress response to the cumulative effects of vessel traffic in the Salish Sea particularly during years of relatively low Fraser River Chinook abundance. As implied in the population modeling of Lacy et al. (2017), reducing human-created noise and disturbance from vessels — accompanied with a moderate increase in prey availability — should jointly hasten the recovery of Southern Residents. Because mitigation of vessel impacts can be accomplished relatively quickly compared to an increase in the abundance of Chinook salmon, rapid implementation of vessels-related recommendations by the task force can have an immediate benefit for the Southern Residents.

Echo sounders

Underwater transducers such as echo sounders and depth finders use 200-decibel pulses of sonar to transmit sound waves into the water for navigational or commercial and recreational fishing purposes [72]. Studies have highlighted the adverse effects of this equipment on cetaceans [73]. Sonar noise from such devices near orcas, especially at commonly used frequencies of 50 and 80

kHz, overlaps with prime echolocation frequencies [74]. Research shows pulses at 85 kHz can travel more than one kilometer before substantially weakening [75]. Theoretically, the acoustic footprint for a 50 kHz pulse should be even greater at similar range, due to the reduced attenuation of lower frequency in sea water and the broader spread of lower frequencies.

Preliminary results from National Ocean and Atmospheric Administration suggest Southern Residents near the San Juan Islands are exposed to transducer noise more than one-third of the time [76]. This level and intermittence of exposure could impair the orcas' ability to locate and hunt for prey. Outputs from such devices have induced avoidance behavior in seals [77] and led to increased vigilance behavior in other toothed whales [78]. Many modern echo sounders are dual-frequency at 50 and 200-kHz, and the latter frequency does not overlap with the orcas' hearing range.

Manufacturers have indicated contemporary transducers that operate at 1kW have separate transmitters for each frequency, which means each frequency can be disabled at will, and that by switching such units to the 200-kHz setting, boaters can avoid sending 50-kHz pulses into the water column. Therefore, by switching to the 200-kHz frequency when safe to do, many boaters can avoid potential disturbance to orcas. However, it appears most basic entry-level units that operate at 660W change only what is displayed on the monitor and do *not* shut off the 50-kHz pulses that overlap with orcas' hearing.

Oil spills

In addition to the threats related to the disturbance and noise from vessels, major oil spills represent a persistent, low-probability/high-impact risk to Southern Residents. The population's vulnerability to oil spills is magnified because so few females are of reproductive age in the population and pods often aggregate off the San Juan Islands near portions of the international shipping lanes that show greater relative oil spill risk than much of the Salish Sea [79, 80] . Alaska has witnessed the vulnerability of local orcas to major spills, including the loss of reproductive females in one population [81].

Studies examining the effects of oil exposure on other marine mammals have demonstrated them to be both physiological and toxicological [82]. Toxicological effects include fetal distress and in-utero pneumonia, conjunctivitis, increased levels of stress hormones in blood, brain damage, emphysema, lesions on the adrenal gland and lungs, stomach erosions and ulcers and liver disease.

Researchers recently simulated a four-million-gallon diluted bitumen oil spill north of the San Juan Islands and estimated it would cover between 22 and 80 percent of the Southern Resident orcas' inland critical habitat [83]. The recent population viability analysis by Lacy et al. suggests a catastrophic oil spill of two to four million gallons would kill between 12.5 and 50 percent of the Southern Resident orca population [84].

Contaminants

Southern Resident orcas and their prey are exposed to an ever-increasing mixture of pollutants in the marine environment**.** The Contaminants working group identified the following primary

contaminants of concern as most important to address for the health of orcas and/or their prey: polychlorinated biphenyl, polybrominated diphenyl ether, dichloro-diphenyl-trichloroethane, polycyclic aromatic hydrocarbons and contaminants of emerging concern. The toxic industrial contaminants PCBs, PBDEs and DDTs have been banned and are often referred to as "legacy pollutants," however, they are still contaminants of great concern for Southern Resident orcas and their prey. Widespread uses of PCBs, PBDEs, DDTs and other chemical-laden products created before bans or regulations were enacted have resulted in the extensive distribution of these contaminants in the natural environment. Moreover, these toxic contaminants are poorly metabolized, persistent in the environment and bioaccumulate and bio-magnify in the food web. Each of these individual contaminants and its specific effects on orcas are presented in the "Contaminant details" section below.

Food web interactions

Contaminants enter the Salish Sea through stormwater, wastewater, air deposition, biological transport and direct water contamination (such as oil or chemical spills and/or groundwater) and inevitably enter the food web. Some of these contaminants persist in the environment and increase (or biomagnify) up the food chain from zooplankton and forage fish [85, 86, 87] to adult Chinook salmon [88, 89]. At the top of the food chain, these contaminants can accumulate in long-lived, high level predators including Southern Resident orcas [90, 91, 92, 82].

Forage fish

The prey of adult Chinook salmon in Puget Sound, which includes Pacific herring and other forage fish, are exposed to persistent bioaccumulative contaminants [87, 86] as well as non-bioaccumulative contaminants [93] in sensitive rearing habitat in the Salish Sea and Columbia River Basin. These contaminants reduce the health and survival of forage fish while also reducing the food supply available to adult Chinook salmon.

Chinook salmon

Adult Chinook salmon are a major source of persistent toxic chemicals to Southern Resident orcas [82, 94, 88, 89]. Puget Sound Chinook salmon and some Fraser River Chinook salmon (Harrison and Chilliwack populations) accumulate higher concentrations of PCBs and PBDEs than other Chinook salmon populations because of their time spent foraging in the Salish Sea and the Puget Sound [82, 89, 95], where forage fish are highly contaminated [87, 86].

Additionally, the health and survival juvenile Chinook salmon from Puget Sound and the Columbia River, may be reduced by their exposure to toxic contaminants [96, 97, 98, 99, 100]. In particular, toxics can reduce juvenile Chinook salmon survival by reducing their growth and making them more susceptible to disease [101, 102, 100]. Specific contaminant hotspots for juvenile Chinook salmon include the Duwamish estuary and river, Commencement Bay, Snohomish estuary, Anacortes, Portland Harbor, Hanford Reach, Sinclair/Dyes Inlet and Lake Union. Hotspots in British Columbia include Victoria Harbor and the Fraser Delta.

Southern Resident orcas

High levels of persistent toxic contaminants including PCBs, PBDEs and DDTs are present in the blubber of Southern Resident orcas, potentially resulting in harmful health effects including alterations in hormone levels, reproductive disruption or miscarriages, reduced immunity to diseases, neurotoxicity, neurobehavioral disruptions and cancer [82]. The toxic effect of these contaminants is further exacerbated by periods of weight loss, which can redistribute contaminants from fat stores (blubber) to other tissues, increasing the toxic response [103]. When starving whales draw on fat reserves stored in their blubber, it mobilizes contaminants into circulation, where they have the potential to cause a greater toxic response. Orcas with higher contaminant levels in their blubber also have higher levels circulating in their blood, even when they are well fed. This effect has been demonstrated in dolphins [104] and the National Oceanic and Atmospheric Administration's Northwest Fisheries Science Center has unpublished data on orcas that also show this effect.

Contaminant details

Polychlorinated biphenyl

PCBs are commonly found in caulks, paints and dyes in old buildings, in old power transformers and at toxics clean-up sites. PCBs were banned from production in the United States in 1979, but because they do not break down easily in the environment, they persist in air, water, soil and organisms. A rich base of literature shows PCBs are distributed globally, found in plants and animals from the remotest regions of the planet. PCBs are still released into the environment through improper disposal, incineration and poorly maintained hazardous waste sites [105]. Furthermore, PCBs can be found at low concentrations in many current-use consumer products (for example, toothpaste, yellow dyes and plastics) due to either inadvertent production or recycled use. Long-term contaminant monitoring shows PCBs in the food chain are high and have not measurably decreased over the past 20 years in the central and southern basins of Puget Sound. This indicates ongoing inputs to these areas from the sources noted above [87].

PCB levels are at concentrations exceeding a health effects threshold for marine mammals (extrapolated from effects in seals, otters and mink) in most sampled Southern Resident orcas [91, 92, 82]. The concentration of PCBs in male Southern Resident orcas is almost four times higher than those of male Northern Resident orcas [106]. Female orcas pass these contaminants on to their offspring when they give birth and nurse, which can reduce the survival of their young pups [107].

PCBs are also elevated in juvenile Chinook salmon collected from urbanized river-estuaries in Puget Sound [108, 96] and approximately one-third of the salmon collected in Puget Sound have PCB concentrations above an adverse-effects threshold for salmon health. Moreover, the survival of juvenile Chinook salmon from these urbanized estuaries was 45 percent lower than Chinook collected from uncontaminated estuaries [98]. PCBs were also elevated in Chinook salmon migrating from the Columbia River, with 32 percent of fish samples collected in the vicinity of Portland, Oregon and Vancouver, Washington found to be above an adverse-effects threshold for salmon health [99].

Although the majority of Chinook salmon originating from Puget Sound migrate to the Pacific Ocean to feed and grow, approximately one-third reside in the Salish Sea for much of their marine rearing phase [109, 89]. Here, they are exposed to persistent organic pollutants through their diet, including Pacific herring and other oceanic fishes, which are highly contaminated in Puget Sound [110, 86].

Polybrominated diphenyl ether

PBDEs were created primarily as flame retardants for industrial and domestic uses. They are found in products such as furniture, mattresses, hard plastics such as television casings, foam nap and gym mats, and car seats. They are especially concentrated in residential dust and travel from homes to Puget Sound through wastewater. PBDEs are associated with altered thyroid levels, a hormone important for growth and metabolism.

High concentrations of PBDEs have been observed in Southern Resident orcas [111, 91, 92]. Adverse health effects associated with exposure to PBDEs include endocrine disruptions, liver and thyroid function impairment, autoimmunity induction, immunosuppression and impacts on lung and neural development [82]. In the Southern Resident orca community, PBDEs have been shown to be highest in J pod, attributed to its time spent in Puget Sound and closer proximity to urban environments relative to the other pods [112].

Juvenile Chinook salmon from the Snohomish and Puyallup river systems in Puget Sound have also shown elevated PBDEs [97, 113, 96] at concentrations that can increase their susceptibility to disease and alter thyroid levels involved with growth and smoltification [101, 114]. In the Columbia River, PBDEs are elevated in juvenile Chinook salmon, especially fish collected in the vicinity of Portland, OR and Vancouver, WA [97]. Although PBDEs have also been measured at high levels in forage fish, their concentration has been declining [87].

Dichloro-diphenyl-trichloroethane

DDT was formerly used as a widespread insecticide on numerous crops. DDT and its toxic chemical break-down products and metabolites (dichloro-diphenyl-dichloroethylene and dichloro-diphenyl-dichloroethane) persist in soils and aquatic sediments and are now found in agricultural areas throughout the Columbia River Basin and central California. DDTs are the dominant toxic chemical found in Southern Resident pods K and L [112]. DDT is carcinogenic and has been shown to impair immunity and affect liver and nervous system function in mammals [115, 82].

DDTs are not elevated in forage fish or juvenile and adult Chinook salmon from Puget Sound. In the Columbia River, however, juvenile Chinook salmon yearlings (salmon spending a year in the river) had higher concentrations of DDTs than sub-yearlings, with 14 percent of samples exceeding an adverse effects threshold versus 1.1 percent of samples from sub-yearlings [99].

Polycyclic aromatic hydrocarbons

PAHs are a class of compounds derived primarily from petroleum products or the combustion of these products and can enter the aquatic environments directly (for example, through an oil spill) or

indirectly (for example, through stormwater runoff or atmospheric deposition). PAHs are commonly found in creosote-treated wood (marine pilings, utility poles, etc.), vehicle emissions/ exhaust and leaks, marine vessel leaks and spills, wood smoke and industrial emissions.

Compared to other organic contaminants (PBDEs, DDTs and PCBs), PAHs have a relatively low risk of bioaccumulation in Southern Resident orcas [82]. Most PAH chemicals are metabolized by vertebrates so they do not tend to bioaccumulate, meaning PAHs are unlikely to magnify like other contaminants. Vertebrates such as marine mammals and fish rapidly metabolize PAHs, sometimes into more toxic forms eliminated from the body in urine or feces [116].

Even though bioaccumulation and magnification do not play a significant role in PAH toxicity, PAHs still present risk from direct exposure [82]. Animals are exposed to and take up PAHs present in the environment through multiple pathways, including inhalation, dermal contact, or consumption of PAH-contaminated prey or sediments [117]. A recent study documented Southern Resident orcas are exposed to PAHs through vehicle exhaust [118], however, information on the effects of such is lacking.

PAHs are toxic to the Chinook salmon upon which the Southern Resident orcas feed, altering their growth or making them more susceptible to disease. Concentrations of PAHs found in Chinook salmon stomachs have exceeded concentrations known to alter salmon growth and energetics and reduce immunosuppression [119, 102]. Juvenile salmon in urbanized estuaries of Puget Sound rivers and in urbanized habitats of the Columbia River are exposed to PAHs via their prey (forage fish). In forage fish, PAHs have been linked to developmental deformities, liver toxicity, a dysfunctional adrenal system and other adverse effects [120, 121, 122, 123].

PAHs are present in nearshore habitats of Puget Sound where salmon prey on forage fish such as herring [124, 125]. The combination of sunlight and oil (PAH) contamination can be lethal to fish embryos [126]. Herring exposed to low concentrations of PAHs still experience development abnormalities, which have lasting adverse effects on the populations [121, 120, 122].

Contaminants of emerging concern

CECs include a broad range of chemicals found in widely used everyday items such as pharmaceuticals and personal care products (soap, lotion, cosmetics), detergents, plastics, water-resistant clothing and some pesticides. They also include toxic flame retardants (including new variants of PBDEs), phthalates, bisphenols, alkylphenols and highly fluorinated or per- and polyfluoroalkyl substances. CEC exposure can result in a variety of adverse effects, but data is limited on where they occur in the environment, where they ultimately end up and how toxic they are to orcas and their prey.

CECs have been detected regionally and globally in aquatic habitats. They enter rivers, estuaries and marine habitats from various sources, including discharges from wastewater treatment plants, aquaculture operations, industrial outfalls, stormwater outfalls and surface stormwater runoff from impervious surfaces, landfills, agricultural lands and lands where biosolids were applied. Under current law, many CECs are not regulated or assessed for toxic effects before they are introduced

into commercial or industrial processes. Many CECs are suspected endocrine (or hormone) disrupters, which can have developmental, neurological, reproductive and immune effects.

In most cases little information exists on the specific toxicity of CECs to Southern Resident orcas or their prey. However, recent studies have detected CECs in wastewater effluent [127, 128], estuaries [128], in juvenile Chinook salmon and in a bottom dwelling fish [128, 129] from Puget Sound. Levels of a variety of pharmaceuticals occurred in the range expected to produce adverse effects in juvenile Chinook salmon [130, 129]. Furthermore, in juvenile Chinook salmon collected from the Puget Sound, several blood chemistry parameters (early indicators of metabolic stress) were altered in fish from wastewater treatment plant-impacted estuaries, but fish from cleaner "reference sites" did not show the same effects [131]. Additionally, the correct function of mitochondria — energy factories of cells, which enable actively growing fish to process oxygen and convert nutrients — was impaired in fish from wastewater-impacted sites [132].

To reduce or remediate contaminant inputs, management actions must address the major sources of contaminants to Southern Residents orcas, their prey and forage fish, including:

- **Contaminated sediments.** Clean-up of toxic contaminants in sediment is slow, not always prioritized and underfunded. Moreover, contaminants in sediments of major river estuaries are transported to the marine food web where forage fish are further exposed. Specific areas with contaminated sediments or wildlife and plants include: the Duwamish estuary and river, Salmon Bay, Commencement Bay, Snohomish estuary, Anacortes, Portland Harbor, Hanford Reach, Sinclair/Dyes Inlet and Lake Union. Hotspots in British Columbia include Victoria Harbor and the Fraser Delta.
- **Stormwater runoff.** Extensive monitoring data shows stormwater runoff contains high concentrations of toxic chemicals. Toxic stormwater hotspots include commercial and industrial lands, adjacent roadways and parking areas and high traffic areas throughout the region, as well as known geographic hotspots, including the Snohomish River and Duwamish River basins and Salmon Bay in central Puget Sound. Although new and redeveloped land must meet stricter standards, retrofitting current developments with modern stormwater controls has been delayed because of funding gaps, lack of a corrective imperative and the slow pace of redevelopment.
- **Other discharges of toxic contaminants.** Current National Pollutant Discharge Elimination System regulations for many wastewater, industrial and stormwater facilities allow discharges of toxic contaminants that can impact Southern Resident orcas and their prey. It can be very expensive to clean up or provide stormwater and wastewater treatment at these "end of pipe" locations. A more cost-effective approach is to prevent contaminants from coming into these systems in the first place.
- **Toxics in consumer products.** A common pathway for some contaminants, especially contaminants of emerging concern, to enter the environment is through use of a variety of consumer products. Some toxic chemicals (for example, non-PBDE flame retardants, phthalates, per and polyfluoroalkyl substances and alkylphenols) are flushed or poured down the drain in our homes or businesses. PBDEs in consumer products such as couches,

bedding, electronics and personal care products can break down as fine dust or particles. Dust is picked up on clothing, rinsed off in washing machines and then transported into the wastewater stream. These contaminants eventually make their way into wastewater treatment plants, where some are poorly removed. PCBs are also found in low concentrations in current-use consumer products (for example: toothpaste, yellow dyes and plastics) due to either inadvertent production or recycled use.

- **Pharmaceuticals.** Some CECs such as pharmaceuticals are excreted by people and animals or flushed down toilets, entering the Puget Sound via wastewater and/or stormwater.

Climate change

Climate change is an overarching threat that will affect the Southern Residents primarily through the food web. Climate change exacerbates current stresses on the Chinook salmon populations Southern Residents rely on. Observed and projected changes in climate include increased air and water temperatures, more severe heavy rainfall events in the winter, lower summer stream flows, changes to the magnitude and timing of low and peak stream flows, changes from snowmelt to rain dominant stream systems, increased sedimentation and rising sea levels [133, 134, 135, 136, 137]. Climate change will continue to affect salmon habitats and salmon populations at each life stage.

In the Salish Sea and Pacific Northwest, observed and projected impacts include the following:

- **Warmer stream temperatures** deplete energy reserves, decrease growth rates and make salmon more vulnerable to predation and disease. They can also impede upstream or downstream migration. One study of fall Chinook salmon in the lower Columbia River found their average migration rates slowed when water temperatures rose, as the fish waited in cooler tributaries [138]. Warmer streams can also favor warm-adapted nonnative fishes that can outcompete or prey on salmon [133].
- **Lower summer stream flows** impede upstream and downstream migration and reduce freshwater habitat capacity.
- **Heavier winter rainstorms** lead to high-flow events that can scour river beds and destroy or smother salmon redds (nests). More heavy precipitation events may also increase contaminant runoff into salmon-bearing streams.
- **Warmer ocean temperatures** increase metabolic demands, reduce salmon size and reduce return rates, as shown in a study of juvenile salmon along the coasts of Washington and Oregon [139]. Warming ocean temperatures can affect the base of the food web, changing the phytoplankton and zooplankton composition to lower calorie species [140, 141]. It can also promote the abundance of harmful algae, toxic to fish, and plankton grazers such as jellyfish, which are a caloric dead end in the food web due to their few predators [142, 143]. Further, changes in weather patterns can affect spring bloom timing and magnitude in the Salish Sea [144]. These issues can precipitate up the food web and affect the growth and survival of juvenile salmon and forage fish. Forage fish support both salmon and higher order predators such as piscivorous fish, marine mammals and seabirds. When forage fish abundance is limited, these predators can increase predation on juvenile salmon. Warmer

ocean temperatures could also bring more predators into the region, including Pacific hake and mackerel [145].

- **Sea-level rise** reduces habitat and spawning grounds available to forage fish such as smelt, sand lance and herring that spawn in the intertidal and shallow subtidal. Effects will be seen sooner and more dramatically on hardened beaches with shoreline armoring, due to their inability to adjust to sea-level.

Abdul-Aziz et al. projected by 2100, under a moderate greenhouse gas emissions scenario, summer habitat for Chinook salmon in the North Pacific will decrease by 86 percent compared to 1980 levels as a result of warmer temperatures [146]. A study on the effects of increased atmospheric carbon dioxide predicted adult Fraser River sockeye salmon would be smaller and less abundant [147].

A 2017 report by the University of Washington Climate Impacts Group and the Puget Sound Partnership concluded the orca recovery goal was at high risk from climate change impacts because the projected decline in Chinook abundance will lead to increased nutritional stress and disease susceptibility for the orcas. It noted warmer waters may also bring new pathogen and disease vectors that could be harmful for orcas [148].

Increasing levels of carbon dioxide in the atmosphere also contributes ocean acidification which will adversely affect many marine species. Increased levels of atmospheric carbon dioxide are absorbed by the ocean, reacting with the water to form carbonic acid which increases hydron ion (H+) concentrations and results in a lower oceanic pH (more acidic). Recent studies on juvenile coho salmon exposed to low level pH, representing projected future scenarios, showed disruption of olfactory driven behaviors and related neural signaling pathways. Although the salmon's ability to smell remained intact, their response to alarm odors was indifference, versus a typical fear and avoidance response. Olfaction plays a central role in salmon survival, navigation and reproduction. These neural signaling pathways are highly conserved across many species, indicating other salmon species could be at risk as well [149]. Although few studies exist on the direct effects of ocean acidification on Pacific salmon species, studies of projected future ocean acidification scenarios on tropical reef fish showed reduced growth, behavioral changes and decreased survival [150, 151].

Salmon are also likely to be impacted through food web changes, as ocean acidification can negatively affect organisms such as copepods that are a primary food source for forage fish such as sand lance, herring and surf smelt [152, 153]. The combined effects of ocean acidification on zooplankton and rising sea-level on forage fish nearshore spawning habitat will continue to perturb the food web that salmon and orcas rely on for survival in unpredictable ways. As such, we must seek to reduce and mitigate other stressors.

The Prey working group analyzed the relevance of climate change to the potential prey actions presented for task force consideration. They noted:

- Summer and fall Chinook are expected to be more resilient than spring Chinook to climate change effects due to their late run timing, spawn timing and sub-yearling migrant life history.

- Many of the most important Chinook habitat areas for acquisition and protection are also the most susceptible to climate change (sea-level rise resulting in estuary and floodplain inundation due to encroaching seawater or floods, respectively).
- In the long term, removal of dams that lack fish passage, combined with reintroducing fish into formerly blocked areas, can offer access to cooler water in high-elevation headwater areas and eliminate heating behind dams. Where dams remain, they can help store water to mitigate against low water years. Some reservoirs behind dams provide cool water in the summer and flow improvements when needed. Both can buffer against climate change.
- Monitoring zooplankton is critical to understanding and separating the influence of climate change on salmon and forage fish growth and survival from the hatchery, harvest and habitat actions we take [154].
- The impacts of climate change should be accounted for when assessing hatchery facilities for increased production, including facility water temperature and availability, river access to hatcheries and disease management. Further, consistent with current recommendations, hatchery managers should assess stock selection, growth rates and release timing as tools for reducing climate impacts to salmon as they live out their lives in the rivers and ocean.
- Climate change should be considered in prioritizing habitat restoration projects.

The Legislature has recognized the need to act on climate change and to reduce the severity of its threat to Washington. In 2008 the Legislature set limits on Washington's greenhouse gas emissions. The law requires the state to:

- By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels.
- By 2035, reduce overall emissions of greenhouse gases in the state to 25 percent below 1990 levels.
- By 2050, do its part to reach global climate stabilization levels by reducing overall emissions to 50 percent below 1990 levels, or 70 percent below the state's expected emissions that year.

In addition to the state taking actions to meet its greenhouse gas reduction goals, it must also consider anticipated changes in the climate when determining how to approach habitat restoration, salmon hatchery management, salmon and forage fish harvest management and other actions intended to help recover Chinook salmon and Southern Resident orcas. Implementing agencies and partners must monitor changes in climate as well as the effectiveness of projects and actions and adjust approaches as needed to maximize the benefit to salmon and orcas. At the same time, some of the recommended actions can also help build broader ecosystem resilience and therefore have benefits for other species and human communities in addition to benefiting salmon and orcas.

The task force developed many recommendations that contribute to addressing climate change impacts. For example, recommendations include restoring and protecting habitat which results in cooler rivers and riparian buffers that sequester carbon. Properly functioning rivers also help reduce flood risks and enhance reliability of water. Opening fish passage allows salmon access to cooler upstream habitat, and reintroducing salmon above blockages allows them to colonize healthy

productive headwater habitats. Protecting habitat from being converted to other uses will also help to buffer against potential climate change impacts.

Most vessels recommendations emphasized immediacy, but two of them highlighted longer-term measures to reduce underwater noise and increase sustainability in the maritime sector, including ferries and shipping. The governor has convened a separate, concurrent Maritime Innovation Advisory Council to develop the Washington Maritime Blue Strategy to lead the country in accelerating innovation for the maritime sector's shift towards deep de-carbonization and low-impact vessels with benefits including noise reduction and improved water quality.

Ongoing and immediate actions

As part of Executive Order 18-02, Gov. Inslee directed the following state agencies to take immediate actions to support Southern Resident orca recovery:

- Washington Department of Fish and Wildlife
- Governor's Salmon Recovery Office
- Puget Sound Partnership
- Washington State Parks and Recreation Commission
- Washington State Department of Ecology
- Washington State Department of Transportation
- Washington State Department of Licensing

The nine immediate actions the governor directed these state agencies to take are outlined in Table 1. Progress updates are provided in Appendix 4.

Table 1: Summary of immediate actions directed in Executive Order 18-02 and responsible agencies

Action	Deadline	Responsible Agencies						
		WDFW	GSRO	PSP	State Parks	Ecology	WSDOT	DOL
Develop implementation plans for increased enforcement, outreach and education of vessel regulations as well as enforcement of Chinook fisheries regulations in areas frequented by orcas.	04/30/18	●			●			
Review 2018 recreational and commercial fishing regulations prioritizing protection of key areas and fish runs for Southern Resident recovery.	04/30/18	●						
Explore options and develop a proposal to alter fish food used in state hatcheries to limit the amount of polychlorinated biphenyls in Southern Resident prey.	04/30/18	●						
Create a curriculum to improve and increase the number of trainings for vessels in the whale watching industry to become "vessels of opportunity" to assist in the event of an oil spill	04/30/18					●		
Develop strategies for quieting state ferries in areas most important to Southern Residents.	05/31/18						●	
Prioritize existing outreach resources to support Southern Resident recovery. Collaborate with the Governor's Office to develop a public education program and identify needed resources.	07/01/18	●	●	●	●			●
Identify the highest priority areas and watersheds for Southern Resident prey to focus or adjust, as needed, restoration, protection, incentives, hatcheries, harvest levels and passage policies and programs.	07/31/18	●	●	●				
Develop criteria to prioritize financial assistance beginning in the 2019–21 biennium for storm water projects that benefit Southern Resident recovery	07/31/18					●		
Demonstrate how Chinook recovery projects benefit Southern Resident recovery, beginning in the 2018 grant round, for the Pacific Coast Salmon Recovery Fund, the Puget Sound Acquisition and Restoration Program, the Estuary and Salmon Restoration Program and the Washington Coastal Restoration Initiative.	12/15/18	●	●	●				

Recommendations

The task force sought to develop a bold package of recommendations that, if implemented, would collectively have the impact needed to achieve the vision of a thriving and resilient Southern Resident orca population. The recommendations below are grouped under four overarching goals and include details for the governor, the Legislature, agencies and partners to consider during implementation. Recommendations are then summarized in a table that lays out the leads, key partners, and whether each recommendation requires state, federal or local action or decisions. The task force emphasized the importance of funding these actions in ways that are not detrimental to other ongoing programs that are also critical for the recovery of salmon and the Southern Residents. Task force members' votes on this final package of recommendations are recorded in Appendix 3.



RECOMMENDATIONS THAT WOULD REQUIRE LEGISLATION:

- Recommendation 3
- Recommendation 4
- Recommendation 5
- Recommendation 17
- Recommendation 18
- Recommendation 19
- Recommendation 21
- Recommendation 24
- Recommendation 26
- Recommendation 28

Goal 1: Increase Chinook abundance

Habitat restoration and acquisition: Increase Chinook abundance by restoring and acquiring salmon habitat and food sources

Recommendation 1: Significantly increase investment in restoration and acquisition of habitat in areas where Chinook stocks most benefit Southern Resident orcas.

- Provide capital budget funding to support the existing lists of projects and Salmon Recovery Funding Board requests intended to improve Chinook and forage fish habitat.
- Accelerate the implementation of currently funded Chinook restoration projects known to provide survival benefits to Southern Resident orcas.
- Significantly increase funding for a minimum of 10 years for high-priority actions or projects targeted to benefit Chinook stocks.
- Emphasize large-scale estuary restoration programs and prioritize grant making for restoration that increases Chinook recovery in the short term.
- To complement forest Road Maintenance and Abandonment Plans and Washington State Department of Transportation fish passage improvement efforts, continue to use a strategic approach for using Recreation and Conservation Office administered programs to remove barriers (for example, culverts and small dams) where removal would provide a high benefit to Chinook.
- Create a new funding source to support the significant increases in investments in the habitat protection and restoration programs. This should be done in conjunction with the development of a sustainable funding source for the implementation of all task force recommendations.
- The Legislature should fully fund payment in lieu of taxes to counties to compensate for the loss of revenue associated with the land that is acquired by the state for habitat protection and restoration projects.
- The Legislature should ensure adequate funding for the operations and maintenance of lands acquired by the state for habitat protection and restoration projects.
- Support a more robust monitoring and adaptive management system to better ascertain restoration project compliance and measurable ecological benefits.
- Support funding for completion of Chinook recovery plan updates for 14 of 16 remaining Puget Sound watersheds.

Implementation details:

In 2019, the governor and Legislature should fully fund the Recreation and Conservation Office's budget requests for existing capital budget salmon recovery accounts (Salmon Recovery Funding Board, Puget Sound Acquisition and Restoration Program, Estuary and Salmon Restoration

Program, the Fish Passage Barrier Removal Board and the Washington Coast Restoration and Resilience Initiative) with no changes to existing ranked lists.

In 2019, the governor and Legislature should also support programs administered by the Department of Ecology and the Department of Fish and Wildlife that directly benefit Chinook salmon, including Floodplains by Design, Puget Sound Nearshore Estuary Restoration Project, the Office of the Chehalis Basin Strategy and the Yakima Basin Integrated Plan.

Regions should work within their existing priorities that are consistent with high-priority Chinook stocks to accelerate the pace of restoration throughout the Puget Sound, Washington coast and Columbia Basin. Regions — including state natural resource agencies — should fully exercise their technical and policy capacity to accelerate full implementation of habitat restoration projects that are currently under consideration, that have an established funding source and that have feasibility studies indicating the project would provide survival benefits to salmon stocks important to the Southern Resident orcas. Consistent with restoration programs to date, projects on private lands will be limited to high priority habitat areas with willing sellers. Additional state funding should be provided for at least 10 years (five biennia) to focus specifically on high-priority actions for the stocks that most benefit Southern Residents. These programs have traditionally allocated approximately 80 percent of their funding towards projects that benefit Chinook.

When lands are acquired by state agencies for salmon and Southern Resident orca recovery, the Legislature should fully fund payment in lieu of taxes to counties to compensate for the loss of revenue associated with the land acquired by the state for habitat protection and restoration projects. Natural resource managers should be adequately funded for operations and maintenance of lands acquired. In addition, support for comprehensive and systematic evaluation of fish/habitat response/interactions to restoration actions could potentially: (1) provide further detailed information on the mechanistic links or processes that benefit the individual or population as a function of habitat restoration and (2) help prioritize future restoration actions.

Critically important but costly estuary restoration work should be evaluated and prioritized where juvenile Chinook production could be increased in the very near term. Any estuary selected for restoration should be a high-priority Chinook salmon estuary and identified as being important for the Southern Resident orcas. Possible estuaries to focus on are the Nooksack, Skagit, Stillaguamish, Elwha, Dungeness, Snohomish, Green-Duwamish, Puyallup, Nisqually, Skokomish, Snohomish, the mouth of the Columbia and Chehalis, all benefitting high-priority Chinook for Southern Residents.

To complement forest Road Maintenance and Abandonment Plans and WSDOT fish passage improvement efforts, use Recreation and Conservation Office administered programs to fund the removal of barriers (for example, culverts and small dams) where removal would provide a high benefit to Chinook. The Legislature should provide funding for barrier removal projects that already have broad support, such as the Middle Fork Nooksack and Pilchuck dams. In addition, the Governor's Salmon Recovery Office should coordinate with Washington Department of Fish

and Wildlife, the Fish Barrier Removal Board, regional salmon recovery organizations and partners to compile and develop a strategic approach to removing remaining barriers that would benefit Chinook, including those locally or privately owned, where community and technical support can be attained. A draft list of barriers shall be developed by March 2019 and provided to the task force, Governor's Office and Office of Financial Management as Phase I of this recommendation. Phase II will include further assessment of those barriers and any further steps needed for potential removal of those barriers (for example, stakeholder outreach), plus identification of any additional barriers by June 2020. This assessment should be iterative and should be revised as new information becomes available. The Legislature should provide funding via the capital budget for removal of barriers identified through this process that have community support.

Recommendation 2: Immediately fund acquisition and restoration of nearshore habitat to increase the abundance of forage fish for salmon sustenance.

- Provide funding for the immediate implementation of nearshore habitat restoration projects.

Implementation details:

The governor and Legislature should fully fund the projects by the Puget Sound Acquisition and Restoration, Washington Coast Restoration Initiative, Salmon Recovery Funding Board and Estuary and Salmon Restoration Programs that address nearshore habitat and that were approved during the 2018 grant round.

Habitat protection and enforcement: Protect habitat through improved enforcement of existing laws, strengthening laws and ensuring compliance

Recommendation 3: Apply and enforce laws that protect habitat.

- Washington Department of Fish and Wildlife, Washington Department of National Resources and Washington Department of Ecology must strongly apply and enforce existing habitat protection and water quality regulations. Provide WDFW, DNR and Ecology with the capacity for implementation and enforcement of violations.
- Direct DNR, WDFW and Ecology to identify and report to the task force before July 2019 on approaches using existing habitat, instream flow and water quality regulations to improve prey availability.
- Coordinate state and local enforcement efforts.
- Develop and adopt rules to implement and enforce the Fishway, Flow and Screening statute.
- Enhance penalties and WDFW's enforcement of the state Hydraulic Code and fish passage regulations.
- Increase prosecution of violations of state and local habitat protection and water quality regulations, including seeking to hold both property owners and contractors accountable, when appropriate.

Implementation details:

As soon as possible, the governor should direct WDFW staff to develop rules to fully implement and enforce the Fishway, Flow and Screening statute (chapter 77.57 RCW).

WDFW and Ecology should work with the Attorney General's Office and local prosecutors to increase compliance with habitat protection and water quality regulations. The number of WDFW and Ecology staff should be increased to improve implementation, compliance and civil enforcement.

The Legislature should amend WDFW's civil penalty statute (chapter 77.55.291 RCW) to provide the department with enforcement tools equivalent to those of local governments, Ecology and DNR.

Increase coordination among local governments, Ecology and WDFW in reviewing shoreline armoring proposals to better protect forage fish by advancing the Puget Sound Partnership's Shoreline Armoring Implementation Strategy.

The governor and Legislature must support and provide clear direction to Ecology, WDFW and DNR to facilitate improvements in implementation and increasing compliance to improve Southern Resident prey availability through existing habitat and water quality regulations. The agencies should report back to the task force before July 2019 on progress made. At the state level, the governor and Legislature must provide clear direction and support to facilitate change from the status quo (due to variable implementation).

Recommendation 4: Immediately strengthen protection of Chinook and forage fish habitat through legislation that amends existing statutes, agency rule making and/or agency policy.

- Strengthen legislation, agency rules, or agency internal policies, where appropriate, for Ecology and WDFW to better protect Chinook and forage fish.
- Direct WDFW to develop a plan with local governments for analyzing cumulative impacts and amend existing authority to allow WDFW to require mitigation for cumulative impacts over time under the Hydraulic Project Approval authority.
- Provide agencies with clear authority to prohibit or mitigate certain actions.

Implementation details:

Meet regularly with the Governor's Office, legislators, tribes, DNR, WDFW, Ecology, salmon recovery regional representatives and other partners and stakeholders with the goal of developing a habitat protection/regulatory reform legislative packages for the 2019 and subsequent legislative sessions and rule making.

Improve coordination of local and state permits by requiring that local shoreline permits for single-family residential bulkheads, shoreline armor or rock walls be issued prior to the issuance of an HPA by WDFW. This would be added to the HPA statute (chapter 77.55.021 RCW).

Repeal the section of the HPA statute that requires the issuance of a permit (with or without conditions) for a single-family residential bulkhead, shoreline armor or rock wall to allow WDFW to consider the full impacts of these proposals consistent with its consideration of other aquatic projects.

Direct WDFW to develop a plan with local governments for analyzing cumulative impacts of projects permitted under the HPA program and ask the Legislature to rescind or amend appropriate portions of WDFW's HPA authority (chapter 77.55.231[1] RCW) to enable the agency to require mitigation for cumulative impacts over time. This should be coupled with increased enforcement capacity.

Habitat protection: Increase incentive programs to encourage salmon habitat conservation

Recommendation 5: Develop incentives to encourage voluntary actions to protect habitat.

- State agencies should identify and implement incentives for landowners to voluntarily protect shorelines and habitats to benefit salmon and Southern Resident orcas.
- Increase funding for existing and seek to develop additional cooperative conservation programs.

Implementation details:

The Legislature and federal agencies such as the Natural Resource Conservation Service should create additional mechanisms and increase financial assistance for cooperative conservation programs (for example, fish screens, riparian areas, commodity funding for voluntary riparian implementation to Site Potential Tree Height, private fish passage upgrades and enhanced wildlife forage budget for WDFW wildlife areas with estuary restoration potential) implemented by conservation districts, lead entities, Regional Fisheries Enhancement Groups or individual landowners. Relevant existing programs include Floodplains by Design, the Shore Friendly Program, Forest Riparian Easement Program, Rivers Habitat Open Space Program and the Conservation Reserve and Enhancement Program. Salmon recovery regions and state and federal agencies should develop a 10-year funding proposal for incentives by June 2020 to complement habitat restoration and acquisition. The Legislature should allocate funding in the 2019–21 biennium for implementation in select watersheds in Puget Sound, Washington Coast and Columbia Basin.

Hatcheries: Provide additional Chinook through increased hatchery production

Recommendation 6: Significantly increase hatchery production and programs to benefit Southern Resident orcas consistent with sustainable fisheries and stock management, available habitat, recovery plans and the Endangered Species Act. Hatchery increases need

to be done in concert with significantly increased habitat protection and restoration measures.

- Authorize/provide funding for the Washington Department of Fish and Wildlife and co-managers to significantly increase hatchery production at facilities in Puget Sound, on the Washington Coast and in the Columbia River basin in a manner consistent with sustainable fisheries and stock management and the ESA. Decisions on hatchery production are made by WDFW and tribal co-managers, with Endangered Species Act consultation from the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service where appropriate. The Washington Fish and Wildlife Commission adopted a policy statement in 2018 indicating support for hatchery increases of approximately 50 million smolts beyond 2018 levels to produce more Southern Resident orca prey and fisheries benefits; the task force supports significant increases in hatchery production and habitat protection and restoration.
- In 2019, undertake hatchery pilots to test and refine methods and practices (location, timing of release, age, size) that maximize production of Chinook for the benefit of Southern Resident orcas while minimizing competition with wild stocks.
- Manage the increase in hatchery production consistent with available and improved habitat to enable survival of both hatchery and wild fish stocks.
- Provide increased funding to cover the operational, infrastructure, management and monitoring costs associated with increased hatchery production.
- Conduct ongoing adaptive management, five-year comprehensive reviews and the science needed to support a sustained increase in hatchery production.

Implementation details:

To supplement 2019 hatchery production increases, fund WDFW and co-managers in fiscal year 2020 and into the future to increase hatchery production for the benefit of Southern Resident orcas at facilities in Puget Sound, on the Washington Coast and in the Columbia River basin, in a manner consistent with sustainable fisheries and stock management, state and federally adopted recovery plans and the ESA. Increased production can be assessed at appropriate state, tribal, federal or private facilities that most benefit orcas. The governor should also ask other funders – such as NOAA, USFWS, Bonneville Power Administration and the Oregon Department of Fish and Wildlife – of hatchery programs for Chinook stocks that are a priority for Southern Resident orcas to maintain or increase production levels for those stocks, so additional hatchery investments result in an overall increase in prey abundance. Increasing hatchery production will require funding for the following activities:

- Adaptive management and five-year comprehensive reviews. To continue ongoing hatchery production with funding at the increased levels, WDFW must conduct annual adaptive management and five-year comprehensive reviews and adjust production and practices accordingly to limit impacts on natural salmon stocks if the reviews provide evidence of significant risk to the recovery of natural salmon stocks. These reviews should consider stray

rates, productivity, juvenile rearing carrying capacity, density dependence, smolt-to-adult ratios, genetic fitness and other appropriate metrics to determine if action is needed to ensure the health or recovery of natural stocks. In coordination with this effort, annual and five-year reviews will evaluate the effectiveness of increased hatchery production to increase salmon available to Southern Resident orcas at times and locations determined critical to successful feeding, and to ensure effective support of fisheries management plans related to the Pacific Salmon Treaty, tribal treaty right fisheries and other plans and adjust hatchery production and practices to also maximize benefits to orcas and fisheries. Accomplishing this review will require additional state funding for WDFW and co-managers in future years (such as in years when hatchery-produced fish return to Washington waters).

- Production at the 2019 level. Although the Legislature provided funding in fiscal year 2019 to increase hatchery production with existing infrastructure, continued funding is needed to continue these production increases.
- Additional science and infrastructure to support increased production for orcas. Additional funding is needed to expand production beyond the 2019 level driven by the Southern Residents' needs. Expanding production significantly will require additional hatchery facility capacity upgrades and should use the best available science on hatchery production to adaptively manage the program to consider the factors listed above.
- Collaboration among WDFW and co-managers on hatchery production decisions.

The governor and Legislature should also provide funding to WDFW and co-managers to coordinate with NOAA and Long Live the Kings and begin testing pilot actions in hatcheries in 2019. These pilots should aim to: (1) increase marine survival of Chinook, (2) adjust return timing and locations to align with orcas' needs, (3) assess the feasibility and develop a plan to potentially increase size and age of returns and (4) reduce potential competition with wild fish. This work should build from and test findings of the Salish Sea Marine Survival Project, NOAA's salmon ocean program and other relevant efforts that are working to determine what is driving the survival of Chinook as they migrate downstream and through the marine environment. Hatchery pilots may require additional production to ensure existing production levels are not affected by these trials, which have uncertain outcomes in terms of fish survival. Pilot hatchery actions should be used to gather science to adaptively manage hatchery production levels and practices, including guiding the continued increases of hatchery production over time to provide more adult Chinook for Southern Residents, while ensuring increases are done in a manner that complies with ESA guidelines and that does not impact Chinook recovery.

Hydropower operations: Improve survival and distribution of Chinook populations

Recommendation 7: Prepare an implementation strategy to reestablish salmon runs above existing dams, increasing prey availability for Southern Resident orcas.

- Provide funding to Washington Department of Fish and Wildlife and regional salmon organizations to coordinate with partners to determine how to reestablish sustainable salmon runs above dams including, but not limited to, the Chief Joseph and Grand Coulee Dams on the Columbia River and the Tacoma Diversion, Howard Hanson and Mud Mountain dams

in the Puget Sound. Provide policy support for actions needed. Prioritize projects that produce downstream adult Chinook.

Implementation details:

In 2019, the governor and Legislature should provide funding through WDFW and regional salmon recovery organizations to coordinate with tribes, local governments, National Oceanic and Atmospheric Administration and other key partners to assess and prioritize appropriate locations based on potential benefits, costs, management, operations and other key information necessary to reestablish salmon runs as soon as possible above the dams and in the watersheds agreed to by the parties. Provide policy support for Chinook reintroduction upstream of dams such as Chief Joseph and Grand Coulee Dams for both the near-term trap-and-haul efforts (cultural releases implemented by the Upper Columbia tribes). In addition, provide policy support for the long-term phased approach in the Northwest Power and Conservation Council's Fish and Wildlife Program and support the U.S. entity's regional recommendation concerning the Columbia River Treaty. Prioritize projects that can produce downstream adult Chinook and areas with suitable habitat or areas targeted for habitat restoration in the near term.

Recommendation 8: Increase spill to benefit Chinook for Southern Residents by adjusting total dissolved gas allowances at the Snake and Columbia River dams.

- Direct the Department of Ecology to increase the standard for dissolved gas allowances from 115 percent to up to 125 percent, to allow use of the best available science to determine spill levels over these dams to benefit Chinook and other salmonids for Southern Residents.
- Coordinate with the Oregon Department of Environmental Quality to align standards across the two states.
- Maintain rigorous monitoring of impacts to juvenile Chinook and resident fish to ensure any changes in spill levels do not negatively impact salmon or other aquatic species.
- Work with tribes, salmon recovery regions, Ecology and WDFW to minimize revenue losses and impacts to other fish and wildlife program funds.

Implementation details:

Ecology should move to immediately eliminate the current 115 percent standard for the forebay of the eight dams on the lower Snake and lower Columbia rivers and adjust total dissolved gas allowances to up to 125 percent, as measured at tail races. The intent is to create flexibility to adjust spill regimes, using the best available science, to benefit Chinook salmon and other salmonids. Ecology should work as expeditiously as possible with the WDFW and Oregon Department of Environmental Quality to align at this level. Any new spill levels tested through this flexibility in spill regimes should be monitored and adaptively managed to minimize any negative effects on resident and anadromous fish species.

Recommendation 9: Establish a stakeholder process to discuss potential breaching or removal of the lower Snake River Dams for the benefit of Southern Resident orcas.

- In conjunction with the states of Idaho and Oregon, Washington should act quickly to hire a neutral third party to establish a tribal and stakeholder process for local, state, tribal and federal leaders to address issues associated with the possible breaching or removal of the four lower Snake River dams.

Implementation details:

The task force requests the creation of an open collaborative process, the purpose of which is to address a series of questions related to the potential breaching or removal of the lower Snake River dams and associated economic and social impacts and mitigation costs. These should include the potential economic impacts or benefits to coastal fishing communities, both tribal and non-tribal. This local collaborative effort should work in conjunction with the states of Washington, Idaho and Oregon to support a technically sound process.

The work should not interfere with the current Columbia River Systems Operation National Environmental Policy Act process. Washington state will continue its current active support as a cooperating agency in the NEPA process.

The state shall develop a scope of work in conjunction with the National Research Council by March 2019. This process will include engagement from local, state, tribal and federal governments, along with interested stakeholders, to begin developing a regional understanding and potential recommendations for the lower Snake River dams. The process should include consideration of services provided by the dams, potential biological benefits/impacts to Chinook and Southern Resident orcas, as well as other costs and uncertainties related to the question of breaching or retaining the lower Snake River dams.

The task force should be updated on progress by the summer of 2019.

Harvest: Increase adult Chinook abundance through reduced catch and bycatch

Recommendation 10: Support full implementation and funding of the 2019–28 Pacific Salmon Treaty.

- Washington's congressional delegation should prioritize securing appropriations to implement this treaty. Delegation members, the governor, task force members and others should advocate for these appropriations.
- The treaty and its appropriations will result in harvest reductions, reduced bycatch, increased hatchery production and investments in habitat restoration, which are crucial to reducing harvest thereby increasing Chinook for the benefit of Southern Resident orcas.

Implementation details:

Support the full implementation of the 2019–28 Pacific Salmon Treaty, with the funding components that benefit Southern Resident orcas. Elements of the renegotiations included

reductions in impacts on Chinook to make more prey available to Southern Resident orcas. Related funding elements should include investments in habitat and hatcheries to increase Chinook abundance. The governor should express the need for approval of the appropriations requests to the Washington federal delegation. Task force members should also reach out to the delegation for its support of the funding components.

Recommendation 11: Reduce Chinook bycatch in west coast commercial fisheries.

- Washington Department of Fish and Wildlife should work with regional councils and stakeholders to implement practices and regulations in west coast fisheries that further reduce bycatch of Chinook – allowing more of these Chinook to reach Southern Residents.

Implementation details:

The governor should direct WDFW representatives on the Pacific Fishery Management Council and North Pacific Fishery Management Council to work with regional stakeholders and manager starting in 2019 to avoid bycatch and further reduce the bycatch of Chinook in west coast fisheries to the extent practicable to ensure more Chinook reach Southern Residents. Discussions should take into account the effectiveness of existing bycatch reduction measures and provisions of existing federal agency requirements such as the Endangered Species Act.

Predation of Chinook: Decrease the number of adult and juvenile Chinook lost to predation by species other than Southern Residents

Recommendation 12: Direct the appropriate agencies to work with tribes and National Oceanic and Atmospheric Administration to determine if pinniped (harbor seal and sea lion) predation is a limiting factor for Chinook in Puget Sound and along Washington's outer coast and evaluate potential management actions.

- Conduct a pilot project for the removal or alteration of artificial haul out sites where sites are associated with significant outmigration and predation of Chinook smolts. Fund a study to determine if pilot removal accomplishes the goal of significantly reducing Chinook smolt predation.
- Complete ongoing regional research and coordinate an independent science panel (Washington Academy of Sciences or National Academy of Sciences) to review and evaluate research needed to determine the extent of pinniped predation on Chinook salmon in Puget Sound and Washington's outer coast. The ongoing and new work should include an assessment of factors that may exacerbate or ameliorate predation such as infrastructure haul-outs, hatchery strategies, the increased presence and impact of transient killer whales and the presence/absence of forage fish or other fish that are staple food for pinnipeds.
- Engage NOAA to determine the optimal sustainable populations of harbor seal stocks in Puget Sound.
- Convene a management panel of state, tribal and federal agencies to communicate with the independent science panel, review the results of the ongoing regional research and independent scientific review and assess appropriate management actions. Citizen

stakeholders should also be engaged in the process. If pinniped removal is identified as a management option, secure authorization through the Marine Mammal Protection Act.

- Provide funding for the science, research, coordination, decision making and, if deemed necessary, removal.

Implementation details:

In the 2019–21 biennium, the governor and Legislature should begin to fund Washington Department of Fish and Wildlife to work with tribes and NOAA to pilot the removal or alteration of artificial haul-out sites used by pinnipeds in the Puget Sound in places that may improve Chinook survival. Funding should include implementation and monitoring components to assess the effectiveness of this approach to guide potential future haul-out removals.

Starting immediately, the governor, Legislature and NOAA should support and fund the coordination and continued development of science to determine the extent of pinniped predation on Chinook salmon in Puget Sound and Washington's outer coast.
WDFW and the Puget Sound Partnership – or an appropriate board or partner designated by them – should convene a science workgroup to coordinate ongoing research and provide a comprehensive report on the state of science on pinniped predation. The comprehensive report of science should include:

- An analysis to help determine the extent to which pinniped predation is a limiting factor for Chinook survival in Puget Sound and the outer coast that should be completed by WDFW. Further, WDFW should continue to assess the status of the harbor seal and sea lion populations in these areas.
- An assessment of factors that may exacerbate or ameliorate predation, including infrastructure haul-outs, hatchery strategies, the increased presence of transient killer whales and the presence/absence of forage fish or other fish that are staple food for pinnipeds. Strive to complete the assessment in a timeframe that would help inform increases in hatchery production.
- Continue science to identify potential negative feedbacks associated with pinniped removal (using NOAA's Atlantis modeling and other efforts as needed). For example, if the consumption of Pacific hake and spiny dogfish by harbor seals declines, will the increased abundance of those fish lead to higher rates of predation by them on Chinook?
- A quantitative and spatial assessment of the consumption of harbor seals and sea lions by transient killer whales in Puget Sound and the effect of potential removals on transient populations.

WDFW and/or PSP should convene an independent science panel through the Washington Academy of Sciences or National Academy of Sciences to conduct an initial independent science review of the research program and then review the comprehensive report.

At the same time, the governor should ask NOAA to expediently complete an assessment to determine the optimal sustainable populations of the harbor seal stocks of Puget Sound and then convene the Pacific Scientific Review Group to review the assessment.

To ensure emerging science and the independent science panel review are promptly used to improve management, WDFW should expediently convene a panel of state, tribal and federal managers in 2019. The management panel will provide feedback to the science workgroup on specific information required to assess Puget Sound and outer coast pinniped predation and be updated on the state of the science. After completion of the independent science review, the management panel should examine where and what types of management actions are best suited to the situation and, if needed, provide any information necessary to secure authorization to perform needed management actions. The management panel will also ensure participation and input from stakeholders. The panel should clarify management goals and assess actions that may exacerbate or ameliorate predation, including infrastructure haul-outs, hatchery strategies, increased presence of transient killer whales and the presence/absence of forage fish or other fish that are staple food for pinnipeds. WDFW should receive state funding for coordination of this process and the governor should request the Washington federal delegation support funding capacity for NOAA to participate and review any resulting applications for management expediently. Once authorization is received for any management actions, those actions should be funded through state and federal funds.

Recommendation 13: Support authorization and other actions to more effectively manage pinniped predation of salmon in the Columbia River.

- Support efforts to enact a Columbia River-specific amendment to the Marine Mammal Protection Act enabling more effective management of pinniped (harbor seal and sea lion) predation of salmonids.
- Support MMPA authorization to add Steller sea lions to the list of pinnipeds managed in the lower Columbia River. Support increasing removal levels and altering removal requirements.
- Monitor Chinook survival and pinniped distribution in the Columbia River estuary to guide current and future management actions.
- WDFW should work with Oregon Department of Fish and Wildlife to pilot a project to remove artificial sea lion haul-out sites in the lower Columbia River and study the effectiveness of the action in reducing predation on Chinook.

Implementation details:

The governor should support efforts to amend the MMPA to more effectively manage pinniped predation of salmonids in the Columbia River through non-lethal and lethal methods. The task force should join the governor in expressing public support for a Columbia River-specific amendment to the MMPA, which is currently under consideration in Congress.

Alternatively, or in the meantime, the governor should support an application for MMPA authorization to increase effectiveness of the management program by allowing the management

of Steller sea lions, increasing removal levels and altering removal requirements. In the case of an application for MMPA authorization, the governor should request the Washington federal delegation support funding for NOAA to review the application expediently. To implement increased management through either an MMPA amendment or additional MMPA authorization, the Legislature should provide additional funding to WDFW to work with partners to carry out the program.

To monitor the effectiveness of the management program, the governor should request that NOAA provide federal funding to monitor Chinook salmon survival from the Columbia River estuary to Bonneville Dam. The governor and Legislature should provide complementary state funding for WDFW to perform pinniped distribution surveys for this same area. In combination, these two analyses will greatly help to guide current and future management actions.

Recommendation 14: Reduce populations of nonnative predatory fish species that prey upon or compete with Chinook.

- Adjust game fish regulations and remove catch and size limits on nonnative predatory fish — including, but not limited to, walleye, bass and channel catfish — to encourage removal of these predatory fish, where appropriate.
- Evaluate predatory fish reduction options in McNary reservoir as the basis for further action to protect juvenile salmon.

Implementation details:

Request WDFW remove catch and size limits on nonnative predatory fish including, but not limited to, walleye, bass and channel catfish to encourage removal of these predatory fish, where appropriate, to protect salmon or other ESA-listed species. In addition, WDFW should adapt regulations to allow the disposal of these fish species because it is currently illegal to "waste" sport fish. Any increase in fishing for these species should be managed to minimize additional mortality or bycatch of salmonids.

The governor's budget should include funding for next three years as partial funding to support the proposed study to evaluate predatory fish population reductions through McNary Dam reservoir elevation management. The study would evaluate reservoir pool elevation levels that affect nonnative predatory fish spawning.

Forage fish: Increase the food available for Chinook

Recommendation 15: Monitor forage fish populations to inform decisions on harvest and management actions that provide for sufficient feedstocks to support increased abundance of Chinook.

- Complete Puget Sound-wide surveys of herring, smelt and sand lance to map spawning habitat and determine abundance of these food sources for Chinook.
- Surveys should be conducted in conjunction with restoration and protection of forage fish spawning habitat.

- Inventory existing and planned forage fish harvest levels to determine potential impact of forage fish harvest on Chinook.
- Provide funding to conduct these surveys and inventories.

Implementation details:

The governor and Legislature should continue to provide funding for forage fish surveys to identify and map the expansion or contraction of critical habitat used by three species of forage fish in Puget Sound: herring, surf smelt and sand lance. These surveys provide the only index of abundance currently available for any species of Puget Sound forage fish by estimating the spawning biomass of more than 20 Puget Sound herring stocks. Access to quality spawning habitat is critical to the health and persistence of forage fish stocks, so the results of forage fish surveys are updated annually and made available online to inform shoreline development, protection and restoration decisions that affect these species. The studies should be conducted in coordination with existing and ongoing efforts such as the Ocean Ecosystem Indicators work by National Oceanic and Atmospheric Administration's Northwest Fisheries Science Center, the Puget Sound Ecosystem Monitoring Program and other regional ecosystem and forage fish efforts. Ongoing funding should be provided to the Washington Department of Natural Resources' Puget Sound Corps Program and to Washington Department of Fish and Wildlife to implement the surveys.

The governor should provide ongoing funding for WDFW to inventory existing and future planned forage fish harvest levels in Puget Sound and to assess impacts to Puget Sound forage fish populations important to Chinook that would result from varying levels of harvest.

Recommendation 16: Support the Puget Sound zooplankton sampling program as a Chinook and forage fish management tool.

- Monitor zooplankton to better inform forage fish and Chinook conservation. Provide funding to DNR to coordinate this critical sampling program, leveraging the work of and funding from federal, state, tribal and academic partners.

Implementation details:

The governor should fund the Puget Sound zooplankton sampling program, which leverages the work of tribal, county, state, federal (including NOAA, the U.S. Coast Guard, the U.S. Army Corp of Engineers and the Environmental Protection Agency) and academic and non-academic entities, including the Northwest Indian Fisheries Commission, to sample and analyze the zooplankton community every two weeks at 16 sites. This program is essential to better manage Chinook and forage fish populations. These data help determine the role of our restoration actions versus marine drivers of productivity and aid in the forecasting of Chinook and forage fish abundance to help make continuous management decisions for whales and fisheries. Funding should be provided through the DNR, which will be leveraged with non-state partner funds to enable the continuation of the program.

Goal 2: Decrease disturbance of and risk to Southern Resident orcas from vessels and noise, and increase their access to prey

Reduce noise from small vessels operating near Southern Resident orcas

Recommendation 17: Establish a statewide "go-slow" bubble for small vessels and commercial whale watching vessels within half a nautical mile of Southern Resident orcas.

- Enact legislation in 2019 creating a half-mile "go-slow" zone, defined as speeds of seven knots over ground or less.
- Provide for discretion in enforcement and public outreach and education as needed.
- Encourage coordination among Washington state, federal and Canadian authorities to align regulations.

Implementation details:

In the 2019 legislative session, the Washington State Legislature and governor should update chapter 77.15.740 RCW to establish a statewide "go slow" bubble for small vessels operating within a half nautical mile of Southern Resident orcas. "Go slow" is defined as 7kt speed over ground, as measured using GPS. It is intended that fish and wildlife officers and other law enforcement officers will use discretion when enforcing this section and granting exceptions for safety reasons and provide public outreach and education when they determine it is appropriate.

Recommendation 18: Establish a limited-entry whale-watching permit system for commercial whale-watching vessels and commercial kayak groups in the inland waters of Washington state to increase acoustic and physical refuge opportunities for the orcas.

- Create a limited-entry permit system to manage commercial whale-watching in the inland waters of Washington state to reduce daily and cumulative impacts on Southern Residents.
- Washington Department of Fish and Wildlife should develop the permit system in consultation with the Pacific Whale Watch Association, orca conservation organizations and other stakeholders.
- The permitting system will consider limiting commercial whale-watching activities by: (1) number of boats that receive permits, (2) hours and duration spent in the vicinity of the Southern Resident orcas and (3) location. Development of the permit system will consider limiting the total number of boats that receive permits and help codify conservative and flexible measures, such as limiting the amount of time commercial whale-watching vessels may spend in the vicinity of a particular group of whales and limiting the number of commercial whale-watching vessels that may be in the vicinity of the whales at a given time. Permitting system must be in place by July 2019, including initial limits as described above.
- Consider implementing a buy-back program.
- Require the use of the Automatic Identification System to enable effective monitoring and compliance.

- Coordinate with Canadian authorities to develop and implement the permit system across boundaries.
- Formally apply standards from the Kayak Education and Leadership Program's "Code of Conduct" to the organized operation of kayaks and other human powered vessels near Southern Resident orcas (for example, practices such as "rafting up").

Implementation details:

By July 2019, the Legislature and governor should establish a Washington state commercial whale-watching license for whale watching in the inland waters (exempting the ocean) to be managed by WDFW. The fees for the license should be placed in a WDFW-dedicated account that could be used for the management and enforcement of whale-watching activities.

WDFW should also develop, assess and consider alternatives that restrict the number of Washington state whale-watching licenses and implement any restrictions by May 2020.

Recommendation 19: Create an annual Orca Protection endorsement for all recreational boaters to ensure all boaters are educated on how to limit boating impacts to orcas.

- Create a $10 statewide Orca Protection endorsement with an opt-out option for all registered recreational vessels.
- Provide education on Be Whale Wise guidelines, voluntary and regulatory measures and other information at the time the marine endorsement is purchased, so every boater has this basic information.
- Direct the resulting revenue to WDFW's new Marine Enforcement Division, to the Washington State Department of Licensing to cover costs of administering the program and to partners doing outreach and education.
- Work with trade associations and ports and through existing government programs and channels to provide additional education to commercial and recreational boaters.

Implementation details:

Establish a $10 endorsement on boater registration statewide to increase awareness and fund education and enforcement activities that promote recreational vessels' compliance with best boating practices near orcas. Boaters will be able to opt out of this fee. The DOL should also note Southern Resident orca regulations and guidelines on its website.

The governor should request that the Washington State Parks and Recreation Commission, Northwest Marine Trade Association and Recreational Boating Association of Washington work with the U.S. Coast Guard and National Association of State Boating Law Administrators to require the print and online curricula, testing and outreach for the mandatory Washington State Boater Education Card: (1) include Be Whale Wise guidelines, (2) include related updates to voluntary and regulatory measures by May 2019 and (3) include broader outreach to charter boat, boat rental companies and exempted audiences from outside Washington state (particularly in Canada) and those whose lifetime certification was obtained prior to the updated standards. Look

at how to leverage Enhancing Cetacean Habitat and Observation Program's new online mariners training. Tribal governments will make their own decisions.

Recommendation 20: Increase enforcement capacity and fully enforce regulations on small vessels to provide protection to Southern Residents.

- Create a WDFW Marine Enforcement Division with four additional officer positions at WDFW focused on protection and enforcement in Puget Sound.

Implementation details:

In the 2019 legislative session, the Washington State Legislature and governor should provide proviso funding to WDFW to create at least four new fish and wildlife officer positions that will be dedicated to the goal of providing marine-based Southern Resident orca protection on every day of the whale-watching season and at other times of need. The proposed fish and wildlife officers will be based in northern Puget Sound in summer and be prepared to shift coverage southward to match the seasonal movements of Southern Residents to central Puget Sound. They will be strictly focused on protection of all marine resources when not engaged in priority Southern Resident orca protection activities (such as promoting compliance with chapter 77.15.740 RCW and any new regulations). To complement their priority Southern Resident orca protection activities on water, one or more of them will concentrate on enforcement of penalties for egregious noncompliance with regulations and develop strategies for the public to contribute photographic and video evidence of violations WDFW can pursue. Funding should be provided to WDFW to purchase an additional vessel and equipment, cover operations and maintenance and hire additional officers.

Reduce noise from the use of echo sounders near orcas

Recommendation 21: Discourage the use of echo sounders and underwater transducers within one kilometer of orcas.

- Establish a "standard of care" for small vessel operators limiting the use of echo sounders and other underwater transducers within a half nautical mile of Southern Resident orcas. Implement as a voluntary measure and provide exceptions for safe navigation.
- Conduct education and outreach.
- Consider phasing in mandatory equipment requirements and regulations.

Implementation details:

By December 2018, the Puget Sound Harbor Safety Committee should develop a "standard of care" for small vessel operators to turn off echo sounders and other underwater transducers when within a half nautical mile of orcas except when necessary for safe navigation. The adopted standard should be reported to the task force and communicated to registered vessel owners in Puget Sound counties through the Washington State Department of Licensing. The Southern Resident Orca Task Force Interagency Communicators Group should work immediately with maritime organizations with broad communications networks — such as the Northwest Marine

Trade Association, Recreational Boating Association of Washington, U.S. Coast Guard Auxiliary and Boating Squadron, Washington State Ferries, State Parks, ports, marinas, Be Whale Wise.org — to develop and implement a complementary outreach campaign for voluntary compliance. In 2019, the task force should consult with the Legislature about opportunities to phase in mandatory equipment requirements (for whale-watching vessels in the recommended limited entry permit system, for example) and initiate a formal conversation with echo sounder manufacturers and suppliers.

Reduce noise from ships and ferries near Southern Resident orcas

Recommendation 22: Implement shipping noise-reduction initiatives and monitoring programs, coordinating with Canadian and U.S. authorities.

- Create a program similar to Enhancing Cetacean Habitat and Observation for Washington state, including participation by ports, whale watching operators, private vessel operators and Tribal governments as desired.
- Coordinate with the ECHO Program on transboundary efforts to reduce noise impacts to Southern Residents. Provide funding to complete an underwater acoustic monitoring network for Puget Sound, filling in gaps — such as on South San Juan Island — and supporting acoustic and visual mapping to improve the ability to identify when and where Southern Resident orcas are present.

Implementation details:

The governor should continue to encourage strategic U.S. and Washington state collaborations with ECHO — from the U.S. Coast Guard, Washington State Ferries, Puget Sound ports, the Pacific Merchants Shipping Association, the Puget Sound Pilots, OrcaSound, Tribal co-managers and others — that continue to support parallel and adaptive implementation of ECHO and related shipping noise-reduction initiatives while promoting safe, sustainable shipping practices.

Work with the Washington Public Ports Association to create a program similar to ECHO for Washington state. Gov. Inslee and the Legislature should fund the deployment of a permanent scientific grade hydrophone on South San Juan Island and fill in other key gaps in the underwater acoustic monitoring network of Puget Sound. Gov. Inslee and the Legislature should also support advancement of acoustic and visual mapping efforts by WSF and others, with the goal to share Washington data with the Southern Resident Killer Whale Report Alert System being developed in Canada by ECHO and the Vancouver Aquarium.

Recommendation 23: Reduce noise from the Washington state ferries by accelerating the transition to quieter and more fuel-efficient vessels and implementing other strategies to reduce ferry noise when Southern Residents are present.

- Conduct a ferry fleet noise baseline study as the basis for establishing noise reduction goals and developing plans.

- Based on the results of the baseline study, institute engineered or operational strategies to safely reduce noise from ferries when Southern Residents are present.
- Provide capital funding to accelerate the transition to quieter and more fuel-efficient ferry fleet.

Implementation details:

The governor and Legislature should support and accelerate transition of the WSF fleet to quieter, more fuel-efficient designs and technologies — while funding WSF's fleet noise baseline analysis project in 2019 — to achieve data-driven noise reduction goals.

WSF should institute engineered or operational strategies to safely reduce noise in the vicinity of the Southern Residents.

Increase protection of Southern Residents from the risk of a catastrophic oil spill

Recommendation 24: Reduce the threat of oil spills in Puget Sound to the survival of Southern Residents.

- Initiate zone-based rule making on tug escort requirements for oil laden tank vessels, including barges, more than 5,000 tons but less than 40,000 dead weight tons.
- Enact legislation disallowing any shoreline or seafloor infrastructure that would support offshore oil and gas development off the Washington coast.
- Update oil spill prevention and cleanup standards to address new types of oil and increased use of articulated tug-barges.
- Support the requirement for a stationed emergency response towing vessel (rescue tug) in a location to minimize response time in Haro Strait and other navigation lanes with the highest tank vessel traffic.

Implementation details:

Utilizing recommendations from the Department of Ecology's Strait of Juan de Fuca and Puget Sound Vessel Traffic Safety Report (2018), the 2019 Washington State Legislature should enact legislation to reduce the risk of oil spills in Puget Sound. The legislation should: (1) initiate zone-based rule making on tug escort requirements for oil laden tank vessels, including barges, more than 5,000 tons but less than 40,000 dead weight tons, including oil barges and articulated tug-barges, (2) support the requirement for a stationed emergency response towing vessel (rescue tug) in a location to minimize response time in Haro Strait and other navigation lanes with the highest tank vessel traffic and (3) require updated oil spill prevention and cleanup standards to address new types of oil (for example, diluted bitumen) and increased shipments by articulated tug-barges. The governor should meet with Canadian officials and seek involvement from the U.S, Coast Guard and the joint meetings of the Puget Sound Harbor Safety Committee and Canadian Pacific Coast Marine Advisory Review Panel and Navigation Aids and Navigation Services. The governor should direct Ecology and Washington Department of Fish and Wildlife to engage in

Canadian environmental assessments of project-related shipping's cumulative effects on Southern Resident orcas (such as Roberts Bank Terminal 2).

Formalize or extend vessel protections for Southern Resident orcas

Recommendation 25: Coordinate with the Navy in 2019 to discuss reduction of noise and disturbance affecting Southern Resident orcas from military exercises and Navy aircraft.

- The U.S. Navy was not among the organizations that were initially asked to participate in the Vessels working group during Year One. However, early in the task force process several task force members and the full Vessels working group indicated the need for direct engagement with the Navy in Year Two, which was reinforced in hundreds of public comments on the draft report.

Implementation details:

The governor should meet with the U.S. Navy's Commanding Officer for the region that includes Washington state to address the acoustic and physical impacts to Southern Resident orcas from Naval exercises in waters and air of Washington state. The governor should request the Navy participate on the Vessels working group in Year Two and identify actions to reduce the Navy's impacts to Southern Resident orcas.

Recommendation 26: Revise chapter 77.15.740 RCW to increase the buffer to 400 yards behind the orcas.

- The guidelines of the Pacific Whale Watch Association include this voluntary standard.
- By limiting the distance at which vessels can approach from behind (and their speed), the intent is to decrease the occurrence of chase-like situations that may adversely affect Southern Resident orcas.
- Encourage coordination among Washington state, federal and Canadian authorities to align regulations, which will foster clear communication and increase compliance.

Recommendation 27: Determine how permit applications in Washington state that could increase traffic and vessel impacts could be required to explicitly address potential impacts to orcas.

- State agencies should study potential requirements for relevant permit applications to explicitly address potential impacts to Southern Resident orcas and treat underwater noise as a "primary constituent element" of critical habitat and report to the task force by 2019.
- Coordinate with local governments and tribes and increase transboundary coordination with Canada.

Implementation details:

The governor should direct Ecology and request that DNR and WDFW work with the Governor's Office for Regulatory Innovation and Assistance to determine how applicable current and future permit applications in Washington state that could increase vessel traffic and vessel

impacts (risk of oil spills, increased noise, threat of ship strikes) could be required to explicitly address potential impacts to Southern Resident orcas and treat underwater noise as a "primary constituent element" of critical habitat. This work must coordinate with local governments, tribes and others to identify authorities to issue permits, authorizations or mitigation measures related to any projects, and must increase transboundary coordination to address impacts from projects initiating in Canada (such as Roberts Bank Terminal 2). The agencies should report to the task force by April 2019.

Potential avenues for adding these requirements include:

- Updating the State Environmental Protection Act checklist.
- Updating the Joint Aquatic Resources Permit Application form.
- Updating the Prevention of Significant Deterioration Permit to Construct to specifically include potential vessel traffic impacts to Southern Resident orcas.
- Updating state regulations and Ecology's Shoreline Master Program Handbook to address vessel traffic impacts and require Southern Resident orca expertise for all state application submittals.

Recommendation 28: Suspend viewing of Southern Resident orcas

- Establish a whale watching regulation that precludes Southern Resident orca viewing by all boats in Puget Sound for the next three to five years. The governor should direct WDFW to begin rule making to define Washington whale watching in coordination with the commercial whale watching industry, kayak industry, local governments and interested nongovernment organizations.
- Report back to governor and Legislature after three to five years on the effectiveness of the suspension.

Goal 3: Reduce the exposure of Southern Resident orcas and their prey to contaminants

Prevent further use and release of toxics that could harm orcas and their prey

Recommendation 29: Accelerate the implementation of the ban on polychlorinated biphenyls in state-purchased products and make information available online for other purchasers.

- Direct the Department of Enterprise Services to accelerate implementation of the ban, enacted by the Legislature in 2014, on PCBs in products purchased by the state.
- This law includes a provision for suppliers to provide information on PCBs in products to the state, which should be shared publicly to facilitate PCB-free purchasing by other entities.

Implementation details:

The Department of Enterprise Services should immediately accelerate implementation of the ban on PCBs in state-purchased products and make information about PCB levels in state-purchased products and packaging available online to the public so other purchasers can access this information and make informed purchasing decisions.

Washington state adopted a procurement law in 2014 that states: "no agency may knowingly purchase products or products in packaging containing polychlorinated biphenyls above the practical quantification limit except when it is not cost-effective or technically feasible to do so" (chapter 39.26.280 RCW). Implementation of this law should be accelerated to reduce PCBs entering Puget Sound from products such as paints, hatchery fish feed, adhesives, electrical equipment, caulking, paper products and lubricants. Product suppliers to the state will provide information about PCBs in their products and this information can be shared with other purchasers that want to avoid products containing PCBs.

Recommendation 30: Identify, prioritize and take action on chemicals that impact orcas and their prey.

- By March 2019, the Department of Ecology should develop a prioritized list of chemicals of emerging concern that threaten the health of orcas and their prey and pursue policy and/or budget requests in the 2019 legislative session to prevent the use and release of chemicals of emerging concern[2] into Puget Sound.
- Direct Ecology to convene discussions and develop a plan to address pharmaceuticals, identifying priorities, source control and wastewater treatment methods.
- Periodically review and update toxicological information as new science emerges and adaptively manage plans and programs.

Implementation details:

Ecology should develop a prioritized list of the chemicals of emerging concern based on greatest benefit to Southern Resident orcas and their prey if action is taken. Ecology, with input and review from regional experts, including Washington Department of Fish and Wildlife and National Oceanic and Atmospheric Administration, should begin this prioritization process in 2018 and complete the list in March 2019.

It is important to note toxicological information is limited on many chemicals of emerging concern. This list will need to be periodically revisited to ensure new chemicals and new research findings are incorporated into our efforts to decrease chemical exposure to Southern Residents and their prey.

[2] The following groups of chemicals were identified as potentially important (in no particular order): flame retardants, per- and polyfluoroalkyl substances, phthalates, bisphenols, nonylphenols, medications, pesticides and chemical(s) in tires.

Ecology should develop a plan and pursue agency request legislation and/or budget requests in the 2019 legislative session to address control of those chemicals of emerging concern based on greatest benefit to Southern Resident orcas and their prey if action is taken (informed by the prioritized list). This legislative request should include funding to implement existing policies as well as identify new policies and actions to decrease the load of priority chemicals of emerging concern to Puget Sound (for example, phaseouts, disclosure, assessment of safer alternatives and enhanced treatment). Given pharmaceuticals require a different control mechanism, Ecology should convene discussions about priority pharmaceuticals, source control and wastewater treatment options. The plan will identify the most effective actions to decrease loading of priority chemicals of emerging concern* to Puget Sound and will be completed by 2025.

Accelerate removal and clean-up of legacy sources of toxics harmful to orcas and their prey

Recommendation 31: Reduce stormwater threats and accelerate clean-up of toxics harmful to orcas.

- Provide funding to accelerate the clean-up and removal of legacy sources of polychlorinated biphenyls or PCBs, polycyclic aromatic hydrocarbons or PAHs, polybrominated diphenyl ether or PBDEs and per and polyfluoroalkyl substances present in Puget Sound.
- Prioritize and fund clean-up actions likely to have the greatest benefit to Southern Resident orcas.
- Identify toxic hotspots in the stormwater entering Puget Sound. Prioritize these for retrofits and/or redevelopment to meet current standards.
- Increase funding for the Stormwater Financial Assistance Program to incentivize immediate and accelerated retrofits and other source control actions.
- Prioritize and accelerate sediment remediation, nearshore restoration and clean-up of hotspots in forage fish and Chinook rearing habitats based on risk to Southern Resident orcas.

Implementation details:

The Legislature should fund the Department of Ecology in 2019 for a program that incentivizes the accelerated removal of primary legacy sources of PCBs, PAHs, PBDEs and per and polyfluoroalkyl substances present in the built environment in the central Puget Sound. In Phase I, Ecology should develop the program, to include: (1) prioritizing those legacy chemicals likely to have greatest impact on Southern Resident orcas, (2) coordinating with ongoing programs, (3) gathering stakeholder input and (4) undertaking targeted communications and outreach. In Phase II, the incentive program will be implemented.

Ecology should reduce stormwater threats in existing hotspots as soon as possible. In 2018-19, Ecology, in consultation with regional experts, should identify toxic stormwater hotspots and prioritize them for source control, stormwater retrofits and/or redevelopment projects to meet today's standards. Ecology should seek new funding in the 2019 Legislature through the

Stormwater Financial Assistance Program to incentivize stormwater retrofits and source control to achieve goals faster. Programs such as the Stormwater Financial Assistance Program, retrofits through the Washington State Department of Transportation and federal funding through the Clean Water State Revolving Fund are in place to support this effort but they need substantially increased funding to increase the pace and provide the necessary pollutant removal.

Ecology and the Washington State Department of Natural Resources should immediately prioritize and accelerate sediment remediation and nearshore restoration and clean-up of hotspots in forage fish and juvenile Chinook rearing habitat in sensitive areas where toxics are known to impact prey survival. All prioritized cleanup actions should ensure "upstream" source control is also addressed. During the prioritization process, Ecology should coordinate with other agencies such as the Washington Department of Fish and Wildlife, Puget Sound Partnership and the National Oceanic Atmospheric Administration. Previously identified hotspots include the Duwamish Estuary and river, Commencement Bay, Hanford Reach, Sinclair and Dyes Inlets and Lake Union.

Improve pollution permitting and management to reduce contaminant exposure of orcas and their prey

Recommendation 32: Improve effectiveness, implementation and enforcement of National Pollutant Discharge Elimination System permits to address direct threats to Southern Resident orcas and their prey.

- Update aquatic life water quality standards focused on pollutants most harmful to Southern Residents and their prey.
- Direct the Department of Ecology to consider developing stronger pre-treatment standards for municipal and industrial wastewater discharges under NPDES.
- Provide funding for Ecology to increase inspections, assistance programs and enforcement to achieve water quality standards. Prioritize enforcement where limits are exceeded for pollutants known to be harmful to Southern Resident orcas.

Implementation details:

Ecology should report in 2019 on how to accelerate effectiveness, implementation and enforcement of NPDES permits. Using the existing regulatory framework and authority under the Clean Water Act and Water Pollution Control Act, Ecology should update aquatic life water quality standards focused on pollutants most harmful to Southern Resident orcas and their prey. To fill gaps, this will focus primarily on PBDEs, contaminants of emerging concern[3] and other chemicals based on greatest benefit to Southern Resident orcas and their prey. In addition,

[3] The following groups of chemicals were identified as potentially important (in no particular order): flame retardants, per- and polyfluoroalkyl substances, phthalates, bisphenols, nonylphenols, medications, pesticides and chemical(s) in tires.

Ecology should consider developing stronger pre-treatment standards for municipal and industrial wastewater dischargers under NPDES.

Improved permit requirements would also result in increased innovation and source control for permitted dischargers and drive improved technology requirements under the existing "best available technology" standard. For municipal wastewater facilities this would combine improved industrial pretreatment and deployment of improved treatment technologies with already planned or required upgrades to wastewater treatment facilities. New standards could be implemented through renewals of the five-year NPDES permit cycle and could allow permittees the necessary time to fully implement solutions (ideally within one permit cycle).

To ensure new and existing NPDES permit conditions and water quality standards are met, Ecology should seek funding in the 2019 legislative session to conduct more robust inspections, assistance programs and enforcement. This funding should support field staff and data analysis and should include a clear directive to increase enforcement against entities that exceed limits for pollutants known to cause harm to the Southern Resident orcas and their prey.

Recommendation 33: Increase monitoring of toxic substances in marine waters; create and deploy adaptive management strategies to reduce threats to orcas and their prey.

- Expand and better coordinate existing toxic monitoring programs in Puget Sound focused on chemicals harmful to the Southern Resident orcas.
- Fund the development and implementation of a program to study and monitor the impact of CECs on Southern Resident orcas.

Implementation details:

The Legislature should fund Ecology, the Washington Department of Fish and Wildlife and the Puget Sound Ecosystem Monitoring Program managed by PSP, to expand and coordinate existing monitoring and new science programs in 2019. Funding is needed immediately to develop and support a robust toxic monitoring program as well as to conduct new science to understand the effects of CEC exposure on Southern Resident orcas, their prey and other species in the lower trophic levels. This funding is critical to gain a more comprehensive understanding of CECs; to collect data to address critical uncertainties; to evaluate the impact of CECs on Southern Resident orcas to prioritize cleanups, phase outs and bans; to document whether the actions taken are effective; and to make changes to implemented actions/strategies if the data demonstrates no impact.

The task force requested that in Year Two, the Contaminants working group look at issues associated with nutrient loading and water quality, as well as available ongoing work that is examining links between specific contaminants and health and reproductive challenges for the orcas.

Goal 4: Ensure funding, information and accountability mechanisms are in place to support effective implementation

Provide sustainable funding

Recommendation 34: Provide sustainable funding for implementation of all recommendations.

- Provide immediate capital and operating funds in the 2019-21 biennium budget to implement near-term high-priority actions.
- Request that the governor and Legislature establish a sustainable, durable funding source to implement these recommendations and meet needs as they arise.
- Include funding to state agencies for staffing, research and ongoing management needed to initiate and implement task force recommendations.

Conduct research, science and monitoring to enable adaptive management

Recommendation 35: Conduct research, science and monitoring to inform decision making, adaptive management and implementation of actions to recover Southern Residents.

- Request that National Oceanic and Atmospheric Administration Northwest Fisheries Science Center model the task force's Year One recommendations related to the three major threats to determine the degree of benefit to Southern Resident orcas that the recommended actions may produce under a reasonable range of future growth and development scenarios.
- Request that the zooplankton monitoring team engage with the Puget Sound Ecosystem Monitoring Program and the Department of Ecology to look at impacts associated with nutrient pollution.
- Request that the Regional Response Team and the Northwest Area Committee assess the connections to and impacts of oil spills on plankton.
- It will be important to use an adaptive management approach to track effectiveness of implemented recommendations, look for unintended consequences, monitor ongoing ecosystem change and adjust future investments based on our findings.

Track progress and address gaps in Year Two

Recommendation 36: Monitor progress of implementation and identify needed enhancements.

- Agencies shall report to the governor and the task force on progress implementing recommendations by May 1, 2019. These reports are to address progress, shortcomings, issues, barriers and gaps associated with initial implementation.
- The task force will identify changes needed, any new ideas and other actions needed to recover Southern Resident orcas.

Overview of recommendations

The Office of Financial Management is working with state agencies to develop budget estimates for implementation of each recommendation. An estimated cost for implementation in the next biennium will be released in December.

Recommendation	Lead	Key partners	Requires state, federal, or local action or decision
Recommendation 1: Significantly increase investment in restoration and acquisition of habitat in areas where Chinook stocks most benefit Southern Resident orcas.	Recreation and Conservation Office	Washington Department of Fish and Wildlife, Puget Sound Partnership, Washington State Department of Transportation, regional salmon organizations, tribes	Federal and state
Recommendation 2: Immediately fund acquisition and restoration of nearshore habitat to increase the abundance of forage fish for salmon sustenance.	RCO	WDFW, PSP, regional salmon organizations, tribes	Federal and state
Recommendation 3: Apply and enforce laws that protect habitat.	WDFW, DNR, Washington Department of Ecology	Attorney General's Office, local governments, PSP, tribes	State and local
Recommendation 4: Immediately strengthen protection of Chinook and forage fish habitat through legislation that amends existing statutes, agency rule making and/or agency policy.	WDFW, Ecology	PSP, DNR, regional salmon organizations, local governments, tribes, interested non-governmental organizations	State
Recommendation 5: Develop incentives to encourage voluntary actions to protect habitat.	Conservation Commission, Natural Resource Conservation Service	Washington Association of Conservation Districts, RCO, WDFW	Federal and state
Recommendation 6: Significantly increase hatchery production and programs to benefit Southern Resident orcas consistent with sustainable fisheries and stock management, available habitat, recovery plans and the Endangered Species Act. Hatchery increases need to be done in concert with significantly increased habitat protection and restoration measures.	WDFW, tribes	NOAA, regional salmon organizations, Oregon Department of Fish and Wildlife	State, with federal review
Recommendation 7: Prepare an implementation strategy to reestablish salmon runs above existing dams, increasing prey availability for Southern Resident orcas.	WDFW, regional salmon organizations	Tribes, local governments, NOAA, RCO, Canada	State, with federal review
Recommendation 8: Increase spill to benefit Chinook for Southern Residents by adjusting Total Dissolved Gas allowances at the Snake and Columbia River dams.	Ecology	WDFW, NOAA, Oregon Department of Environmental Quality, ODFW, Bonneville Power Administration	State, with federal review

Recommendation	Lead	Key partners	Requires state, federal, or local action or decision
Recommendation 9: Establish a stakeholder process to discuss potential breaching or removal of the Lower Snake River Dams for the benefit of Southern Resident orcas.	Washington state, with Idaho and Oregon	WDFW, NOAA, BPA, regional salmon organizations, local communities, stakeholders, independent scientists, interested non-governmental organizations	State and federal
Recommendation 10: Support full implementation and funding of the 2019-28 Pacific Salmon Treaty.	WDFW	Canada, Alaska, NOAA, tribes	Federal
Recommendation 11: Reduce Chinook bycatch in west coast commercial fisheries.	WDFW	Pacific Fishery Management Council, North Pacific Fishery Management Council, regional stakeholders	State and federal
Recommendation 12: Direct the appropriate agencies to work with tribes and National Oceanic and Atmospheric Administration to determine if pinniped (harbor seal and sea lion) predation is a limiting factor for Chinook in Puget Sound and along Washington's outer coast and evaluate potential management actions.	WDFW	Tribes, NOAA, PSP, independent scientists, interested non-governmental organizations	State and federal
Recommendation 13: Support authorization and other actions to more effectively manage pinniped predation of salmon in the Columbia River.	WDFW	Tribes, NOAA, ODFW, Idaho Department of Fish and Game, US Army Corps of Engineers, interested non-governmental organizations	Federal and state
Recommendation 14: Reduce populations of nonnative predatory fish species that prey upon or compete with Chinook.	WDFW	ODFW, BPA, US Army Corps of Engineers, independent scientists, angler community, tribes	State
Recommendation 15: Monitor forage fish populations to inform decisions on harvest and management actions that provide for sufficient feedstocks to support increased abundance of Chinook.	DNR, WDFW	NOAA, PSP, independent scientists, interested non-governmental organizations, tribes	State
Recommendation 16: Support the Puget Sound zooplankton sampling program as a Chinook and forage fish management tool.	DNR	WDFW, interested non-governmental organizations	State
Recommendation 17: Establish a statewide "go-slow" bubble for small vessels and commercial whale watching vessels within half a nautical mile of Southern Resident orcas.	WDFW	US Coast Guard, San Juan County, local governments, interested non-governmental organizations	State
Recommendation 18: Establish a limited-entry whale-watching permit system for commercial whale-watching vessels and commercial kayak groups in the inland waters of Washington state to increase acoustic and physical refuge opportunities for the orcas.	WDFW	Pacific Whale Watch Association, commercial kayak groups, San Juan County, Canada	State

Recommendation	Lead	Key partners	Requires state, federal, or local action or decision
Recommendation 19: Create an annual Orca Protection endorsement for all recreational boaters to ensure all boaters are educated on how to limit boating impacts to orcas.	WDFW	Department of Licensing, State Parks, USCG, Northwest Marine Trade Association, Recreational Boating Association of Washington	State
Recommendation 20: Increase enforcement capacity and fully enforce regulations on small vessels to provide protection to Southern Residents.	WDFW	State Parks	State
Recommendation 21: Discourage the use of echo sounders and underwater transducers within one kilometer of orcas.	Puget Sound Harbor Safety Committee	PSP, DOL, WDFW, NOAA, NMTA, RBAW, USCG, Washington State Ferries, State Parks, ports, marinas, BeWhaleWise.org, Canada	N/A
Recommendation 22: Implement shipping noise-reduction initiatives and monitoring programs, coordinating with Canadian and U.S. authorities.	Washington Public Ports Association, Northwest Seaport Alliance	USCG, WSF, Commerce, Pacific Merchants Shipping Association, Puget Sound Pilots, OrcaSound, tribes, ECHO (Port of Vancouver), Vancouver Aquarium, Canada	N/A
Recommendation 23: Reduce noise from the Washington state ferries by accelerating the transition to quieter and more fuel-efficient vessels and implementing other strategies to reduce ferry noise when Southern Residents are present.	WSF		State
Recommendation 24: Reduce the threat of oil spills in Puget Sound to the survival of Southern Residents.	Ecology, WDFW	USCG, Puget Sound Harbor Safety Committee, Canadian Pacific Coast Marine Advisory Review Panel, Transport Canada, PSP	State with federal review
Recommendation 25: Coordinate with the Navy in 2019 to discuss reduction of noise and disturbance affecting Southern Resident orcas from military exercises and Navy aircraft.	Governor's Office, PSP	US Navy, Vessels working group	State and federal
Recommendation 26: Revise chapter 77.15.740 RCW to increase the buffer to 400 yards behind the orcas.	WDFW	NOAA, interested non-governmental organizations	State
Recommendation 27: Determine how permit applications in Washington state that could increase traffic and vessel impacts could be required to explicitly address potential impacts to orcas.	Governor's Office of Regulatory Innovation and Assistance	Ecology, DNR, WDFW, interested non-governmental organizations	State
Recommendation 28: Suspend viewing of Southern Resident orcas.	WDFW	PWWA, kayak industry, local governments and interested non-governmental organizations, State Parks, NOAA, USCG, Canada	State
Recommendation 29: Accelerate the implementation of the ban on polychlorinated biphenyls in state purchased products and make information available online for other purchasers.	Department of Enterprise Services		State

Recommendation	Lead	Key partners	Requires state, federal, or local action or decision
Recommendation 30: Identify, prioritize and take action on chemicals that impact orcas and their prey.	Ecology	Affected stakeholders, NOAA, WDFW	State
Recommendation 31: Reduce stormwater threats and accelerate clean-up of toxics that are harmful to orcas.	Ecology	Local governments, private landowners	State and local
Recommendation 32: Improve effectiveness, implementation and enforcement of National Pollutant Discharge Elimination System permits to address direct threats to Southern Resident orcas and their prey.	Ecology	Local governments, affected stakeholders	State and local
Recommendation 33: Increase monitoring of toxic substances in marine waters; create and deploy adaptive management strategies to reduce threats to orcas and their prey.	Ecology, WDFW	PSP, local governments	State and local
Recommendation 34: Provide sustainable funding for implementation of all recommendations.	Legislature	Congress, local governments, private sector, foundations	State, federal, and local
Recommendation 35: Conduct research, science and monitoring to inform decision making, adaptive management and implementation of actions to recover Southern Residents.	Multiple agencies	Tribes, NOAA, PSP, independent scientists, interested non-governmental organizations	State and federal
Recommendation 36: Monitor progress of implementation and identify needed enhancements.	All agencies responsible for recommendations above; Task Force	Working groups	State



Next steps for the task force

The task force will continue its work in 2019. The executive order charges the task force with producing a second report outlining the progress made, lessons learned and outstanding needs by October 1, 2019; that will conclude the work of this task force.

The task force hopes that through the recommendations in this report, we can make significant, immediate progress toward our goal of consistently well-nourished whales and the survival of several thriving young orcas in the near term. In 2019, the task force will work to refine additional recommendations to ensure the state is on a clear path to working with partners and across boundaries to ensure a self-sustaining and resilient population of Southern Resident orcas for many generations to come.

Abbreviations

CEC	Contaminants of emerging concern
DDT	Dichloro-diphenyl-trichloroethane
DOL	Washington State Department of Licensing
ECHO	Enhancing Cetacean Habitat and Observation Program
EPA	Environmental Protection Agency
ESA	Endangered Species Act
GSRO	Governor's Salmon Recovery Office
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWFSC	Northwest Fisheries Science Center
OFM	Office of Financial Management
PAH	Polycyclic aromatic hydrocarbons
PBDE	Polybrominated diphenyl ether
PCB	Polychlorinated biphenyl
PFAS	Per- and polyfluoroalkyl substances
PMFC	Pacific Fishery Management Council
PSP	Puget Sound Partnership
RCO	Recreation and Conservation Office
RCW	Revised Code of Washington
SRKW	Southern Resident Killer Whale
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation
WSF	Washington State Ferries

Appendix 1. Executive order

Executive order 18-02

Southern Resident Killer Whale Recovery and Task Force

WHEREAS, Southern Resident Killer Whales (Southern Residents) are an iconic and treasured species in Washington and throughout the Pacific Northwest;

WHEREAS, Southern Residents are classified as endangered in Washington and surrounding waters, under the U.S. Endangered Species Act and in Canada under the Species at Risk Act;

WHEREAS, the population of Southern Residents has declined, from a high of 98 in 1995, to 76 today, which is the lowest number of Southern Residents in more than three decades. Recent science also indicates that many Southern Residents are in poor condition and are struggling to raise calves;

WHEREAS, if Southern Residents were to become extinct, we would suffer an unacceptable loss to our environment, economy, and way of life. We would also lose an essential component of our marine ecosystem and an indicator of the health of our waters;

WHEREAS, Southern Residents hold significant cultural value to native tribes and all Washingtonians;

WHEREAS, Southern Residents, through the whale watching industry alone, contribute as much as $60 million to the local economy annually and provide hundreds of jobs to the Puget Sound region;

WHEREAS, Southern Residents make their home in Washington's marine waters for a portion of the year, but they are also highly migratory seeking prey along the west coast from Northern California to Southeast Alaska. Therefore, Southern Residents rely on healthy ecosystems and food sources from Washington and throughout the west coast of the United States and Canada;

WHEREAS, three primary factors threaten Southern Resident populations: (1) prey availability, (2) legacy and new toxic contaminants, and (3) disturbance from noise and vessel traffic. The health of Southern Residents and Chinook salmon are tightly linked. Recent scientific studies indicate that reduced Chinook salmon runs undermine the potential for the Southern Resident population to successfully reproduce and recover. Both Southern Residents and Chinook salmon populations are adversely impacted by warming oceans and ocean acidification due to climate change. Presence of contaminants and accumulation of pollutants in Washington's waters are 2 also linked to the decline of Southern Residents. Key sources of contamination in storm water runoff remain to be addressed and the potential for a catastrophic oil spill continues to threaten Southern Residents and the entire ecosystem of Puget Sound. In addition, increased boat and ship traffic has caused greater underwater noise that interferes with Southern Resident critical feeding and communication;

WHEREAS, both swift near-term actions and effective long-term actions are necessary to recover these iconic and endangered animals. Essential recovery actions that are described in both United States and Canadian federal plans and federally approved regional plans must be implemented through close coordination with all of our partners including state, local, tribal, and Canadian governmental entities and other private sector partners to be successful;

NOW THEREFORE, I, Jay Inslee, Governor of the state of Washington, by virtue of the power vested in me by the Constitution and statutes of the state of Washington do hereby order and direct as follows:

Implement Immediate Actions to Benefit Southern Resident Killer Whales

Within existing resources, I ask the following state agencies, in consultation with the appropriate local governments, federal agencies, and tribal governments, to conduct the immediate actions listed below to further the purpose of this Executive Order.

- Washington Department of Fish and Wildlife (WDFW) with review from the Governor's Salmon Recovery Office (GSRO) and the Puget Sound Partnership (PSP)—By July 31, 2018, identify the highest priority areas and watersheds for Southern Resident prey in order to focus or adjust, as needed, restoration, protection, incentives, hatcheries, harvest levels, and passage policies and programs.
- WDFW and Washington State Parks and Recreation Commission (WSPRC)—By April 30, 2018, develop implementation plans for increased enforcement, outreach and education of vessel regulations as well as enforcement of Chinook fisheries regulations in areas frequented by orcas.
- Washington State Department of Ecology (Ecology)—By April 30, 2018, create a curriculum to improve and increase the number of trainings for vessels in the whale watching industry to become "vessels of opportunity" to assist in the event of an oil spill.
- Washington State Department of Transportation (WSDOT)—By May 31, 2018, develop strategies for quieting state ferries in areas most important to Southern Residents.
- WDFW—By April 30, 2018, review and amend, as needed, 2018 recreational and commercial fishing regulations prioritizing protection of key areas and fish runs for Southern Resident recovery. I will also ask our tribal co-managers, and international and federal fisheries managers to work directly with WDFW and its Commission in developing recommendations for implementing this action.
- WDFW—By April 30, 2018, explore options and develop a proposal to alter fish food used in state hatcheries to limit the amount of Polychlorinated Biphenyls (PCBs) in Southern Resident prey.
- PSP, WDFW, GSRO—By December 15, 2018, demonstrate how Chinook recovery projects benefit Southern Resident recovery, beginning in the 2018 grant round, for the Pacific Coast Salmon Recovery Fund, the Puget Sound Acquisition and Restoration Program, the Estuary and Salmon Restoration program and the Washington Coastal Restoration Initiative.

- PSP, WDFW, GSRO, WSPRC, Washington State Department of Licensing (DOL)—By July 1, 2018, prioritize existing outreach resources to support Southern Resident recovery. Collaborate with the Governor's Office to develop a public education program and identify needed resources.
- Ecology—By July 31, 2018, develop criteria to prioritize financial assistance beginning in the 2019-21 biennium for storm water projects that benefit Southern Resident recovery.

Establishment of the Southern Resident Killer Whale Task Force

A Southern Resident Killer Whale Task Force is hereby created to identify, prioritize, and support the implementation of a longer term action plan needed for the recovery of Southern Residents and necessary to secure a healthy and sustained population for the future. The plan shall include actions needed to make significant progress in addressing all three of the identified threats to Southern Residents. The Task Force should monitor and evaluate the immediate actions undertaken by state agencies and build upon the progress and effectiveness of that work when developing longer term actions. Where available and applicable, the Task Force should build upon existing state, regional and federal plans.

Members of the Task Force will include directors or their senior designees from the Washington Departments of Agriculture, Commerce, Ecology, Health, and Transportation, as well as the Puget Sound Partnership, the Governor's Office of Indian Affairs, the Recreation and Conservation Office, and the Governor's Salmon Recovery Office. I also invite the Department of Fish & Wildlife and its Commission, the Department of Natural Resources, and the Washington State Parks and Recreation Commission to participate on the Task Force as members in full.

I will separately invite representatives of appropriate federal, tribal, and local governments, the private sector and the nonprofit sector, to participate in the Task Force. I will invite each Washington legislative caucus to appoint a member to participate in the Task Force.

I shall appoint co-chairs and convene the Southern Resident Killer Whale Task Force (Task Force) beginning in April 2018.

The Task Force shall work with all levels of government and other partners to identify needed policies and programs, recommend priority actions to support recovery efforts, highlight budget needs, and recommend any legislation needed to support this Executive Order. The Task Force shall coordinate their work with appropriate representatives of the Government of Canada, the Province of British Columbia, and the states of Oregon, California, Idaho, and Alaska.

The Task Force shall prepare a comprehensive report and recommendations for recovering Southern Residents, with a full draft due by October 1, 2018, and a final report by November 1, 2018. The report should detail ongoing and new actions that will address all of the major threats to Southern Residents, including prey availability, legacy and ongoing toxic contaminants, and disturbance from noise and vessel traffic. A second report outlining the progress made, lessons learned, and outstanding needs shall be completed by October 1, 2019. With the submission of its second report, the Task Force shall dissolve.

I direct the Puget Sound Partnership and ask the Department of Fish and Wildlife to organize the necessary agency experts and staff to support the work of the Task Force.

The Governor's Policy Office and the Office of Financial Management will provide assistance and guidance to the lead agencies as needed to ensure the success of the Task Force.

The Governor's Office will work with both the State Legislature and State Congressional delegation to solicit their early and ongoing advice and guidance.

The Southern Resident Killer Whale Task Force shall conduct its business in an open, transparent manner, and its meetings will be open to the public.

Signed and sealed with the official seal of the state of Washington on this 14th day of March, 2018, at Olympia, Washington.

By:

/s/_____

Jay Inslee
Governor

BY THE GOVERNOR:

/s/_____

Secretary of State

Appendix 2. Task force and working group members

Task force members

Member Name	Organization / Affiliation
Amy Scarton	Washington State Department of Transportation
Amy Windrope	Washington State Department of Fish and Wildlife
B.J. Kieffer	Spokane Tribe
Brad Smith	Washington State Fish and Wildlife Commission
Brendan Flynn	Commercial fisherman
Butch Smith	Ilwaco Charters
Cecilia Gobin	Northwest Indian Fisheries Commission
Chad Bowechop & Katie Wrubel	Makah Tribe
Chairman Jay Julius	Lummi Nation
Chairman Leonard Forsman	Suquamish Tribe
Chairman Tom Wooten	Samish Indian Nation
Commissioner Andy Hover	Okanogan County
Commissioner Kathy Pittis	Port of Anacortes
Commissioner Jamie Stephens	San Juan County
Dave Herrera	Skokomish Tribe
Debra Lekanof	Swinomish Tribe
Donna Sandstrom	The Whale Trail
Gary Chandler	Association of Washington Businesses
George Harris	Northwest Marine Trade Association
Jacques White	Long Live the Kings
Jeff Dickison	Squaxin Island Tribe
Jeff Friedman	Pacific Whale Watch Association
Joe Gaydos	The SeaDoc Society
JT Austin	Office of Gov. Inslee
Kaleen Cottingham	Washington State Recreation and Conservation Office
Karen Condon	Colville Confederated Tribes
Kelly McLain	Washington State Department of Agriculture
Ken Balcomb	Center for Whale Research
Kristin Swenddal	Washington State Department of Natural Resources
Thomas (Les) Purce (co-chair)	Formerly president of Evergreen State College
Lisa Lantz	Washington State Parks
Lynne Barre	National Oceanic and Atmospheric Administration
Maia Bellon	Washington State Department of Ecology
Mark Doumit	Washington State Forest Protection Association
Mayor Will Hall	City of Shoreline
Mindy Roberts	Washington Environmental Council
Paul McCollum	Port Gamble S'Klallam Tribe
Phil Anderson	Pacific Salmon Council
Rep. Brian Blake (D)	WA House of Representatives (D), District 19, Aberdeen

Member Name	Organization / Affiliation
Rep. Drew MacEwen (R)	WA House of Representatives (R), District 35, Union
Ron Garner	Puget Sound Anglers
Ron Schulz	Washington State Conservation Commission
Sen. Kevin Ranker (D)	WA State Senate (D), District 40, Orcas Island
Sheida Sahandy	Puget Sound Partnership
Stephanie Solien (co-chair)	Puget Sound Partnership Leadership Council, Vice Chair
Terry Williams	Tulalip Tribes
Tom Davis	Washington State Farm Bureau
Trina Wellman	Northern Economics, Inc.

Working group members

Prey working group

Member Name	Organization / Affiliation
Alene Underwood	Chelan Public Utility District
Alicia Olivas	Hood Canal Coordinating Council Lead Entity
Amy Carey	Sound Action
Casey Baldwin	Colville Confederated Tribes
Dan Paul	Humane Society of the United States
Dave Croonquist	Recreational Fishing Industry
Dave Palazzi	Department of Natural Resources
David Troutt	Nisqually Tribe
Debra Giles	University of Washington Friday Harbor Labs
Giulia Good Stefani	Natural Resource Defense Council
Guy Norman	Northwest Power & Conservation Council
Jay Gordon	Dairy Association
Jeff Dickison	Squaxin Island Tribe
Laura Blackmore	Puget Sound Partnership
Lee Blankenship	Hatchery and Science Review Group
Lisa Jones	Canada Fisheries and Oceans (DFO)
Liz Hamilton	Recreational Fishing Industry
Liz Klumpp	Bonneville
Michael Schmidt	Long Live the Kings
Michele Culver	Washington State Department of Fish and Wildlife
Mike Ford	National Oceanic and Atmospheric Administration
Penny Becker, Co-chair	Washington State Department of Fish and Wildlife
Robb Krehbiel	Defenders of Wildlife
Scott Revell	Roza Irrigation District
Shaun Clements (Chris Kern, alternate)	Oregon State Department of Fish and Wildlife
Skip Anderson	Commercial Fishing
Steve Manlow	Regional Rep Salmon Recovery
Steve Martin, Co-chair	Governor's Salmon Recovery Office
Tiffany Petersen	Makah Tribe

Vessels working group

Member Name	Organization / Affiliation
Brian Corrigan	United States Coast Guard D-13, Law Enforcement
Captain Alan Myers	Washington State Department of Fish and Wildlife
Captain Eric Von Brandenfels	Puget Sound Pilots
Captain Laird Hail	United States Coast Guard
Captain Mike Moore	Pacific Merchants Shipping Association
Captain Scott Ferguson	Washington State Department of Ecology
Chad Bowechop	Makah Tribal Council Office of Marine Affairs
Commissioner Fred Felleman	Port of Seattle
Cyrilla Cook	Department of Natural Resources
Dr. David Bain	Orca Conservancy
Denien Ford	British Columbia Chamber of Shipping
Donna Sandstrom	The Whale Trail
Dr. Chris McKesson	University of British Columbia
Dr. Deborah Giles	Friday Harbor Labs-University of Washington, Orca Salmon Alliance
Dr. Marla Holt	National Oceanic and Atmospheric Administration
Dr. Rich Osborne	Whale Museum/Soundwatch/University of Washington
Dr. Rob Williams or Dr. Erin Ashe	Oceans Initiative
Dr. Todd Hass, Chair	Puget Sound Partnership
Frances Robertson and Kendra Smith (alternate)	San Juan County Public Works
Haley Kennard	Makah Tribal Council Office of Marine Affairs
Jeff Friedman	Pacific Whale Watching Association
Jeff Pelton	Transport Canada
Joshua Berger	Washington State Department of Commerce
Kevin Bartoy	Washington State Ferries; Washington Department of Transportation
Kurt Russo	Lummi Nation
Lovel Pratt	Friends of the San Juans
Orla Robinson	Port of Vancouver
Steve Finney	Recreational Boaters Association of Washington

Contaminants working group

Member Name	Organization / Affiliation
Abby Barnes	Department of Natural Resources
Andy James	University of Washington
Barbara Zaroff	Kitsap Public Works
Cecilia Wong and Chris Marshall	Environment and Climate Change Canada
Char Naylor	Puyallup Tribe
Christian Nilsen	Geosyntec
Dana DeLeon	City of Tacoma
Deanna Seaman	Northwest Seaport Alliance
Deb Lester	King County Department of Natural Resources and Parks
Derek Day, Co-chair	Washington State Department of Ecology

Dianne Barton	Columbia River Inter-Tribal Fish Commission
Emily Howe	The Nature Conservancy
Eric Strecker	Geosyntec
Heather Trim	Zero Waste Washington
Herb Pearse	Eco-Tec
Jen McIntyre	Washington Stormwater Center
Jennifer Lanksbury	Washington State Department of Fish and Wildlife
Jessica Lundin	National Oceanic and Atmospheric Administration
Jill Brandenberger	Pacific Northwest National Laboratory / Battelle
Jim West	Washington State Department of Fish and Wildlife
John Stark	Washington Stormwater Center
Ken Zarker	Washington State Department of Ecology
Laurie Valeriano	Toxic Free Future
Lincoln Loehr	Retired
Linda Bentley	Washington State Department of Commerce
Mike Johnson	Puget Sound Partnership
Mindy Roberts	Washington Environmental Council
Rachel McCrea	Washington State Department of Ecology
Robb Krehbiel	Defenders of Wildlife
Tom Laurie, Co-chair	Washington State Department of Ecology
Will Hobbs	Washington State Department of Ecology

Steering committee members

Member Name	Organization/Affiliation
Cathy Cochrane	Puget Sound Partnership
Derek Day	Washington State Department of Ecology
Heather Bartlett	Washington State Department of Ecology
Jim Cahill	Office of Financial Management
JT Austin	Governor's Office - Senior Policy Advisor, Natural Resources
Laura Blackmore	Puget Sound Partnership
Leslie Connelly	Office of Financial Management
Penny Becker	Washington Department of Fish and Wildlife
Stephanie Solien	Co-chair
Steve Martin	Governor's Salmon Recovery Office
Thomas (Les) Purce	Co-chair
Todd Hass	Puget Sound Partnership
Tom Laurie	Washington State Department of Ecology

Consultant team

Member Name	Organization/Affiliation
Abby Hook	Prey working group Liaison, Environmental Science Associates
Angela Pietschmann	Writing support, Cascadia Consulting Group
Gretchen Muller	Vessels/Contaminants working group Liaison, Cascadia Consulting Group
Marc Daudon	The Caspian Group
Nora Ferm Nickum	Project Manager, Cascadia Consulting Group
Susan Gulick	Facilitator, Sound Resolutions

Appendix 3. Voting tally on final package of recommendations

The following table summarizes the votes of each task force member at the November 6 meeting on the final package of recommendations as presented in this report.

The final package was approved with 33 task force members voting to consent, one not consenting, six abstaining and seven absent from the meeting at the time of the vote.

Individual (alphabetically by first name of primary task force representative)	Organization/Affiliation	Consent	Do Not Consent	Abstain	Absent
Amy Scarton	Washington State Department of Transportation	X			
Amy Windrope	Washington State Department of Fish and Wildlife	X			
Andy Hover	County Commissioner, Okanogan County	X			
B.J. Kieffer	Spokane Tribe	X			
Brad Smith	Fish and Wildlife Commission	X			
Brendan Flynn	Commercial fisherman	X			
Butch Smith	Ilwaco Charters	X			
Cecilia Gobin	Northwest Indian Fisheries Commission				X
Chad Bowechop	Makah Tribe	X			
Dave Herrera	Skokomish Tribe			X	
Donna Sandstrom	The Whale Trail	X			
Gary Chandler	Association of Washington Business			X	
George Harris	NW Marine Trade Association	X			
Jacques White	Long Live The Kings	X			
Jamie Stephens	County Commissioner, San Juan County	X			
Lisa Wilson for Chairman Jay Julius	Lummi Nation			X	
Jeff Dickison	Squaxin Island Tribe			X	
Brian Goodremont for Jeff Friedman	Pacific Whale Watch Association		X		
Joe Gaydos	The SeaDoc Society	X			
JT Austin	Gov. Office	X			
Kaleen Cottingham	WA Recreation and Conservation Office	X			
Casey Baldwin for Karen Condon	Colville Confederated Tribes	X			
Kathy Pittis	Port of Anacortes	X			
Kelly McLain	Washington State Department of Agriculture				X
Ken Balcomb	Center for Whale Research				X
Kristin Swenddal	Washington State Department of Natural Resources	X			
Leonard Forsman	Chairman, Suquamish Tribe				X
Les Purce	Co-chair	X			
Lisa Lantz	Washington State Parks	X			
Lynne Barre	National Oceanic and Atmospheric Administration	X			
Maia Bellon	Washington State Department of Ecology	X			

Individual (alphabetically by first name of primary task force representative)	Organization/Affiliation	Consent	Do Not Consent	Abstain	Absent
Mark Doumit	Washington Forest Protection Association			X	
Mindy Roberts	Washington Environmental Council	X			
Paul McCollum	Port Gamble S'Klallam Tribe	X			
Phil Anderson	Pacific Salmon Council				X
Rep. Brian Blake	WA House of Representatives (D)	X			
Rep. Drew MacEwen	WA House of Representatives (R)				X
Ron Garner	Puget Sound Anglers	X			
Ron Schulz	WA Conservation Commission	X			
Sen. Kevin Ranker	WA State Senate (D)	X			
Sheida Sahandy	Puget Sound Partnership	X			
Stephanie Solien	Co-chair	X			
Terry Williams	Tulalip Tribe	X			
Tom Davis	Washington State Farm Bureau			X	
Tom Wooten	Chairman, Samish Indian Nation				X
Trina Wellman	Northern Economics, Inc.	X			
Will Hall	Mayor, City of Shoreline	X			
	TOTALS	33	1	6	7

Additional details may be found in the meeting summary on the governor's Southern Resident Killer Whale Recovery and Task Force website.

Appendix 4. Progress update on executive order immediate actions

Status summaries for each executive order immediate action are provided below. Full final reports for each immediate action are available at the governor's Southern Resident Killer Whale Recovery and Task Force website.

Action: Develop implementation plans for increased enforcement, outreach and education of vessel regulations as well as enforcement of Chinook fisheries regulations in areas frequented by orcas.

Responsible agencies:

- Washington Department of Fish and Wildlife
- Washington State Parks and Recreation Commission

Deadline: April 30, 2018
Status: **Completed April 30, 2018**

- WDFW Enforcement hired Fish and Wildlife Police Officer positions in the Anacortes and Bellingham stations, funded and dedicated toward Southern Resident orca protection. Approximately 80 marine patrols, focused on limited vessel effects on Southern Resident orcas, took place during the summer months throughout Marine Area 7.
- WDFW Enforcement staff met with the 45 members of the Pacific Whale Watch Association in March 2018 and provided them with available information on Southern Resident orca protection efforts. PWWA shared new industry guidelines that (1) provide requirements for a go-slow zone within a larger perimeter around Southern Resident pods and (2) limit commercial activity near Southern Residents in traditional foraging areas and when other non-Southern Resident viewing options are nearby.
- WDFW Enforcement staff gave a presentation at an event organized by the Whale Museum in April 2018 that provided outreach materials and input to commercial whale watching naturalists ahead of the 2018 season.

Action: Review and amend, as needed, 2018 recreational and commercial fishing regulations prioritizing protection of key areas and fish runs for Southern Resident recovery. Tribal co-managers and international and federal fisheries managers will work directly with Washington Department of Fish and Wildlife and its commission in developing recommendations for implementing this action.

Responsible agencies:

- Washington Department of Fish and Wildlife

Deadline: April 30, 2018
Status: Completed April 30, 2018

- During the 2018 North of Falcon process (annual meeting among state, federal and tribal fishery managers to plan the Northwest's salmon fisheries), department staff engaged commercial and recreational constituents to seek input on prioritizing protection of key areas and fish runs for Southern Resident orca recovery. The North of Falcon process coincides with the March and April meetings of the Pacific Fishery Management Council, the federal authority responsible for setting ocean salmon seasons three to 200 miles off the Pacific coast. In addition to the two PFMC meetings, the state of Washington engages the treaty Indian tribes and constituents in additional meetings to discuss alternative fishing seasons that meet conservation and allocation objectives. In total six meetings throughout Puget Sound had Southern Resident orcas on the agenda.
- For the 2018 fishing season, fisheries that directly overlap in time and space with Southern Resident orca foraging activity have been curtailed.
- WDFW intends to implement a package of outreach and education programs related to Whale-wise guidelines, focused at boat launches and marinas in the San Juan Islands and key access point for vessels intending to travel to the islands, as well as commercial and recreational fishing vessels.
- WDFW will promote the adherence to a voluntary "No-Go" Whale Protection Zone along the western side of San Juan Island in Marine Area 7 (area Southern Residents most frequently use for foraging and socialization in the San Juan Islands) for recreational boats—fishing and non-fishing—and commercial fishing vessels. WDFW will work with state partners to develop a new potential "No-Go" Whale Protection Zone alternative for consideration by the governor's Southern Resident Killer Whale Task Force as a proposed long-term solution.
- WDFW will work with the Governor's Office, State Parks and Recreation Commission and the Department of Natural Resources to discuss and consider using our respective authorities to strengthen the efficacy of the voluntary program and outreach efforts.
- For all vessels, WDFW will work with Island County to maintain slow transit speeds (restricted to 7 knots or less) and potentially reduce transit speeds in areas frequently used by Southern Residents in the summer season (specifically off the west coast of San Juan Island) and to silence their sonar in the presence of Southern Residents and when fishing gear is deployed (especially those transmitting at 83 kHz).
- The number of angler trips in certain locations, particularly those important to Southern Residents will be reduced. There are no Chinook-directed fisheries in May-June and September-November or later in the Strait of Juan de Fuca, San Juan Island, Georgia Strait and Admiralty Intel and Port Susan/Port Gardner areas (Marine Areas 5–9).

Action: Explore options and develop a proposal to alter fish food used in state hatcheries to limit the amount of polychlorinated biphenyls in Southern Resident prey.

Responsible agencies:

- Washington Department of Fish and Wildlife

Deadline: April 30, 2018
Status: Completed April 30, 2018

- Hatchery feed is estimated to contribute a maximum of 1 percent of the PCBs measured in adult Chinook from Puget Sound that originated in WDFW hatcheries. Hatchery feed contains low concentrations of PCBs. WDFW is actively engaged with researchers, other government agencies and fish feed manufacturers to identify detectable PCBs in fish feed and will pursue alternative feed options that contain the lowest concentration of PCBs when feasible and cost-effective to do so.
- The amount of PCBs in adult salmon acquired in the freshwater environment, including hatcheries, varies from approximately 1 percent in undeveloped rivers to 4 percent in developed river where outmigrating juvenile fish acquire more PCBs.
- Juvenile salmonids have trace amounts of PCBs through maternal transfer. Most (96 percent to 99 percent) of the PCBs in adult salmonids is acquired in the marine environment in which they migrate and live.

Action: Create a curriculum to improve and increase the number of trainings for vessels in the whale watching industry to become "vessels of opportunity" to assist in the event of an oil spill.

Responsible agencies:

- Washington State Department of Ecology

Deadline: April 30, 2018
Status: Completed March 28, 2018

- The term "vessel of opportunity" describes an organized system to preregister volunteer boat operators who can be quickly activated after a spill occurs and tasked to deter whales away from oil. Vessel operators and their crews would not be working in contact with oil; instead their actions will be limited to surveillance, reporting and deterrence outside of oiled waters.
- The goal for this curriculum is to broadly recruit, pre-register, equip and train whale watching vessels of opportunity to be able to safely conduct Southern Resident deterrence activities during a major oil spill. Outreach will support three phases of the curriculum plan: awareness, training and implementation.
- The curriculum plan is published at: https://fortress.wa.gov/ecy/publications/summaryPages/1808006.html

Action: Develop strategies for quieting state ferries in areas most important to Southern Residents.

Responsible agencies:

- Washington State Department of Transportation

Deadline: May 31, 2018
Status: Completed May 31, 2018

- Unless safety or schedule dictate otherwise, Washington State Ferries will slow its vessels through the Haro Strait shipping channel from 16 knots to 11 knots during its two daily crossings to Sidney, BC beginning with summer schedule June 24, 2018.
- From August 2018 to January 2019, WSF will participate in Enhancing Cetacean Habitat and Observation Program's trial of the Whale Report Alert System and use the notifications to indicate when vessels should slow to 11 knots through the Haro Strait shipping channel.
- WSF is undertaking analysis of existing data to determine if such data can be used to develop baseline noise levels for the entire fleet. (Pilot project on two vessel classes to be completed by July 2018). WSF will seek funding from the Federal Highway Administration, National Oceanic and Atmospheric Administration and others to expand noise analysis pilot project to existing data and collect additional new data to fill data gaps to develop baseline noise levels for the entire fleet.
- Following completion of baseline noise analysis, WSF will identify and implement mitigation measures, both operational and engineered, to address on-vessel sources of frequencies of concern.
- By January 2019, WSF will begin a program to minimize trim on vessels through improved loading procedures, related primarily to reducing fuel consumption in response to the governor's Executive Order 18-01, with a potential co-benefit of reducing noise generated by pressure differential and cavitation.
- In January of 2019, WSF will incorporate a marine mammal training program as part of its mate orientation.
- WSF will participate as members of the governor's Executive Order 18-02 task force and Vessels Work Group to develop additional measures and support for actions that may benefit Southern Residents.
- WSF will include vessel noise reduction as a key criterion for future vessel design-build contracts.
- WSF will pursue electrification of Jumbo Mark IIs, related primarily to reducing fuel consumption in response to the governor's Executive Order 18-01, with a potential co-benefit of noise reduction.

- As part of a current long-range planning effort, WSF will investigate an electric hybrid ferry to replace the MV Elwha as one of two vessels in the fleet meeting Safety of Life at Sea standards for the crossing to Sidney, BC.
- WSF will continue negotiations with NOAA National Marine Fisheries Service and U.S. Fish and Wildlife Service for a programmatic Endangered Species Act consultation for pile driving that includes a conservation program addressing Southern Residents and salmon responsive to the established recovery plans for those species.
- WSF will pursue a Letter of Authorization from NOAA National Marine Fisheries Service covering incidental harassment of marine mammals by pile driving noise.
- WSF will continue to remove creosote from its assets with 8,000 tons planned for removal by 2020.
- WSF will seek funding to study baseline stormwater quality at its facilities.
- WSF will develop additional agency policy addressing Southern Resident orca conservation and recovery efforts as needs are identified.
- WSF will pursue grant and internship opportunities with Orca Network, the Whale Museum, the Whale Trail and others to increase naturalist and other education programs aboard vessels.

Action: Prioritize existing outreach resources to support Southern Resident recovery. Collaborate with the Governor's Office to develop a public education program and identify needed resources.

Responsible agencies:

- Puget Sound Partnership
- Washington Department of Fish and Wildlife
- Governor's Salmon Recovery Office
- Washington State Parks and Recreation Commission
- Washington State Department of Licensing

Deadline: July 1, 2018
Status: Completed July 1, 2018

- In May 2018, the Governor's Office, WDFW, Ecology, and PSP created webpages on their websites to share information with the public about Southern Resident orca recovery. The agencies coordinated messaging and information to emphasize the science behind orca recovery and the urgent need to take action.
- In May, the Governor's Office, WDFW, Parks, Ecology, Dept. of Licensing, GSRO, PSP and NOAA formed an interagency communications workgroup to share information relevant to outreach and education, develop a shared communications plan, and take collective action on communication opportunities and requests arising via the task force. The

workgroup continues to meet twice monthly and periodically updates the shared communications plan with actions accomplished and actions anticipated.

- The interagency communications group invited communication staff from task force entities and interested parties to meet periodically and discuss collaborative action for public outreach and education concerning orca recovery. This larger group of communicators convened in July 2018 and September 2018, with plans to continue meeting into the future. The group identified funding for outreach and education activities as a major barrier; several members are investigating the possibility of applying for grants and private funding.

Action: Identify the highest priority areas and watersheds for Southern Resident prey to focus or adjust, as needed, restoration, protection, incentives, hatcheries, harvest levels and passage policies and programs.

Responsible agencies:

- Washington Department of Fish and Wildlife
- Governor's Salmon Recovery Office
- Puget Sound Partnership

Deadline: July 31, 2018
Status: Completed July 31, 2018

- WDFW and NOAA have developed criteria to determine Chinook stocks likely to be most beneficial to Southern Residents, using the best available information on whale diet at different times and places, fisheries data about chinook stocks that overlap with whale distribution and prioritizing stocks that if boosted may aid the Southern Residents at a critical time of year.
- The National Fish and Wildlife Foundation held a workshop June 12–13, 2018, bringing together a small group of agency, tribal, academic, nonprofit and other scientists and managers to provide feedback and validation on the priorities criteria. The review of initial priorities included evaluation of the considerations used to identify priorities and modeled the outputs of which stocks would rise to be priorities based on criteria selected. NOAA an WDFW have further refined the criteria based upon input from the workshop. The model, list of priority stocks and some frequently asked questions can be found on the NOAA webpage at: https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/Killer_whale_priority_chinook_salmon_q_a.html
- The model will continue to be updated as we gather additional data and increase our knowledge of where Chinook salmon overlap with the whales, what Chinook runs are important to the whales' diet and where and when the whales are food limited.

Action: Develop criteria to prioritize financial assistance beginning in the 2019–21 biennium for stormwater projects that benefit Southern Resident recovery.

Responsible agencies:

- Washington State Department of Ecology

Deadline: July 31, 2018
Status: Completed July 31, 2018

- The Water Quality Program will add language to the combined water quality application guideline document and scoring guidelines referencing governor's Executive Order 18-02 and Southern Resident Orca recovery as an additional criterion/consideration that stormwater funding applicants can make connection to as a priority for those projects addressing Puget Sound water quality issues. Language will be added through the current guideline revision process for the upcoming state fiscal year 2020 fund cycle which opens for applications in August 2018.
- We will coordinate with the National Estuary Program Stormwater Initiative team (housed in Ecology's Water Quality Program) to address Executive Order 18-02 connections to projects funded through its process, which are already Puget Sound recovery focused.

Action: Demonstrate how Chinook recovery projects benefit Southern Resident recovery, beginning in the 2018 grant round, for the Pacific Coast Salmon Recovery Fund, the Puget Sound Acquisition and Restoration Program, the Estuary and Salmon Restoration Program and the Washington Coastal Restoration Initiative.

Responsible agencies:

- Puget Sound Partnership
- Washington Department of Fish and Wildlife
- Governor's Salmon Recovery Office

Deadline: December 15, 2018
Status: Progress update provided August 22, 2018

- The majority of projects that are currently active, awaiting funding decision, or proposed for funding (2019–21) through the salmon recovery grant programs at the Recreation and Conservation Office benefit Chinook salmon populations. Specifically:
    - 80 percent of projects currently funded in the four programs identified in the Executive Order benefit Chinook.
    - 82 percent of projects proposed for future funding in the four programs identified in the Executive Order benefit Chinook.

Appendix 5. Minority reports from task force members

Minority report from Ken Balcomb, Center for Whale Research

11 November 2018 Statement of Ken Balcomb for Governor Jay Inslee

Dear Governor Inslee,

Thank you for your good faith effort to convene a Task Force to make recommendations to you regarding how to recover the Southern Resident Killer Whale population, and for the honor of inviting my participation in the process. You have before you the list of recommendations that were discussed at length among the Task Force members, and I herein submit my minority report.

The Co-Chairs and organizers of the Task Force meetings and all of the Member participants worked diligently to wrestle through some very difficult environmental issues; and, some very polarized stakeholder positions were brought to the table. I was heartened to see that Goal 1 is to increase Chinook abundance to benefit SRKWs, because that is what they most need most urgently. There are sixteen specific recommendations put forth to move toward that goal, and most of them have at least some optimism of benefit for the SRKW. However, virtually all of the recommendations have hoped-for results that might appear in the distant future and be impossible to evaluate with respect to significant whale demographic trajectory change in a meaningful time-frame. Some of the recommendations are clearly self-serving for stakeholders, but that is my observation more than a criticism.

Throughout the meetings I have been dismayed that the discussion of bypass of the four Lower Snake River dams (Recommendation 9) did not get more traction, given that action would offer the most immediate and dramatic increase in returning adult Chinook salmon to the mouth of the Columbia River and Washington coast (prime SRKW foraging areas) in the shortest time (2-3 years). The 4LSR dams never should have been built and have been an acknowledged ecological disaster from their conception. I kept hoping that you would simply initiate a phone call to LT General Semonite (the commanding general of the Army Corps of Engineers) to get the facts about who has the authority to order bypass of these dams, but it seems that the consensus of the Task Force was to establish a time-consuming several year stakeholder process to address issues associated with the possible breaching or removal of the four lower Snake River dams, rather than get the facts now and/or make a bold recommendation. The number one fact, who has the authority, can be answered in a phone call, but it seems that the forces against bypass want to keep everyone confused. As a result, recommendation number 9 now slips into a less meaningful timeframe and back into the quibbling that has gone on for decades while the salmon and SRKW continue to dwindle. My discussions with career salmon biologists who studied the spill option (#8) and NOAA's own reports conclude that following that recommendation will not lead to salmon recovery, either. So it looks like the SRKW are stuck with the failed status quo.

The second Goal of decreasing disturbance to whales in the Salish Sea has a feel-good veneer but it results from naïve hypotheses elevated to hysterical dogma that the SRKW are suffering from stress of all the underwater noise and/or cannot find their food in the din. It may seem odd coming from someone like me who has sounded the alarm over military sonar, but those sound sources are many orders of magnitude louder and designed to be stressful and injurious; whereas, ordinary vessel radiated propulsion sound is an anthropogenic acoustic feature that creates little overlap into the biosonar envelope of the whales, and in its steady predictable pattern is readily accommodated. Whales evolved in occasionally extremely noisy sound fields and are exquisitely adapted to interpret their acoustic environment as it changes - they behaviorally react more to abrupt starts and stops and changes of frequency and intensity than they do to small vessels idling in their vicinity. They will voluntarily approach the extremely loud sound field of large vessels underway to ride in the bow and stern wake within meters like surfers, and then they go about their ordinary travelling and feeding. In years not too long ago they would approach and take fish from fishermen's gear in spite of gunshot, seal bombs, and dynamite aimed at them. Alaskan fish-eating Orca still receive those insults. The twelve recommendations in pursuit of Goal 2 are largely "red herrings" compared to Chinook salmon restoration, and their effect on SRKW demographics or distribution cannot be objectively evaluated in spite of the hysterics of some Task Force Members. Regrettably, recommendation number 28 represents the worst in cliff-hang politicking and coercing for a diversionary recommendation that is meaningless for whale protection, while obfuscating much more important issues. I give it a "thumbs-down" and the other recommendations in this goal a "ho-hum".

Goal #3 to reduce toxins in the environment is laudable and long overdue, but it provides no immediate relief to the SRKW and it will be decades, if not centuries before the half-lives of many of the most noxious legacy chemicals expire. Interestingly, the lethal toxin premise completely ignores the fact that the much more contaminated ecotype Transient killer whales are flourishing. The effects of implementing the five recommendations for this laudable goal will more likely benefit the food chain and the prey in the near-term than benefit the predators in a demographic way. I would give these recommendations a "thumbs-up" and accept that their goal is in the long term category of actions.

Thank you,

<Original signed by>

Minority report from Kathy Pittis, Port of Anacortes, and Gary Chandler, Association of Washington Business

Les Purce, Co-chair
Stephanie Solien, Co-chair
The Southern Resident Killer Whale Task Force
Office of the Governor
PO Box 40002
Olympia, WA 98504-0002

Dear Co-chair Purce and Co-chair Solien,

As you are well aware, each of us is personally committed to taking immediate actions to protect and recover our Southern Resident Killer Whales. These beautiful animals are powerful icons that live in our collective imaginations. Killer whales, like the salmon they feed upon, have existed from "time immemorial" in the Pacific Northwest and Washington State. We could not have been surprised that Task Force members felt viscerally, as a united community, the suffering and death of whales this summer. We thank Governor Inslee for charging us to help lead our fellow citizens away from a world forever diminished by a terrible and preventable loss. It has been our privilege to serve the public interest as members of the Southern Resident Killer Whale Task Force.

We remain concerned the Task Force lacked basic information about the costs associated with individual recommendations. When combined with a lack of data regarding the benefits of these recommendations, the Task Force as a whole had no way to evaluate priorities; to elevate recommendations offering bang for the buck or eliminate those with low benefits but high costs. For example, which habitat investments offer the greatest benefits? A great deal of work has been done to evaluate the relative costs and benefits of a wide range of salmon and Puget Sound recovery projects.

Despite a thorough briefing by the Office of Financial Management regarding the $1.5 billion budget shortfall facing the state, the Task Force made only minor recommendations regarding specific new fund sources necessary to accomplish its recommendations. We believe a consensus on a specific plan to fund our recommendations would have advanced the chances for success in the 2019 Legislature immeasurably.

In several instances, our shared urgency seemed to drive the Task Force to accept extreme positions that were not well justified by objective data. For example, the water quality standards in effect in the State of Washington are among the most stringent in the nation. Absent an extended scientific discussion of the merits and a much stronger understanding of the strong connection between existing standards and those recommended by the Task Force, elements of Recommendation 32 lack adequate justification. Cost and benefit data would have been especially useful in this case.

We believe the Task Force would have been well served to consider more thoroughly the benefits of moving rapidly to augment treatment of municipal stormwater runoff. The horrifying fact of pre-spawn mortality in urban streams demands immediate action. In truth, contaminated stormwater lacks a bad guy. Each of us causes this harm in our small way as we commute to work, drive our

kids to school, and head to the grocery store. Again, the lack of a consensus funding recommendation does a disservice to the Southern Resident Killer Whales and a healthy Puget Sound. It is irrational to expect a small capital budget appropriation to address a problem of this scope and scale. Much more should be expected of municipal governments through the use of existing stormwater utility authorities and regulatory intervention by the Department of Ecology.

With regard to toxic contamination, we believe the recommendations should have been more forceful: get the worst out of the water first. Large scale toxic cleanup projects stand ready to proceed. At the Port of Everett, a $100 million cleanup improves near-shore habitat for prey species and migrating juvenile salmon. Funding generated by the Model Toxics Control Act should prioritize actions with clear environmental and economic benefits. We are disappointed the recommendations did not advocate more forcefully for these actions.

In our experience, processes of this kind, operating in an emotionally charged context under extraordinary time pressure, lacking a shared understanding of the best available science, and having no framework by which to evaluate and prioritize actions will inevitably fall short of consensus. Each member of the Task Force has felt the strain of the conflict between our principles and necessary compromise. We recognize that much good work has been accomplished despite these challenges.

However, we have concluded that our responsibilities to the public and to the elected officials who will consider the Task Force recommendations require us to formally submit a minority report as provided for in the Task Force Charter adopted on May 1, 2018.

Collectively we have identified three over-riding concerns with the Southern Resident Killer Whale Task Force Final Report. Respectfully, we offer the following formal objections:

Spill and Total Dissolved Gas

Recommendation 8 advocates for increasing spill by adjusting Total Dissolved Gas (TDG) allowances at Snake and Columbia River dams. The purported benefit of the recommendation is to increase the number of migrating juvenile salmon that pass these facilities. Despite a lack of data documenting benefits to fish as a result of the court-ordered 2018 spill regime, the Task Force is suggesting even higher levels of spill, which would need to be accompanied by waivers for even higher levels of dissolved gas. Waivers must be sought for high levels of dissolved gas, because it causes gas bubble trauma and kills migrating juvenile salmon. Advocating for an increase of TDG levels up to 125% in the Columbia and Snake Rivers is contrary to the Task Force's goals to increase Chinook abundance and to recover Chinook populations.

This narrow focus on spill as a fish recovery concept ignores the important improvements which have been made at the dams. These include fish-friendly turbines, bypass screens, removable spillway weirs, and transportation of juveniles around the projects. Though the Task Force has selected 125% TDG as a number to recommend to the Washington State Department of Ecology, we respectfully suggest that this matter is more appropriate for analysis and recommendations by federal and state fish managers.

Snake River Dam Breaching Impacts

Recommendation 9 requires a report to the Task Force, involving the National Research Council, regarding broad potential impacts of breaching or removal of the Snake River dams. This recommendation is an unnecessary attempt by the Task Force to duplicate the much more extensive federal effort already underway by the U.S. Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration to prepare an environmental impact statement (EIS) in accordance with the National Environmental Policy Act on the operations and configurations for 14 federal projects in the Columbia River System in the interior Columbia River Basin.

The Columbia River System Operations (CRSO) EIS will present a range of reasonable alternatives for long-term system operations and evaluate the potential environmental and socioeconomic impacts on flood risk management, irrigation, power generation, navigation, fish and wildlife conservation, cultural resources, water quality and recreation. Snake River dam breaching is one of the alternatives which will be studied. Since Snake River dam breaching would impact or eliminate certain authorized purposes, such as commercial navigation, the EIS will include an economic impact analysis. This analysis will include an assessment of different modes of transportation like rail and trucking, and identify and describe tradeoffs. This analysis also will determine both costs and benefits to regional biological and socio-economic resources. The action recommended by the Task Force lacks the time and likely the resources to produce a credible product useful to decision makers. The duplication of the federal effort, already long underway, is wasteful and would divert resources away from actions that could produce real benefits in the short-term.

For those on the Task Force who are concerned about the timeline for completion of the CRSO EIS, please note the following information which was recently released by the federal agencies at www.crso.info:

1) On October 19, 2018, the federal co-lead agencies, NOAA Fisheries, and the U.S. Fish & Wildlife Service received a directive from the President to develop a schedule to complete the Columbia River System Operations (CRSO) Environmental Impact Statement (EIS) and associated biological opinions by 2020. We are working with these agencies to develop that schedule to submit to the Chair of the Council on Environmental Quality (CEQ) within the 60-day timeframe as required by the President.

2) After submitting a schedule to CEQ and once a final schedule is developed, the timeline will be shared with cooperating agencies, states, tribes, and the public. The operators of the Federal Columbia River Power System are committed to continuing to conduct an open, transparent, and collaborative process as we implement a new schedule and complete the CRSO EIS.

Hydraulic Permit Approvals

Discussions of the Hydraulic Permit Approvals issued by the Department of Fish and Wildlife made no attempt to resolve the long-standing public policy conflicts that have blocked progress in previous legislatures. While the pressure of time is to blame, we fear the Task Force has failed to listen deeply to develop full understanding of the challenges facing this recommendation.

Nonetheless, the organizations we represent will engage in good faith discussions regarding the Hydraulic Permit Approvals during the 2019 Legislative Session.

We feel compelled to thank Les Purce and Stephanie Solien for their steady, patient leadership. Their task was immense, but they managed it with grace and intelligence. Likewise, we thank our colleagues on the Task Force for opening their hearts to us, for sharing their hopes and tears. Each of us has been changed by what we learned from our fellows and by the many connections we developed with members of the public who engaged with us. We are grateful to have played our small role and hope that the efforts of Governor Inslee's Southern Resident Killer Whale Task Force meet with every success.

In closing, we offer our profound thanks to Governor Inslee for seeing beyond the horizon of the everyday and in doing so opening our eyes to the systemic problem that festers just beneath the shimmering surface of Puget Sound on even the brightest summer days.

Sincerely,

<Original signed by>

Kathy Pittis, Commissioner, Port of Anacortes
<Original signed by>

Gary Chandler, Vice President of Government Affairs, Association of Washington Business

Additional letter from Kathy Pittis, Port of Anacortes

Les Purce, Co-chair
Stephanie Solien, Co-chair
The Southern Resident Killer Whale Task Force
Office of the Governor
PO Box 40002
Olympia, WA 98504-0002

Dear Co-chair Purce and Co-chair Solien,

After considerable deliberation, I have concluded that language in Recommendation 22 within the Task Force report merited inclusion in the minority report previously submitted on Tuesday, November 12th. I respectfully request the following be added to the minority report:

With regard to the Recommendation 22, I strongly believe it would be improved by the deletion of the sentence referring to the role of the Washington Public Ports Association in the creation of an ECHO program in Washington State. As it proceeds in its efforts in 2019, I urge the Task Force to rely upon the following language to assess progress:

"Puget Sound Ports will convene a meeting with the above-mentioned partners by Spring 2019 to identify ways to collaborate with the Port of Vancouver's ECHO Program."

The language better reflects the manner in which the recommendation will be implemented in Puget Sound. The ports themselves have capacity to implement Recommendation 22 that is simply not available to the Washington Public Ports Association.

Thank you for considering this request as a correction to the previous minority report.

Respectfully,

<Original signed by>

Kathy Pittis, Commissioner, Port of Anacortes

Minority report from George Harris, Northwest Marine Trade Association

To: Steering Committee of the Southern Resident Killer Whale Task Force

Date: November 13, 2018

From: Northwest Marine Trade Association
Recreational Boating Association of Washington

Subject: **Minority Report Regarding Task Force Recommendations**

The Northwest Marine Trade Association (NMTA) and the Recreational Boating Association of Washington (RBAW) respectfully submit Minority Report comments about the following Southern Resident Killer Whale (SRKW) Task Force Recommendations.

Recommendation 12: Direct the appropriate agencies to work with tribes and NOAA to determine if pinniped predation is a limiting factor for Chinook in Puget Sound and along Washington's outer coast and evaluate potential management actions.

We think the best available science confirms pinniped predation is a significant factor limiting the availability of Salish Sea chinook for SRKWs and the forthcoming Salish Sea Marine Survival Project will further confirm this.

Recommendation 19: Require an annual "Be Whale Wise" certification for all recreational boaters on the inland marine waters and ensure that all boaters are educated on how to limit boating impacts to orcas. Includes $10 fee on all boaters – structured as 'opt-out'

The NMTA and RBAW are supportive of efforts to better educate boaters and to voluntarily use Be Whale Wise as a way to increase education and awareness. It is the $10 opt-out fee on all boaters that is of significant concern to our organizations. The $10 fee is proposed to be added to all 2019 registrations with an opt-out provision similar to what citizens see for Washington State Parks on their vehicle license renewals.

We believe it is grossly unfair to attempt to fund a Be Whale Wise certification program on the backs of recreational boaters who already pay far more than their fair share into the state general fund for environmental stewardship. Specifically, recreational boaters are the largest outside contributor to both the Aquatic Invasive Species program administered by WDFW and the Derelict Vessel Removal Program administered by DNR – paying $2 per registration and $3 per registration, respectively, for these two important programs.

NMTA and RBAW recommend the Be Whale Wise guidelines be included with all vessel registrations and that a *voluntary* contribution of any amount should be allowed and encouraged.

To illustrate the concern recreational boaters have with being unfairly singled out, consider a 2010 JLARC report on recreational boating activities: http://leg.wa.gov/jlarc/AuditAndStudyReports/Documents/10-12.pdf The report notes that recreational boaters contribute $71.9M per biennium for taxes, fees and permits and receive only $54M in services. The JLARC report shows that boaters are already contributing financially more than any other user group.

Recommendation 28: Suspend viewing of Southern Resident Killer Whales for 3-5 years.

NMTA's position throughout the Task Force process is that recreational boaters do not consider SRKW viewing as a primary activity and that it is reasonable to strongly encourage all recreational boaters to avoid the SRKWs whenever possible. Furthermore, when boaters do encounter SRKWs they should strictly adhere to the Be Whale Wise guidelines. Suspending viewing of SRKWs will not impact recreational boating businesses, but we do think it will significantly impact commercial whale watching businesses.

Throughout the Task Force process commercial whale watching businesses communicated that SRKW viewing presently represents only 20% of their tours because they have voluntary stopped viewing SRKWs and that healthy populations of northern transients, humpback and gray whales are available in greater numbers for viewing. The voluntary regulations the Pacific Whale Watching Association has implemented are notable and impressive.

NMTA and RBAW recommend this recommendation be delayed until Year Two of the Task Force so the Vessel Working Group can fully review the best available science and make a recommendation to the Task Force for the following reasons. 1) Some SRKW experts believe commercial whale watching vessels are helpful and protective to the SRKWs. 2) This new recommendation was discussed briefly and quickly at the final Task Force meeting. 3) Suspended viewing could have significant economic impact to commercial whale watching businesses because the media and the public may inaccurately think all whale watching has been suspended. 4) Increasing the "Go Slow Bubble" to 800-yards for all vessels as per Recommendation 17 is a significant new protective measure for 2019.

Minority report from Donna Sandstrom, The Whale Trail

November 12, 2018

Office of the Governor
P.O. Box 40002
Olympia, WA 98504-0002

Re: Task Force Minority Report, Recommendation 13

Dear Governor Inslee,

Thank you for the honor of serving as a member of your Task Force on Southern Resident Killer Whale Recovery. The Task Force has recommended a robust set of actions that will make a difference for these beloved and iconic pods.

The Whale Trail Board and I heartily support all the actions except Recommendation 13. Recommendation 13 encourages support for an exemption of the Marine Mammal Protection Act (MMPA) to allow culling of seals and sea lions in the Columbia River Basin, and to add Steller sea lions to the animals that can be killed.

We do not support the recommendation for the following reasons:

1. It doesn't work. As a management approach, lethal removal of pinnipeds rarely achieves its intended outcome. Lethal removal is most likely to be successful only when the location is remote, and the animals that are killed are not replaced by others. That is not the case at the Columbia River Basin. If we remove 100 seals today, they will be replaced by 100 seals tomorrow, and 100 more the day after that. How many seals and sea lions are we willing to kill before there is any discernible difference for the southern resident orcas?

2. It will have unintended consequences. When we tug at the thread of an ecosystem, we don't know what will unravel. Killing enough pinnipeds to make a difference at the Columbia River Basin will disrupt the environment in ways we can't predict. For example, what happens to the animals like transient orcas who depend on the seals and the sea lions for food?

3. It is counterproductive to our conservation values and goals. The Whale Trail was founded to promote shore-based viewing of orcas and other marine mammals, and to inspire stewardship for them. People connect to the ocean through its creatures. They thrill to see seals and sea lions in our state waters. The public interest is best and well served by protecting the pinnipeds who share our shores and seas.

4. Steller sea lions have only recently recovered from being endangered, and were removed from the Endangered Species list just 11 years ago. They continue to face human-caused threats such as climate change, entanglements, and vessel strikes. Stellar sea lions are an integral part of the North Pacific ecosystem. They deserved continued protection under the MMPA in the Columbia River Basin and throughout their range.

5. We do not support any exemption to the Marine Mammal Protection Act. The MMPA has successfully and effectively protected marine mammals since 1972. We do not encourage any exceptions that weaken the Act, or open the door to other special cases around the country.

In closing, we do not support Recommendation 13 because it yields little benefit to the southern resident orcas, and it will be counterproductive to engaging the public in SRKW recovery.

Humans have created the artificial conditions that attract predators to the Columbia River Basin. We have also created the scarcity that drives the perceived competition for prey. Yet only the animals are held accountable, paying for our mismanagement with their lives.

It wasn't that long ago that people were shooting orcas along this coast because they, too, were seen as competitors for salmon.

We encourage you to disregard Recommendation 13, and focus state time and resources on other actions that are more likely to achieve our goal of recovering the southern residents.

Respectfully,

<Original signed by>

Donna Sandstrom
Founder/Director
The Whale Trail

cc: Les Purce, Stephanie Solien

Policy recommendation and minority report from Jeff Friedman, Pacific Whale Watch Association

In partnership with the many organizations and persons signed below, the Pacific Whale Watch Association submits this recommendation for additional actions to be considered and included by Governor Inslee in his upcoming executive action and legislative agenda.

The Pacific Whale Watch Association (PWWA) continues to be an engaged partner as a member of the Governor's Orca Task Force (OTF), and will continue to seek bold action on behalf of the Southern Resident Killer Whale (SRKW) population. The OTF report's recommendation 28 was hurried through the task force process without the thoughtful and detailed vetting found in all other recommendations that are included in the final report for the Governor.

Because the language for Recommendation 28 was proposed late in the final meeting of the task force, and was only granted a few minutes of discussion prior to a vote, it is the only recommendation that is vague and lacks any implementation details. Most importantly, stakeholder engagement and input from the scientific community was absent from the process behind recommendation 28.

Because of the absence of stakeholder and scientific engagement, recommendation 28 carries serious risks of harm to SRKWs and other negative consequences. These risks would have been mitigated through proper vetting, stakeholder engagement and input from the science community.

Due to our concern over the welfare of the SRKWs and the negative consequences of this recommendation, PWWA has partnered once again with the scientific community, including several members of the OTF Vessel Working Group, to mitigate these risks through a science-based vessel management plan. We intend to work with Governor Inslee's office, WDFW, the OTF Co-Chairs, and other stakeholders to assist in developing implementation plans and rule making around the science-based vessel management plan.

History of Recommendation 28

Recommendation 28 offered several options to establish either a no go zone or a go slow zone (or both) in a fixed geographic area on the west side of San Juan Island. There were 3 options being considered by OTF and these options were sent to OTF members prior to the November 6th meeting. PWWA supports all of the original 3 options listed under Recommendation 28 (Options A, B, and C). During discussions at the OTF meeting on November 6th, the options under Recommendation 28 were:

> ***Recommendation 28: Establish a whale protection zone to reduce disturbance to foraging orcas.***
> *Note: As planned, a Task Force member convened two conference calls where options were discussed with a sub-group that expressed interest at the October 17-18 Task Force meeting. There has not been agreement on draft Recommendation 28 to date and further discussion will take place at the November 6 meeting.*

Option A- No Go Zone and Go Slow Zone

- Establish a go-slow zone for all vessels on the west side of San Juan Island from Cattle Point to Pile Point, within ¼ mile of shore, with a speed limit of 7 knots over ground. In addition, establish a no-go whale protection zone for commercial whale watching vessels, recreational vessels, and commercial kayak groups on the west side of San Juan Island from Pile Point to Mitchell Bay, within ¼ mile of shore. Allow vessels to transect the no-go zone to exit from shore.

Option B- Go Slow Zone

- Establish a go-slow zone for all vessels on the west side of San Juan Island from Cattle Point to Mitchell Bay, within ¼ mile of shore, with a speed limit of 7 knots over ground.

Option C- Update Science, and Seek to Identify Zone with Additional Participation of Others in 2019

- The best available science (Ashe et al. 2009) indicates that a polygon of 7.4 square nautical miles, extending 1 mile off south-west San Juan Island outlines an optimal candidate no-entry zone for small vessels. This area was identified because it is a "high-probability feeding area" for Southern Resident orcas where feeding behavior is 2.7 times more likely to occur than in areas beyond its boundaries. As already proposed by San Juan County, this study should be updated with more recent information including current Southern Resident orca distribution patterns to generate a revised candidate area. Once the updated science is available in 2019, pursue actions to identify and protect Southern Resident orcas while they are off south-west San Juan Island, with the exact boundaries or subdivisions of the candidate area(s) to be determined by science, stakeholder engagement and consultation with Tribal co-managers.

During the fishbowl discussion at the meeting the OTF was not able to reach consensus on any of the three options (Option A, B, or C). Toward the end of the discussion, a new proposal (Option D) was offered and voted on with very limited discussion. Option D became the new Recommendation 28. Option D reads as follows:

<u>Suspend viewing of Southern Resident orcas</u>

- Establish a whale watching regulation that precludes Southern Resident orca viewing by all boats in Puget Sound for the next 3-5 years. The governor should direct WDFW to begin rulemaking to define Washington whale watching in coordination with the commercial whale watching industry, kayak industry, local governments and interested non-governmental organizations.
- Report back to the governor and legislature after 3-5 years on the effectiveness of the suspension.

<u>Risks & Unintended Consequences of Recommendation 28</u>

The original intent of Recommendation 28 was to create a geographically based no go zone. It now seeks to create a no go zone around the SRKWs. However, since the whales are nearly always spread out into multiple groups, and often into small groups and single whales spread over miles,

Recommendation 28 creates 74 no go zones that are constantly in motion and often moving 50-100 miles per day.

The real-world practical challenges and consequences of establishing and maintaining 74 no go zones were not discussed during any of the OTF or Vessel Working Group meetings. Because Recommendation 28 was not properly vetted, implementation will lead to unintended consequences — or an inability to have effective enforcement at all. Many of these consequences will negatively impact or eliminate some of the benefits to the SRKWs of a near-zero impact form of commercial whale watching:

The potential negative consequences include:

- Without the presence of PWWA vessels with SRKWs, the sound in the waters surrounding the SRKWs will likely increase due to recreational, shipping (and other) vessels traveling at high speed, unaware of the presence of SRKWs. This high-speed travel drastically increases sound in the water.

  PWWA vessels often serve as sentinels for the SRKWs, alerting recreational and other vessels to their presence which keeps other boaters clear of the whales' path, slows the speed of their boats, and models good behavior. Enforcement officers and Soundwatch often inform recreational boaters to model their behavior after the professional whale watch vessels when in the presence of whales. Furthermore, data shows that recreational boaters are more likely to exhibit good behavior around the SRKWs when PWWA boats are present.

  If PWWA boats are not present with SRKWs, it creates a high risk that other boaters, unaware of the presence of SRKWs, will travel at high speed over whales. This will lead to a net increase of sound around SRKWs, especially in key foraging areas, and raises potential for other types of vessel impacts.

- PWWA vessels routinely alert law enforcement and boater education vessels (eg the Soundwatch Boater Education Program) to the presence and identity of whales. This allows these vessels to efficiently locate whales, arrive on scene, and provide accurate information to the public.

  Moreover, because the SRKWs are often spread over miles in small groups, it is not possible for enforcement and Soundwatch vessels to monitor recreational vessel traffic around all groups of SRKWs.

  PWWA vessels alert enforcement and Soundwatch to other vessel types traveling at high speed approaching the path of the whales.

  Without the presence of PWWA boats with SRKWs, we will not be able to assist in alerting enforcement to the presence of SRKWs and helping to identify other vessels

traveling toward each group of SRKWs.

- Several times each season, PWWA vessels alert the military of the presence of whales in proximity to active military exercises. With hazardous air, surface, and subsurface exercises occurring frequently throughout the year, PWWA serves as an important safeguard for SRKWs when they are near military ranges. The suspension of viewing SRKWs puts the SRKWs at risk of impacts from military exercises.

- The Center for Whale Research has maintained a record of sighting data and days of presence from J, K and L pod dating back to 1976. Today, with the SRKWs spending less time in Haro Strait and the Salish Sea and often spread into multiple groups when they are present, the Center for Whale Research greatly depends on PWWA sightings data for it's ongoing sightings database. The suspension on viewing SRKWs puts the continuity of the long-term data set in jeopardy.

- Many other scientists and researchers depend on PWWA sightings data for ongoing research, publications, and conservation advocacy. Without PWWA sightings data, this work will be negatively impacted.

- PWWA serves an important role in educating passengers about SRKWs and inspiring them to get involved in conservation efforts, habitat restoration projects, and other actions they can take at home to help SRKWs. PWWA companies also connect passengers to fundraising opportunities to financially contribute to regional NGOs working on conservation, habitat restoration and salmon recovery. PWWA facilitates passenger donations of over $500,000 per year to help SRKWs. This role will be more difficult without being able to connect people directly with SRKWs and their life stories.

Science-Based Vessel Management Plan – PWWA Requests Governor Inslee reflect this plan in his Orca Task Force legislative and executive agenda

The purpose of this section is to outline key components of Science-Based Vessel Management Plan (SBVMP) for PWWA around SRKWs. The purpose of the SBVMP is to help direct Washington State and/or National Marine Fisheries Services to create science-based laws governing how vessels must behave around SRKW. This SBVMP has been created with the input from scientists listed below, including leading experts on the subject of acoustics and SRKW behavior. The goal of this approach is to accomplish a "near zero" acoustic footprint of vessels in the vicinity of SRKW while allowing PWWA vessels to continue their contributions to education, conservation, stewardship, and research efforts. This plan has been created as an alternative to a moratorium on watching SRKW.

Key Components of a Science-Based Vessel Management Plan

The purpose of a Science-Based Vessel Management Plan is to develop laws and guidelines based on credible and validated acoustical data. The PWWA believes the following alternatives represent a science-based place to start given the endorsements of relevant experts of this document.

Action 1: Science Panel

A panel of scientists should convene to review the current body of best available science on the acoustics of vessels and potential vessel impacts and to issue recommendations on how to best achieve the goal of a "near zero" acoustic footprint of whale-watching vessels. The panel can be convened jointly by PWWA and WDFW and include experienced acoustic and SRKW experts and could be chaired by acoustic experts such as Dr. David Bain and Dr. Val Veirs.

Action 2: Permit System

A permit system shall be created by WDFW with PWWA consulted as a key stakeholder. A panel of scientists will convene to advise WDFW on the creation of the permit system. The purpose of the permit system is to cap an industry that currently has no restrictions on growth. Further restrictions will be added as terms of the permit, so that under permit, a Science-Based Vessel Management Plan may be implemented instead of many individual laws.

Action 3: Near Zero** Acoustic Impact

One restriction under the permit will be to determine an acceptable number of vessels, based on acoustic properties, present with SRKW that does not exceed acceptable acoustic thresholds. These acoustic thresholds will be determined by using the best available science. Where gaps in the science are present, the PWWA will voluntarily engage with WDFW and/or NOAA and/or independent scientists to conduct studies to fill these data gaps in order to determine an acceptable acoustic threshold. It has been suggested that the current guideline created by PWWA restricting no more than 10 vessels operating in a 1km Go-Slow Zone may already achieve a "near zero" acoustic footprint. As a precautionary measure, PWWA suggests decreasing this number to a maximum of 5 vessels in the 1km Go-Slow Zone until analysis on the acceptable acoustic thresholds occurs.

**Definition of Acceptable Acoustic Threshold or "near zero" vessel acoustic footprint: PWWA suggests the convened scientific panel define this. It has been suggested that the "near zero" acceptable acoustic footprint is a point at which vessel noise merges with ambient noise and any potential impacts on echolocation are not present.

Action 4: No Go Zone

Codify our No Go Zone of ¼ mile off the west side of San Juan Island Cattle Point to Mitchell Point. (Recommendation 28 Option A). This will apply to all vessels (except kayaks) when SRKW are present. Simultaneously, have the science panel review recent (last 10 years) sightings and behavioral data to determine if there is an additional region it makes sense to protect as an important foraging no-go zone for SRKW either seasonally or year-round.

Action 5: Go Slow Zone

Codify our Go Slow Zone of speeds of 7kts or less 1 km around SRKW at all times (modified Recommendation 28 Option B). This will apply to all vessels at all times.

Why does this Science-Based Vessel Management Plan provide more protection than a moratorium on watching Southern Resident Killer Whales?

The moratorium was introduced in response to a lack of consensus on Recommendation 28. Recommendation 28 was created to respond to concerns about potential vessel acoustical impacts in foraging areas for SRKW. This alternative proposal will allow PWWA to continue its contributions to stewardship, research, education, and conservation that would be negatively impacted by the proposed moratorium. Moreover, the alternative approach, in combination with existing PWWA guidelines, will offer more benefits to the SRKWs than Recommendation 28. The SBVMP described above offers further protection by:

1. Establishing an acoustic threshold based on best available science that achieves "near zero" acoustic footprint of whale watching vessels. This mitigates the biggest concern for SRKW which is the potential masking of their echolocation by vessel sound, therefore making it difficult to find prey. The presence of professional whale watch operators adhering to this threshold will increase compliance of other vessels, thus reducing overall acoustic impacts.

2. The adaptive strategy of a SBVMP allows scientists to determine what acoustic thresholds are acceptable. It also allows the whale watching industry to adapt to new science. For example, once thresholds are determined, PWWA members can adapt over time, if necessary, to quieter propulsion systems. In order to achieve "near zero" acoustic footprint, other solutions could be presented such as "engine off" zones, or silent electric propulsion only zones. Adaptive management allows the industry to still participate in educational tours while meeting the acoustic requirements.

3. The SBVMP allows whale watch vessels to continue their stewardship of whales on the water, while also preventing serious acoustic disturbance or harassment. WDFW officers and other professionals support the whale watching industry as models of good behavior around whales, and rely on PWWA as a source of information on whale location and identities. In an environment with many vessels when whales are present, the professional operators under permit can be used as a beacon for other vessels to indicate whales are present and that they need to slow down. It's possible that in the future, under this permitting system, that only professional vessels could enter the quiet 1km zone. Soundwatch data under NOAA permit and WDFW enforcement data shows that professionally trained PWWA whale watch vessels show strong compliance to all regulations and guidelines. Private vessels on the other hand commit over 90% of the "dangerous" infractions such as high-speed passes and close pursuits of whales. PWWA members can help define that permitted 1km zone through flagging and informing enforcement on SRKW location, preventing these dangerous incidents.

4. The SBVMP allows whale watch vessels to continue helping the valuable research that informs the recovery strategy. Over 90% of SRKW sightings to researchers and enforcement flow from the PWWA. As SRKW use their core habitat in new ways, as they have shown over the last 15 years, it's not possible for researchers to know about their presence because it's become so scattered and unpredictable. The PWWA has become the key provider of this information, making the continued monitoring of SRKW health possible. The research community, scientists, law enforcement, boater education programs and military have come to rely on PWWA to provide ongoing and current sightings data.

5. The SBVMP allows whale watch vessels to continue their valuable contributions to education and conservation. Professional whale watch companies have created conservation programs and are working toward establishing further conservation connections with other partners. Professional whale watch companies educate an estimated 600,000 guests annually. Each guest receives information on how to help recover SRKW, a message that is more powerful when seeing the SRKWs.

The Science-Based Vessel Management Plan (SBVMP) is an alternative plan to the proposed SRKW moratorium. The proposed moratorium has little broad-based support across the scientific community. The SBVMP on the other hand has broad consensus in the scientific community. Most importantly, it addresses the most important vessel issue concerning SRKW and that is the potential acoustic disturbance and masking of echolocation. It also allows for continued protection by being a signpost on the water, supports the continued research of SRKW, and provides valuable education, outreach, and conservation actions that help recovery.

Additional potential actions to strengthen PWWA's conservation role and minimize vessel effects:

- Train all PWWA vessels/captains in oil spill response
- Get all PWWA companies involved in the whale flag program and require usage when vessels are within 1km of whales to further assist with public visibility of whale locations
- Commit to discussing SRKW and how the public can be involved in their conservation on every trip regardless of which type of whales are seen.
- Take a leadership role in the PodMatch app being developed by Whale Scout. Podmatch is an application designed to connect individuals to salmon recovery projects and organizations.
- Develop a mechanism to track how visitor outreach results in action to benefit whales, and make continued adjustments to educational programs to increase results based on studies.

Individuals and Organizations That Support the Science-Based Vessel Management Plan over Recommendation 28

The SBVMP was developed in collaboration with and/or is supported by:

Dr. David Bain	Orca Conservancy
Shari Tarantino	Orca Conservancy
Ken Balcomb	Center For Whale Research
Michael Weiss	Center For Whale Research, University of Exeter
Dr. Darren Croft	Center For Whale Research, University of Exeter
Dr. Rich Osborne	Joyce, WA (Vessels Working Group Member)
Dr. Val Veirs	Beam Reach Marine Science and Sustainability School
Dr. Debbie Giles	Friday Harbor, WA (Vessels Working Group Member)
Julianna Houghton	MS, SAFS, University of Washington
Dr. Andrew Trites	Marine Mammal Research Unit, University of British Columbia
Whitney Neugebauer	Whale Scout
Dr. Julie Woodruff	Orca Behavior Institute
Monika Wieland Shields	Orca Behavior Institute
Sara Hysong-Shimazu	Orca Behavior Institute
Cindy Hansen	Orca Network
Susan Berta	Orca Network
Howard Garrett	Orca Network
Steering Committee	Salish Sea Ecosystem Advocates

Appendix 6. Public comments

All public comments received to date are available in this folder and its sub-folders: https://pspwa.box.com/s/2n27cmx09vec2iz6ia3n4ietcij1smo1

Public comments were welcomed throughout the process and will continue to be accepted until the task force finishes its work in October 2019. This appendix provides the summaries created for task force members following two specific public comment periods in 2018.

Public comment on the September 24 draft report

There were 3,405 responses to the public comment survey on the governor's website about the September 24 draft report and draft recommendations. (Note: There were 2,948 unique IP addresses and 458 duplicates. Duplicates can be due to multiple people in a household or at a public institution submitting individual comments. There could also be some people who responded to the survey more than once.)

Organizations and coalitions also submitted letters; links and summaries are available in the second section of this document.

Individual comments

The full set of comments received through the online survey can be found at https://pspwa.box.com/s/hzq6yings8w8ju8o4cob18k4jj1u5k91.

Vision and goals

- Many people voiced support for the vision and goals statements.
- Several people (8) said that the vision and goals should have a greater emphasis on speed and include immediate goals for 2018 and 2019.
- A few people expressed concern that the draft recommendations wouldn't be enough to achieve the vision and goals.
- Some people mentioned specific actions that they wanted to see in the goals statement (e.g., dam removal).

Habitat

There were 1089 responses in the habitat comment box; 627 responses were ambiguous or not related to habitat. Themes related to habitat include:

Themes	Comments	% of total
Restore/acquire habitat	239	21.9%
Protect habitat with regulations	167	15.3%
Fish passage at dams and culverts	25	2.3%
Improve water quality	10	0.9%
No new regulations	7	0.6%
New action ideas (see below)	5	0.5%
Cooperative compliance programs	4	0.4%
Do not invest in habitat	3	0.3%
Study/assess/inventory	2	0.2%

New, potentially worthwhile habitat ideas to save for the Year Two list:

- "We could have a New New Deal, providing high quality green collar jobs while expediting stream and estuary restoration."
- "Nutrient Enhancement Program statewide would dramatically improve watersheds and fisheries."
- "A Salish Sea protected zone would be one of the first of its kind."
- "All state agencies with land ownership or management responsibilities (WSF/WSDOT, WA Parks, WDFW, WDNR) shall inventory and implement pollution control, contamination cleanup, habitat protection and restoration to benefit forage fish, Chinook Salmon and SRKW. Funding for this work will be incorporated in the agency budgeting process." (2)

Hatcheries

842 total comments were tallied below from 534 total individuals that commented on hatcheries.

Themes	Comments	% of total
Prioritize wild salmon recovery actions over hatchery fish	211	25.1%
Support increased hatchery production	164	19.5%
Hatcheries can negatively impact wild salmon, take precautions and monitor increased hatchery production	120	14.3%
Do not support increased hatchery production	102	12.1%
Support hatchery production as a temporary measure only	87	10.3%
Habitat, forage fish and ecosystem health actions must go with hatchery production	75	8.9%
Concern that increased hatchery production means more Atlantic salmon or fish farms	32	3.8%
Concern over hatchery fish that may have contaminants or diseases	20	2.4%

Concern about resulting fisheries, including more harvest and who will benefit	18	2.1%
Support only doing pilot hatchery studies now, with increases later	10	1.2%
Support the use of all H approach	3	0.4%

Hatchery comments:

- The most common comment received was a statement of support for natural/wild fish recovery (25.1% of comments) over hatchery-produced fish. While some of those people went on to say that they did not support increased hatchery production because of this (12.1%), others supported increased production that was careful to minimize impacts to wild fish stocks (14.3%) and/or was a short-term measure (10.3%) for orcas while wild stocks recover. In particular, some people suggested that careful reviews of hatchery impacts should be conducted and that the increased production would have to be reauthorized with this information in 10 years.
- Several commenters noted that they were concerned that hatchery operations might be funded at the expense of protecting and restoring wild salmon, and many stated that hatchery production must come with investments in habitat, forage fish and ecosystem health (8.9%).
- On the other end of the spectrum, a few commenters expressed their desire for more Chinook fish of any kind (hatchery or wild) and that wild fish genetics and recovery are less or not important.

Confusion about specific hatchery actions or recommendation language:

- A large number of individuals were concerned that the potential recommendation suggested that increased hatchery production would not occur until 2020, which was too slow to address Southern Resident needs. Two pieces of information need to better be explained around this recommendation: 1) WDFW has already begun increasing hatchery production to some level with state money that was received for fiscal year 2019, and 2) More details are needed to explain that it will be 3-5 years before orcas potentially see adult fish prey increases here in Washington after increased production due to their lifecycle.
- Several people were concerned that increased hatcheries meant that Atlantic salmon would be farmed, or that more fish farms would come to Washington. We need to provide a better explanation of hatcheries for the public that is not familiar with them, including that only native salmon species are produced and about how hatcheries function differently than fish farms.

Ideas that the task force might consider as a point of clarification:

- A focus on conservation hatcheries rather than production hatcheries should be first and foremost, with assurances of minimization of genetic weakening of wild stocks.
- There needs to be an increase in hatcheries coordination with Canada.

New, potentially worthwhile ideas to save for the Year Two list:

- We should have hatcheries for the salmon's food source too. (This idea of 'forage fish hatcheries' was discussed by the Prey Working Group but is an action that needs much more research.) Also noted under forage fish below.
- Include educational programs to increase awareness. Make sure the public is aware of hatchery production and why it's important by encouraging hatchery tours, school tours.
- Offering a license discount to sport fishermen as an incentive to work in a hatchery will benefit everyone.

Hydropower

There were 994 responses in the hydropower comment box; 189 responses were ambiguous or not related to hydropower. Themes related to hydropower include:

Themes	Comments	% of total
Breach the lower Snake River dams	365	36.7%
Do not breach the lower Snake River dams	118	11.9%
Prioritize and remove dams in general Includes comments related to: Remove dams on the American Rivers list Remove dams like the Pillchuck Support for recommendation 1 (regions and partners develop a list of dams to remove in agreement with partners) Dams that block salmon and degrade habitat need to be addressed	103	10.4%
Third party facilitator	61	6.1%
Support ongoing NEPA process	50	5%
Reestablish salmon runs above dams	33	3.3%
Restore passage at all dams	33	3.3%
Don't increase spill	23	2.3%
Increase spill	19	1.9%

Harvest

531 total comments were tallied below from 442 total individuals that commented on harvest.

Themes	Comments	% of total
Support closing fishing for one, multiple years or moratorium	115	21.7%
Support harvest reductions	113	21.3%
Support closing important foraging areas	53	10.0%
Support a buyback program for gear or commercial fisheries	38	7.2%
Concern about tribal fishing rights or fishing allocations	35	6.6%
Do not support commercial fishing	30	5.6%
Would like to see an allowance/allocation for orcas specifically in season setting	24	4.5%
Concern that 'real time' closures won't be fast enough to benefit the orcas	22	4.1%

Encourage collaboration with Canada and/or OR on harvest reductions	22	4.1%
Concern about impacts to fishing stakeholders due to foraging area closures	19	3.6%
Support bycatch reduction	18	3.4%
Support getting people to not eat salmon or limit sales of WA-caught salmon	17	3.2%
Do not see harvest reductions as beneficial to orcas	13	2.4%
Do not support buyback programs and want to protect commercial fisheries	9	1.7%
Uncertainty about what a buyback program is	3	0.6%

Harvest comments:

- The most common comments received were statements of support for closing fishing for one year, five years, ten years or a moratorium (21.7% of comments) and statements of support for further reductions in harvest to benefit the Southern Residents (21.3%). Many people commented that they did not feel that the potential recommendations were strong or bold enough to make a difference for the orcas.

Confusion about specific harvest actions or recommendation language:

- While 10% of comments supported closures of foraging areas for orcas, 4.1% of comments expressed concern that closures that occurred within days of detecting orcas would not be fast enough to benefit them. This shows that a better description of how such a real-time mechanism would work is needed in any potential iterations of that recommendation.

Ideas that the task force might consider as a point of clarification:

- One commenter stated that closures to important foraging areas "should include a stakeholders component in the development AND enforcement. I believe the local community using commercial and residential fisheries should work together with WDFW to police this and without those details I do not support."

New, potentially worthwhile ideas to save for the Year Two list:

- Slot size limits was suggested by a commenter and was previously on the Prey Working Group list. If the task force wishes, more information could be brought forward on the pros and cons of such an approach in Year Two.
- Multiple commenters suggested that instead of or in addition to a buyback program, a limited entry commercial fishing permit system could be developed based on longevity in the fishery.
- Several commenters stated that they felt harvest could be changed or curtailed by not buying Chinook. Some wanted a public information campaign and another commenter suggested: "I have heard conflicting messages about whether consumers should buy Chinook salmon, and whether or not this would benefit SRKW. I suggest a factsheet on this issue would help."

- Similarly, multiple individuals suggested limitations on the sale of WA State commercially caught salmon, limited to markets in the continental United States. They stated that Hawaii recently passed a similar bill limiting the sale of billfish.
- Other individuals wanted a slightly different campaign such as "State government must establish and forcefully communicate the positive economic effects of a robust Orca population and a safe, reasonable and sustainable salmon harvest."

Predation

856 total comments were tallied below from 551 total individuals that commented on predation.

Themes	Comments	% of total
Do not support lethal removal of pinnipeds	198	23.2%
Predation of salmon by pinnipeds is not the primary issue for orcas	159	18.6%
Support lethal removal of pinnipeds	148	17.3%
Concern with interfering with Mother Nature's balance/did not want species by species management	80	9.4%
Expressed that not enough information available to support potential recommendations	71	8.3%
Support haul out removal	64	7.5%
Urge the consideration of transient orca needs	52	6.1%
Support lethal removal of predatory fish	47	5.5%
Support lethal removal of salmon-eating birds	23	2.7%
Support protection of pinnipeds	10	1.2%
Support increasing forage fish to aid predation issues	3	0.4%

Predation comments:

- The most common comment received was a lack of support for lethal removal of pinnipeds (23.2% of comments) with many people expressing that predation is not the major threat to address for Southern Resident recovery (18.6%).
- A nearly comparable number of comments (17.3%) expressed their support for lethal removal of pinnipeds. Fewer commenters stated that they supported lethal removal of predatory fish (5.5%) or birds (2.7%).
- Several people noted their concern for transient orcas if lethal management of pinnipeds were to occur (6.1%).

Confusion about specific predation actions or recommendation language:

- Several people commented that they did not know what a pinniped was and suggested that either a definition accompany the recommendation or that other terminology be used in the next version of the report.

Forage fish and marine productivity

There were 366 responses in the forage fish comment box; 156 responses were ambiguous or not related to forage fish. Themes related to forage fish and marine productivity include:

Themes	Comments	% of total
Restore forage fish habitat	100	27.3%
Inventory/monitor/study forage fish	49	13.4%
Protect forage fish habitat	26	7.1%
Stop harvest of forage fish	23	6.3%
No more studies	8	2.2%
New ideas for forage fish actions (see below)	4	1.1%

New, potentially worthwhile ideas to save for the Year Two list:

- Using hatcheries to produce forage fish. (2)
- Education to encourage youth to enter the field; perhaps a mentor program for high schoolers.
- Reintroduce herring.

Vessels

We processed 1,881 comments on vessels.

Major themes (hundreds of entries):

- Need to further evaluate and engage with US Navy (and other military and Canada) on training and tests related to sonar and other exercises (more than 300 entries).
- Improve oil transportation safety, response and accountability (more than 200 entries).
- Need for vessel noise reduction is urgent (more than 150 entries).
- Support for a moratorium or marked restriction on commercial (and recreational) whale watching (more than 110 entries).

Minor themes (tens of entries):

- Slow down ships to mitigate noise, ship-strikes and oil spill risk (more than 80 entries).
- Create permanent exclusion zone for prime feeding areas (more than 40 entries).
- Amplify enforcement penalties for egregious non-compliance using citations and greater fines (more than 30 entries).

Contaminants

Processed 600 comments related to contaminants.

There was significant general support for all of the contaminants recommendations. Some respondents thought that contaminants actions should be prioritized behind other actions—but there was not substantial agreement on that.

Key themes under contaminants:

- **Human health benefits.** The most common theme from the contaminants comments was concerning the human health benefits of addressing contaminants. 50 commenters highlighted the human health benefits, the general idea being 'what's good for the whales is good for us.'
- **Urgency.** The next most frequent response (39 individual comments) was an imploration to act quickly to address contaminants.
- **Action-oriented.** 19 commenters expressed that they would prefer to see actions—not studies or monitoring—however another 14 comments expressed support for science and monitoring
- **Funding.** One major theme related to funding was that polluters should bear the cost of contaminant action (14 individual comments). Another funding theme opposed new funding, some commenters asking that existing funds be reprioritized to address contaminant actions (13 comments).
- **Sewage and wastewater.** A number of commenters expressed concerns with raw sewage from Victoria (7) and sewage generally (8).
- **Additional issues of concern.** Commenters raised a number of issues for the task force and Contaminants Work Group to address:
    - International coordination (12 comments)
    - Pesticides (10 comments)
    - Plastics (6 comments)
    - CECs (4 comments)
    - Fish farms (3 comments)
    - Hatchery PCBs (3 comments)

Overarching comments

- Urgency. More than 120 respondents focused their final comment on the urgency of the situation and the need to take bold action now. This was in addition to respondents who emphasized the need to take a particular action now (e.g., removing dams). Sample quotes:
    - "There is little time left for us to save this community of orcas, and we hope bold, effective actions will happen quickly, to save these Pacific Northwest iconic orcas and salmon from extinction."
    - "The magnitude of this problem requires bold and swift action. I encourage the task force to aim high and ask for solutions that really will make a difference for the survival of these whales."

  - "Please do everything in your power to save the orcas now."
- Several people urged the task force to utilize the best available science.
- Several people asked for clearer wording on the recommendations.
- Respondents could select the top 5 things that think should be done (from the Year One draft recommendations or the additional potential actions in the appendix). The ones with the most votes were:
  - Habitat #1 (12%). (Potential habitat recommendation 1: In 2019, the governor and legislature should provide funding to the Recreation and Conservation Office to support habitat acquisition and restoration projects through existing capital budget salmon recovery accounts…for the subsequent round of funding with no changes to existing ranked lists…additional detail in Sept. 24 draft report.)
  - Hydropower 15 in the appendix (6.3%). (Potential hydropower action 15: Advocate that the US Army Corps unilaterally make a decision to stop operating the Lower Snake River dams and seek authority to breach the dams in near-term. Work to develop a mitigation package for affected communities and stakeholders, and to fund necessary hatcheries and habitat actions in the absence of mitigation funding depending on dam operations. Work to ensure the dams' energy is replaced with carbon-free alternatives.)
  - Hydropower #13 in the appendix (4.5%). (Potential hydropower action 13: Support the removal of dams that are on the American Whitewater list. The dams identified for removal in the next one to three years are Middle Fork Nooksack Diversion Dam on the Middle Fork Nooksack River, Pilchuck on the Middle Pilchuck River, and Nelson Dam on the Naches River. In the next four to five years, the list recommends removing Chambers Creek Dam on Chambers Creek and Enloe Dam on the Similkameen River.)
  - Harvest #1 (4.4%). (Potential harvest recommendation 1: The governor should direct WDFW to collaborate with tribes to analyze the feasibility, logistics and costs/benefits of developing a buyback program to remove fishing gear that has high release mortality of Chinook and/or transition to gear that has lower cumulative Chinook mortality. Complete the analysis by December 2019… additional detail in Sept. 24 draft report.)
  - Habitat #2 (4.3%). (Potential habitat recommendation 2: In 2019, the governor should request that the legislature create a new, large-scale, multiple-benefits estuary-specific capital program and identify revenue sources… additional detail in Sept. 24 draft report.)
  - The vessel actions with the most votes were Vessel #13 (address ongoing vessel safety issues, including oil transport) and Vessel #1 (statewide "go slow" bubble for vessels operating within ½ nautical mile of orcas).

- The contaminant actions with the most votes were Contaminant #1 (accelerate implementation of the ban on PCBs in state-purchased products) and Contaminant #5 (accelerate effectiveness, implementation and enforcement of NPDES permits).
- Note that half of respondents chose not to answer this question, as it was long and time-consuming.

Organization/coalition comments

Organizations and coalitions submitted the following letters commenting on the draft report and recommendations. They can all be found in this Box folder: https://pspwa.box.com/s/0xt6ruk2mi1otygoty9frz4iieriw399 and specific links to each letter are also provided below. The draft report with the recommendations numbered as referred to below can be found at https://www.governor.wa.gov/sites/default/files/SRKWDraftReport_09-24-18.pdf.

Council of Regions (representing the 7 regional recovery regions in WA)**:** https://pspwa.box.com/s/hmdfsjppmx9wal1hzbhjkg5q9yqdk624 Recommends relying on (and potentially expanding) the existing regional salmon recovery plans and frameworks, fully evaluating proposed actions for unintended consequences and coordinating with recovery regions before hatchery management decisions are made, fully considering the complexity of orca and salmon recovery across different scales, and coupling any short-term actions with those that will produce long-term and sustainable benefits.

Stand Up to Oil Coalition: https://pspwa.box.com/s/fc82rmfurt2expod28e8pxord89lmnzc Strong support for Vessels #8, strong support for Vessels #13, and support for Vessels #5 with recommended changes/new language.

Toxics-Free Future: https://pspwa.box.com/s/2urvf7nblfrt1ptxj5xe55utg6zn5ww1 Letter with signatures of 293 people strongly emphasizes support for Contaminants #2 and Contaminants #3.

Oceana: https://pspwa.box.com/s/5cobn0fla0yq89xxkab8o2i9misw05vk Supports Hydro #1, Hydro #2, Hydro #4 (with modification), Hydro #5B (with modification), Habitat #1, Habitat #2, Habitat #3.

Bonneville Power Administration: https://pspwa.box.com/s/qieyuxr5siagp74jxfdueri4qkh7wl30 Supports Habitat #1, Habitat #2; provides comments on hatchery and hydropower recommendations; recommends Hydro #5A.

The Lands Council: https://pspwa.box.com/s/ez5e72ldry5mds40494ks84rf543xnwn Supports Habitat #1, Habitat #2, Habitat #3, Habitat #6, Habitat #8, Hydro #2, Hydro #5B, Hydro #4 (in the absence of or prior to removal), Harvest #3, Harvest #5, supports removing barriers and limiting commercial harvest, opposes lethal management of pinnipeds.

Center for Biological Diversity: https://pspwa.box.com/s/6j6l951bdlr2lsydb9ooow62dauzw97p Supports Vessels #4, Vessels #7A and 7B, Vessels #6, and urges that restrictions be in place by May 1, 2019. Also provided comments from 790 people

(https://pspwa.box.com/s/uj6man5u5zpcpp64s7w1oh9ceunyzvax), many prioritizing: 1) restoration of wild Chinook salmon populations, 2) limiting allowable catch and avoiding all bycatch, 3) considering dam removal, 4) establishing "no go" zones for vessels and a limited-entry permit system for commercial whale-watching vessels, 5) improving water quality and reducing toxics. Opposes any changes to the MMPA that would allow killing harbor seals or sea lions.

3 members of the Senate Republican Caucus:
https://pspwa.box.com/s/tnddh3rhevgecylg8h87qh7nsjwuop4a Letter from Sen. Schoesler (9th district), Sen. Brown (8th district), and Sen. Warnick (13th district) adamantly oppose any recommendations that promote dam breaching or removal and provides comments on other potential hydropower recommendations.

Earthjustice: https://pspwa.box.com/s/csmolse7ne1vsbenz2rkpxcmhwxe9hcb Supports Hydro #5B, Hydro #4, Hydro #2, Habitat #1, Habitat #2, Habitat #3. Recommends adding a new Habitat action (replacing the "no-net-loss" policy in the GMA and SMA with an "ecological-net-gain" policy) and a new Hydro action (directing state agencies to use SEPA to evaluate the potential impacts of new dam projects on salmon availability for the Southern Residents). Signed by 17,480 individuals; 3,469 of those also submitted personalized comments that are appended to the letter.

The American Waterways Operators:
https://pspwa.box.com/s/1eqa3256fu9kp65gvbwxqm24g8aki5am Concerned that Hydro #4, Hydro #5A, Hydro #5B, as well as Hydro Actions 15 and 16 (in the draft report appendix) would be prohibitively costly and would not produce the desired results. Concerned about Vessel #8 and Vessels #13.

Washington State Association of Counties' Coastal Caucus:
https://pspwa.box.com/s/aslu7xgszoe10iwcxenpfshm3oow5qrm Includes comments on Habitat #1 (support), Habitat #3 (needs participation of local governments), Habitat #5 (needs participation of local governments), Habitat #6 (needs participation of local governments), Hydro #2 (support), Forage fish #1 (support), Hydro #5B (if the discussion is to be pursued, counties support a neutral venue), Vessels #13 (support). The Counties do not agree with Contaminants #5 or Contaminants #6 if they come without funding.

Washington Environmental Council:
https://pspwa.box.com/s/uwllv6o4680uzrt6ddrnbwq079wf74gd 2,584 comments from WEC members and public that include: thanking the task force for their passion, commitment, and leadership; potential Year One actions will help but aren't enough; support for all Contaminants actions; emphasize increasing food in the short-term while investing in long-term ecosystem recovery and making any increases in hatchery production for the benefit of SRKWs only; need to make sure there is funding for the bold actions.

Orca Salmon Alliance: https://pspwa.box.com/s/js48xag213dwuaumchr47yqlipuy8l5d Joint comments on each of the specific draft recommendations as presented by OSA's 15 members: *Orca Network, Defenders of Wildlife, Save Our Wild Salmon, Washington Environmental Council, Oceana, Natural*

Resources Defense Council, Sierra Club, Earthjustice, Endangered Species Coalition, Whale and Dolphin Conservation, Puget Soundkeeper, Center for Biological Diversity, *Seattle Aquarium*, *Whale Scout,* and *Toxic Free Future*.

Recreational Boating Association of Washington:
https://pspwa.box.com/s/ztxc654pohyrouy2ur9uah01nk5ys6ld Expresses concerns and opposition to potential Hydro action #13 calling for a removal of a series of hydropower dams, #16 calling for the removal of the Lower Snake River dam, and #12 on developing a list of priority projects for potential removal. Concerns include loss of recreational opportunity and loss of existing paid-for infrastructure.

Association of Washington Cities:
https://pspwa.box.com/s/g1m0w1ufmy6ckxbhkvnrof75zqb7s3f1 Supports removing culverts to provide access to important Chinook habitat. Unsure how Contaminants #5 and #6 would result in any benefit given recently concluded work by Ecology. Encourages bold thinking on funding for Contaminants #7 and encourages assessment of where retrofits would make a critical difference.

American Rivers: https://pspwa.box.com/s/9tkol8kv2mqgrxqibxyaauv773ao8pbd Supports all of the potential habitat recommendations; suggests amendments to Habitat #1, Habitat #3, Habitat #8; requests an additional habitat recommendation replacing the "no-net-loss" policy in the GMA and SMA with an "ecological-net-gain" policy; supports all potential hydropower recommendations and suggests amendments to Hydro #2 and Hydro #5B.

Regional Fisheries Coalition: https://pspwa.box.com/s/63iy7htf9zrzw7rit3brt3x5ranzdop1 Comments on Habitat #1, Habitat #2, Habitat #7, Forage Fish #1. Encourages increasing funding for the capacity of the organizations that we need to work on implementing salmon recovery, and including a recommendation to streamline the process from a project idea to project completion.

Northwest Sportfishing Industry Association:
https://pspwa.box.com/s/960xwh55ah6h28fn2b979y2dpo5rfaxa Provides specific comments on Habitat #1-6, with general support and some suggested edits to #3. Requests an additional habitat recommendation replacing the "no-net-loss" policy in the GMA and SMA with an "ecological-net-gain" policy. Provides comments on Hatchery #1C and requests an additional hatchery recommendation on increasing production of spring Chinook in lower Columbia River SAFE programs. Prioritizes Hydro #4, comments on Hydro #2, and proposes combining #5A and #5B into one action. Supports Harvest #2, Harvest #3, Harvest #5, comments on Harvest #4. Supports Predation #1A, Predation #2A, and Forage Fish #1.

Environment Washington: https://pspwa.box.com/s/mt6pdddddj8g7ujb2vwv631djvx7gcjl Has about 280 signatures. Urges strengthening and adopting Hydro #5B, Hydro #4, Hydro #2, Habitat #1-3. Requests an additional Habitat recommendation replacing the "no-net-loss" policy in the GMA and SMA with an "ecological-net-gain" policy. Requests an additional Hydro recommendation (directing state agencies to use SEPA to evaluate the potential impacts of new dam projects on salmon availability for the Southern Residents).

Skagit Watershed Council: https://pspwa.box.com/s/b227lk66n95tk2afdj1bnzfg0a1ngt3h Strongly supports Habitat #1 (with modifications), Habitat #2 (with modifications), Habitat #7 (with modifications), Forage Fish #1. Recommends focusing boldly now on habitat protection and restoration.

Marine Mammal Commission: https://pspwa.box.com/s/7ck3sld3hej4zb3ehn2ljmpnb89r43tq Supports Hatchery #1C, Hydro #2, considering actions to implement local harvest controls at critical times; comments on Predation #1A and #1B and supports inclusion of a cautious pilot; supports Vessels #4 and #13 (both with comments); suggests re-ordering and clarifying Contaminants recommendations. Notes that the task force should better describe an integrated program of activities and specify priority and sequencing as well as baselines and targets.

Save our Wild Salmon: https://pspwa.box.com/s/k38n7havrervxoctibxlghibupsihieo Has about 1,300 signatures. Urges strengthening and adopting Hydro #5B, Hydro #4, Hydro #2, Habitat #1-3. Requests an additional Habitat recommendation replacing the "no-net-loss" policy in the GMA and SMA with an "ecological-net-gain" policy. Requests an additional Hydro recommendation (directing state agencies to use SEPA to evaluate the potential impacts of new dam projects on salmon availability for the Southern Residents).

Roza Irrigation District: https://pspwa.box.com/s/oegdotgq6zb73c300qns74q7b682xdmj States that near-term actions which can have meaningful benefit to the SRKWs include continuing/maximizing the downstream barging of out-migrating juvenile salmon, accelerating the removal of the Bateman Island causeway, re-starting production at the Ringold hatchery on the Columbia River, and funding promising research projects. Emphasizes that removing the lower Snake River dams will not result in recovery of the SRKWs and will absorb time and resources that could be better invested elsewhere of the benefit of the whales.

Friends of the Earth: https://pspwa.box.com/s/f3j9hmziv9un3r2gda9vqey4l09cek8c Notes support for specific actions. Top priorities are Harvest #2, Harvest #7, Vessels #22, Forage fish #21, and Habitat #17.

Pacific Merchant Shipping Association:
https://pspwa.box.com/s/4vc84i9atuphy3e6f0oads52gfj2syev Expresses concerns about Vessels #1, Vessels #8, Vessels #13, and offers to provide the task force with a briefing about the safety system in place today.

Washington State Academy of Sciences:
https://pspwa.box.com/s/gv213f9pepmh1jkbc9pm1agnnrpz5rro Suggests modifications to Vessel #11 (which referenced the Washington State Academy of Sciences) with wording intended to enable the Academy to remain objective and provide options for policymakers. Also includes a sketch of the process and a budget estimate.

Sound Action: https://pspwa.box.com/s/c38bd8yc9irdeuatvielowo92wj8yn14 Sound Action was represented on the Prey Working Group. Letter urges task force to restore original language of Habitat #3, Habitat #4, Habitat #8 to reflect actual Working Group recommendations.

Northwest Straits Commission: https://pspwa.box.com/s/p5956cojye97lvddw66grcf940qk1x5y Supports an emphasis on funding programs and projects that address nearshore restoration/protection, forage fish and zooplankton studies; protection and restoration of key marine vegetation habitats; need for increased public awareness about the Southern Residents by prioritizing and expanding Forage Fish #9. *Note: Not on letterhead because this was received through the online comment form.*

Snoqualmie Watershed Forum: https://pspwa.box.com/s/68lfw9dlev1kwidy1cqqhe8fba2fhcwo Supports all 8 habitat recommendations and suggests more specific wording; supports all draft forage fish and all contaminants recommendations; comments on hatchery recommendations. Encourages task force to acknowledge climate change is causing species to migrate (related to predation). Would like to see recommendation limiting commercial offshore mixed stock fisheries in waters where adult Chinook are caught before orcas can feed on them.

Defenders of Wildlife: Letter: https://pspwa.box.com/s/oiwzj36clg4e2d8hp84nx8hkoc8qtrfe Indicates level of support for all potential recommendations; top 5 actions are Habitat #2, Habitat #3, Hydro #2, Hydro #4, Hydro #5B. Opposes Predation #2A. Recommends adding a new Habitat action (replacing the "no-net-loss" policy in the GMA and SMA with an "ecological-net-gain" policy) and a new Hydro action (directing state agencies to use SEPA to evaluate the potential impacts of new dam projects on salmon availability for the Southern Residents). Petition signed by ~900 people: https://pspwa.box.com/s/330llix6tfj4wn4s9jqd0hfw2bbijr5d Consistent with what is noted above and also calls out support for Habitat #1.

Palouse Regional Transportation Planning Organization:
https://pspwa.box.com/s/yv2e9xneqrthpz6796pwz140cltzhd0y As a regional transportation planning organization, strongly recommends looking at all possible issues thoroughly before making any decisions towards dam breaching. Presents the transportation perspective (barge transportation throughout the Columbia River System).

Columbia County Commissioners:
https://pspwa.box.com/s/wbvwjvlxkt6x9p8azrg2u1ybjgrreo1t Supports funding for certain capital projects as long as not in place of other needed projects in the state that have been vetted and are awaiting action; comments on impacts of out-migrating smelts from birds and nonnative fish, and on returning adults by seals and sea lions; says it's time to address untreated sewage; says the Snake River Dams are off-limits to them in any conversation that suggests their removal or compromise, and that there are improvements that could make a huge difference.

The Nature Conservancy: https://pspwa.box.com/s/ctf61vxs4xkdrrdlyeoqsomfd9b6s9y0 Expresses support for Habitat #1, Habitat #3-5, Habitat #7, Hydro #2, Vessels #8, Vessels #13, Contaminants #7, and strongly encourages funding goals and habitat recovery targets to be added to the habitat recommendation. Additional suggestions for Year One or Year Two in the letter.

Swinomish Indian Tribal Community:
https://pspwa.box.com/s/fbjpbx0tfnhn2hsrdoc46ng4y1dmybst Offers comments in advance of a

requested government-to-government consultation. Says we absolutely must take action to set aside and plant riparian buffers that will provide fully functioning habitat for salmon. Provides a response to each of the 8 draft habitat recommendations.

Okanogan Public Utility District:
https://pspwa.box.com/s/9dg93mdfb632xz0kb2jru7omoxva3wgy Requests that references to Enloe Dam be removed from the final report (see Hydro #13) and provides the rationale.

Oregon Department of Fish and Wildlife:
https://pspwa.box.com/s/gp21vlyij8fo0gkfk554wbcs4rxegfwu Requests inclusion of language on appropriate coordination between ODFW, WDFW, and other entities (e.g., under Habitat #2). Comments on Hatchery, Hydropower, Harvest, Predation recommendations.

Note: Many of these and other organizations also submitted comments using the online survey. All survey responses are available at https://pspwa.box.com/s/hzq6yings8w8ju8o4cob18k4jj1u5k91

If any links to organizations' letters have problems, the letters can all be found in this same Box folder: https://pspwa.box.com/s/0xt6ruk2mi1otygoty9frz4iieriw399

Sent after Sept. 24-Oct. 7 public comment period on draft report:

Western States Petroleum Association:
https://pspwa.box.com/s/47b8sjpv6sdjue6wbxwjxdc2kp4u2tcf Requests that Vessel #13 not be included in the report and instead allow the process created by SB 6269 to complete its work.

Yakima Basin Fish & Wildlife Recovery Board:
https://pspwa.box.com/s/kh8i53a1e6fk8pv7oh4fz3km9ercr758 Expresses strong support for Habitat #1 and comments on Habitat #2 and other habitat actions. Supports Hydro #2 and Hydro #3, with comments; prefers Predation #2A over #2B; supports Predation #3; encourages inclusion of Hydro action #10.

Letter from 6 orca scientists: https://pspwa.box.com/s/cv1juj4hd6zc9d0x9bxblggiplaebim3 Urges the task force to recommend: 1) changing Washington's water quality standards to allow increased spill to 125% of saturation and 2) convening a process to recommend steps for lower Snake River dam removal as soon as possible.

Public comment on the Oct. 24 draft recommendations

There were 12,720 responses to the public comment survey (on the governor's website) about the updated draft recommendations. Of those, there were 3,898 unique IP addresses. Three IP addresses had more than 400 responses and 21 IP addresses had between 100-399 responses. Duplicates can be due to multiple people in a household or at a public institution submitting individual comments. There could also be some people who responded to the survey more than once.

Organizations and coalitions also submitted letters; links and summaries are available in the second section of this document.

Individual comments

The full public comment survey report is available at:
https://pspwa.box.com/s/re6npi1hzu76e27975cclc7efyit6wz9

Attachments and letters from individuals received between 10/24-10/29 via the public survey:
https://pspwa.box.com/s/oawgw6qh99p0ia12ofquzz06d9owsiwh

Survey respondents were first asked to indicate their level of support for or opposition to each of the draft recommendations. Results are shown in the charts in the handout on the governor's website.

Voting on top 5 recommendations

Top recommendations, in order:

1) Recommendation 9: Determine whether removal of Lower Snake River Dams would provide benefits to Southern Resident orcas commensurate with the associated costs, and implementation considerations.
2) Recommendation 8: Increase spill to benefit Chinook for Southern Residents by adjusting Total Dissolved Gas allowances at the Snake and Columbia River dams.
3) Recommendation 1: Significantly increase investment in restoration and acquisition of habitat in areas where Chinook stocks most benefit Southern Resident orcas.
4) Recommendation 3: Enforce laws that protect habitat.
5) Recommendation 6: Increase hatchery production and programs to benefit Southern Resident orcas consistent with sustainable fisheries and stock management, available habitat, recovery plans, and the Endangered Species Act. Hatchery increases should be done in concert with increased habitat protection and restoration measures.

Top prey recommendations: Same as above.

Top vessel recommendations, in order:

1) Recommendation 24: Reduce the threat of oil spills in Puget Sound to the survival of Southern Residents.
2) Recommendation 18: Establish a limited-entry whale-watching permit system for commercial whale-watching vessels and commercial kayak groups in the inland waters of Washington State to increase acoustic refuge opportunities for the orcas.
3) Recommendation 22: Implement shipping noise-reduction initiatives and monitoring programs, coordinating with Canadian and US authorities.
4) Recommendation 17: Establish a statewide "Go-slow" bubble for small vessels and commercial whale watching vessels within half a nautical mile of orcas.
5) Recommendation 25: Coordinate with the Navy in 2019 to discuss reduction of noise and disturbance affecting Southern Resident orcas from military exercises and Navy aircraft.

Top contaminant recommendations, in order:

1) Recommendation 31: Reduce stormwater threats and accelerate clean-up of toxics that are harmful to orcas.
2) Recommendation 30: Identify, prioritize and take action on chemicals that impact orcas and their prey.

Habitat

There were 412 comments tagged as being related to habitat.[4] Of those 412 comments, themes related to habitat include:

Themes	Number of comments
Fund habitat restoration/protection projects in general	107
Increase habitat protection regulations	95
Fund nearshore/estuary/forage fish habitat restoration projects	12
Reintroduce salmon above dams	4

The reviewers' overall assessment from reading all of the responses that had some mention of habitat was that there was strong support for a combination of strategies to (1) protect whales while they are in the Salish Sea by reducing vessel disturbance and fishing, in combination with (2) enforcing existing regulations and ordinances that are intended to stop habitat loss, contaminants, and water quality while simultaneously (3) restoring and protecting habitat (acquisition) with many references to the importance of nearshore/estuary and forage fish, and (4) restoring fish passage, including above dams that block salmon from accessing suitable upstream habitat. Responses

[4] Others not in this list either did not have clear habitat content or did not share themes with other habitat comments. Same comment true for the other prey topic areas.

indicated strong support for this suite of synergistic strategies regarding prey availability and vessel disturbance consistent with Lacy's recommendations that represent a mix of immediate and longer-term outcomes.

Hatcheries

There were 222 comments from 202 survey respondents tagged as being related to hatcheries. Of those comments, themes related to hatcheries include:

Themes	Comments
Support increased hatchery production (without caveats mentioned)	87
Do not support increased hatchery production	48
Fix predation issues while ramping up hatchery production	26
Support hatchery production as a temporary measure only	24
Hatcheries can negatively impact wild salmon, take precautions and monitor increased hatchery production	12
Prioritize habitat conservation	11
Habitat, forage fish and ecosystem health actions must go with hatchery production	11
Support the use of all-H approach	3

The most common comment received related to hatcheries was a statement of support for increased hatchery production, with 39.2% of the 222 hatchery-focused comments stating it outright, 11.7% of hatchery-focused comments only supporting it with predation management measures in place, 10.8% of hatchery-focused comments only supporting it as a temporary measure, 5.4% of hatchery-focused comments only supporting increases done in a manner that will not be detrimental to wild fish, and 5% of hatchery-focused comments mentioning that it should be done with investments in habitat. (72.1% of the 222 hatchery-focused comments supported increased hatchery production in some way.)

The second most common comment received was opposition to increased hatchery production (21.6% of the 222 hatchery-focused comments), with commenters often explaining that they were concerned about wild fish conservation.

Several commenters urged the task force to focus on habitat conservation for longer term wild stock recovery (5.0% of hatchery-focused comments).

Harvest

There were 240 comments tagged as being related to harvest. Of those 240 comments, themes related to harvest include:

Themes	Number of comments
Reduce harvest	74
Ban harvest	72
Eliminate nets/gillnets	21
Fishing isn't the problem	14
Reduce bycatch	12
Consider SRKW in fishing policies	11
Reducing fishing will hurt the economy	10
Better fisheries monitoring	6

Hydropower

There were 8,687 comments on hydro. Due to the magnitude of comments and the short amount of time to assess them, the reviewers read 800 comments (comment 1, 100, 200 and so on until 8,600).

Of the 800 randomly reviewed comments, over 99% were comprised of one of two comments repeated verbatim. Both comments were to request a forum to convene and develop a transition plan to remove the dams combined with increasing total dissolved gas to 125%. One of the comments was provided to its members by Save our Wild Salmon. One commenter also thanked the Sierra Club for instructing the public on how to comment and what to say.

Below are the two nearly identical comments that were submitted verbatim 99% of the time:

- "The science is clear. The lower Snake River dams must go to restore Chinook salmon and save orcas. And stakeholders in Washington must led the way. Please act now to establish a forum for local, state, tribal, and other stakeholders to develop a transition plan for removal of the four lower Snake River dams and restoration of the lower Snake River and its imperiled salmon populations by the end of 2019. You also must ask the Washington Department of Ecology to immediately change state water quality standards that limit the amount of water that can spill past the dams during the critical spring juvenile salmon migration months. The new standards must allow total dissolved gas levels up to 125 percent of saturation as measured at each dams tailraces. Salmon and orcas urgently need increased spill to this new level starting in 2019."
- "Governor Inslee and Members of the Orca Task Force: Time is short and the science is clear. The lower Snake River dams must go to restore chinook salmon to feed Southern Resident orca and help save them from extinction. Act now to establish a forum for local, state, tribal, and other stakeholders to develop (1) a transition plan for removal of the four lower Snake River dams and restoration of this historic river and its imperiled salmon populations and (2) a timeline for implementing this action. You also must ask the

> Washington Department of Ecology to immediately change state water quality standards that limit the amount of water that can be spilled at the dams during the spring juvenile salmon migration months as a critical interim measure to help salmon and orca now. The new standards must allow total dissolved gas levels up 125% of saturation. Salmon - and the orcas that depend upon them - urgently need 'spill' increased to this new level starting in 2019. Thank you."

Also, in comments that were also tagged under vessels, 18 people included a comment expressing opposition to new dams (such as Chehalis).

Predation

There were 340 comments from 288 survey respondents tagged as being related to predation. Of those comments, themes related to predation include:

Themes	Number of comments
Do not support lethal removal of pinnipeds	90
Support management of pinnipeds (did not indicate support for lethal or non-lethal)	73
Support lethal removal of pinnipeds	72
Concern with interfering with the ecosystem or affecting transient orcas	48
Predation of salmon by pinnipeds is not the primary issue for orcas	40
Support non-lethal measures for pinnipeds such as haul-out removal	12
Support lethal removal of predatory fish	5

The most common predation-related comment received was supported for management of some kind of pinnipeds (46.2% of 340 predation-related comments), although commenters differed on whether they specifically asked for lethal removal (21.2% of predation-related comments), or non-lethal measures (3.5% of predation-related comments).

26.5% of predation-related comments expressed that they did not support lethal removal of pinnipeds at all.

Many people noted their concern for transient orcas and for interfering in the complex ecosystem if lethal management of pinnipeds were to occur (14.1% of predation-related comments).

Forage fish and marine productivity

There were 124 comments tagged as being related to forage fish. Themes include:

Themes	Number of comments
Fund RCO programs	46
Enforce regulations	38
Stop harvest	10

Vessels

There were 491 comments tagged as being related to vessels. The most common themes (with number of entries expressing support and/or opposition) to changes that have occurred since the last public review include:

Themes	Support (number)	Opposed (number)
Greater restrictions on commercial whale watching by number or time of day, etc.	32	~low tens – not tallied systematically
Moratorium or more quiet days or periods	23	12
Restricting kayaks near SRKWs	15	10

In addition, 6 people expressed concerns about safety with shutting off echo sounders (or being thoughtful about alternatives and phase-outs).

Contaminants

There were 173 survey respondents tagged as being related to contaminants. Of those comments, themes related to contaminants include:

Themes	Number of comments
Address stormwater	37
Take immediate action	33
Control PCBs	31
Provide adequate/sustainable funding	23
Need a holistic approach to toxics	21
Follow science not politics or emotion	7

Organization/coalition comments

10/24/2018 to 10/29/2018

Organization	Link to letter
American Whitewater	https://pspwa.box.com/s/9518riu8ll69snbfcm8r7aanolufx6im
Animal Welfare Institute	https://pspwa.box.com/s/43jgv2lxqnibsxdnjgk6v3axoxhwcrm6
Association of Washington Cities	https://pspwa.box.com/s/pkgx85bjkc1tgpv2irsklslx2bmfdsnj
Big Bend Electric Cooperative	https://pspwa.box.com/s/lg2mebl4bvhsxkft4bk4y87fdqlg18zv
Bluefish.org	https://pspwa.box.com/s/1km6vbpdfeflsbmlvw6648dilm23fln0
Bonneville Power Administration	https://pspwa.box.com/s/9ypvc5tpfgylrjhtri21kcvsofryo5pk and https://pspwa.box.com/s/88kwvw007ugzwqz05uvjy71ot88ra8sq
Center for Environmental Law & Policy	https://pspwa.box.com/s/rx7a0jf8yj1dam2y73y7nfmeyj3axb6y
Columbia Rediviva	https://pspwa.box.com/s/os5ey41ihiy12acdocky918ev7kf9wut
Columbia River Inter-Tribal Fish Commission	https://pspwa.box.com/s/masqy3k6nhp3pjt4tzmemiutmmhkvdz1
Defenders of Wildlife	https://pspwa.box.com/s/bbbyw6nb10b8pj2pd3nak2fzcuixib40
Environment Washington	https://pspwa.box.com/s/8ydompwj3q3r7runvhqnuyxmyub156lg
Everett Bayside Marine Inc	https://pspwa.box.com/s/b4gulpzzjoh3djhwee0r6peyb6xbibsy
Fall Creek Fish Company	https://pspwa.box.com/s/tes99kg6nv0oauepc1kd4ym53kqgcown
Forterra	https://pspwa.box.com/s/2yzb83adj0jf2mo9rqovkxmj5v8dt8un
Friends of the Earth	https://pspwa.box.com/s/02uft7776x39pgdouy52hvhivjdcex3z
Great Old Broads for Wilderness	https://pspwa.box.com/s/usm4j5vylzs3104f21ptfk9funuj61uf
Hood Canal Salmon Enhancement Group	https://pspwa.box.com/s/t1ssnwxwowdch1f1m3cm1wa4cgz9asiw
King County Department of Natural Resources and Parks	https://pspwa.box.com/s/2z2ete5f9x310c174yk3b4helebwyecq
Lands Council	https://pspwa.box.com/s/ifphrbuaqvmyuvbpko6p31mxo2xit9gp
Lifeforce Foundation	https://pspwa.box.com/s/tzo9b9f1ms4z9t2o5xhw2msxfih5fvxw
Northwest River Partners (submitted by Lincoln Electric Coop)	https://pspwa.box.com/s/bswxfiyezoics12axr8h3f7oa4w8v8oz
Lummi (re: Roberts Bank)	https://pspwa.box.com/s/iz092d2o45d7kvb7asitu3gn1qjlr9ew and https://pspwa.box.com/s/8i8cxgki22xx3ntviqnzjtzm3ll2u60u
Native Fish Society	https://pspwa.box.com/s/i2znaziojyha8p0o25edf5l8ytmodm2v
Natural Resources Defense Council	https://pspwa.box.com/s/2465mp0z2erjk4oaahimaiknsw287ul3
NSEA	https://pspwa.box.com/s/0eavxtwx9r4lhpyfj08cd3jngtaaai1j
Olympic Forest Coalition	https://pspwa.box.com/s/k9oea1vz912hda3irh3fc2ceybg28z9m
Orca Behavior Institute	https://pspwa.box.com/s/6eb1fng8ou0ngol95125gdvwugyxjan9
Orca Salmon Alliance	https://pspwa.box.com/s/qw644hf2j430xgl2cymxbsc2ahxnxxq5
Origami Whales Project	https://pspwa.box.com/s/ryoferi57xzpfbrjy5t58rfz0kx6rx5n
Puget Sound Anglers, NOP chapter	https://pspwa.box.com/s/77tvcuhrd4rnlo6xxx9531j8tws1aiyi
Puget Soundkeeper	https://pspwa.box.com/s/uk9gzis2lrmh23t9h86oq4eqm6stpdgl
Puget Soundkeeper Alliance	https://pspwa.box.com/s/ruf1dsct3lg0cd7vd1q9u6p7oyp65lho
Regional Fisheries Coalition	https://pspwa.box.com/s/2lg81zltljwf39l4bonsk8jw077aegmk
Salish Sea Foundation	https://pspwa.box.com/s/ybdq7kdhkq2nif9sgjc9bxeqnoj4mj0w
Salish Sea Institute	https://pspwa.box.com/s/1mcbk3o5r05lairqsihobsbreo0f7hmo
Salmon for All	https://pspwa.box.com/s/vtgwbrqh6qkmtlnl4p41118zbrhj3x90
Save Our Wild Salmon Coalition	https://pspwa.box.com/s/fawewpuunsvq57go0f1seem6kri6u33v
Sierra Club	https://pspwa.box.com/s/o4us7mbtd5qo9vsbaf8s0kzjgebhst2s
Snohomish PUD	https://pspwa.box.com/s/gg51qx29381r7rm8mba5bae9d1rs67ut
Sound Action	https://pspwa.box.com/s/xxtdtt4e0tfpc5xz2wst625mrf5yxnd5
Stand Up to Oil	https://pspwa.box.com/s/o16s2ylc8o91rgd10647ffa9s5ojscvb
Swinomish Indian Tribal Community	https://pspwa.box.com/s/nzj990948hobhhlx0sieaxvki44mnjkk

Organization	Link to letter
Tacoma Public Utilities/Tacoma Power	https://pspwa.box.com/s/67d9mnngymemigybobjjdb3x5fvwwr6p
U.S. Marine Mammal Commission	https://pspwa.box.com/s/q2vca553uxfjc4oco21qpzlma2czuq2q
Washington State Association of Counties	https://pspwa.box.com/s/wsonr1r7esvdbtlunievvl0eh9oms3ci
WA Farm Bureau	https://pspwa.box.com/s/wlam0up9a81d200lii7t5mlaigmg3poo
Western Washington University	https://pspwa.box.com/s/cmcc4o47tr4yije4begnya1i5o2tb1ok
Whale and Dolphin Conservation	https://pspwa.box.com/s/5cbpb0pyughe66xg30uas037ydhzbrlc
Whale Scout	https://pspwa.box.com/s/qrhsq0pu4ny2qmvv6ocez1zcaak8h1m2
Whidbey Environmental Action Network	https://pspwa.box.com/s/9bxgftfgfyxfjpmhfiaw23hwfv1yxd3l
WRIA-1	https://pspwa.box.com/s/x1cdtobmbv7y4ech8ke8ntrspyqyh0pm

Works cited

[1] G. J. Wiles, "Periodic status review for the killer whale in Washington," Washington Department of Fish and Wildlife, Olympia, Washington, 2016.

[2] Environmental Protection Agency, "Southern Resident Killer Whales," July 2017. [Online]. Available: https://www.epa.gov/salish-sea/southern-resident-killer-whales.

[3] S. Wasser, J. Lundin, K. Ayres, E. Seely, D. Giles, K. Balcomb, J. Hempelmann, K. Parsons and R. Booth, "Population growth is limited by nutritional impacts on pregnancy success in endangered Southern Resident killer whales (Orcinus orca)," PLoS ONE, 2017.

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Exhibit 14

Ship noise extends to frequencies used for echolocation by endangered killer whales

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ABSTRACT

Combining calibrated hydrophone measurements with vessel location data from the Automatic Identification System, we estimate underwater sound pressure levels for 1,582 unique ships that transited the core critical habitat of the endangered Southern Resident killer whales during 28 months between March, 2011, and October, 2013. Median received spectrum levels of noise from 2,809 isolated transits are elevated relative to median background levels not only at low frequencies (20–30 dB re 1 μPa^2/Hz from 100 to 1,000 Hz), but also at high frequencies (5–13 dB from 10,000 to 96,000 Hz). Thus, noise received from ships at ranges less than 3 km extends to frequencies used by odontocetes. Broadband received levels (11.5–40,000 Hz) near the shoreline in Haro Strait (WA, USA) for the entire ship population were 110 ± 7 dB re 1 μPa on average. Assuming near-spherical spreading based on a transmission loss experiment we compute mean broadband source levels for the ship population of 173 ± 7 dB re 1 μPa 1 m without accounting for frequency-dependent absorption. Mean ship speed was 7.3 ± 2.0 m/s (14.1 ± 3.9 knots). Most ship classes show a linear relationship between source level and speed with a slope near +2 dB per m/s (+1 dB/knot). Spectrum, 1/12-octave, and 1/3-octave source levels for the whole population have median values that are comparable to previous measurements and models at most frequencies, but for select studies may be relatively low below 200 Hz and high above 20,000 Hz. Median source spectrum levels peak near 50 Hz for all 12 ship classes, have a maximum of 159 dB re 1 μPa^2/Hz @ 1 m for container ships, and vary between classes. Below 200 Hz, the class-specific median spectrum levels bifurcate with large commercial ships grouping as higher power noise sources. Within all ship classes spectrum levels vary more at low frequencies than at high frequencies, and the degree of variability is almost halved for classes that have smaller speed standard deviations. This is the first study to present source spectra for populations of different ship classes operating in coastal habitats, including at higher frequencies used by killer whales for both communication and echolocation.

Subjects Conservation Biology, Environmental Sciences, Marine Biology, Science Policy, Coupled Natural and Human Systems
Keywords Noise, Hydrophone, Killer whale, Orca, Odontocete, Marine mammal, Ship, Pollution, Acoustics, Bioacoustics

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INTRODUCTION

Commercial ships radiate noise underwater with peak spectral power at 20–200 Hz (*Ross, 1976*). Ship noise is generated primarily from propeller cavitation, propeller singing, and propulsion or other reciprocating machinery (*Richardson et al., 1995*; *Wales & Heitmeyer, 2002*; *Hildebrand, 2009*). The dominant noise source is usually propeller cavitation which has peak power near 50–150 Hz (at blade rates and their harmonics), but also radiates broadband power at higher frequencies, at least up to 100,000 Hz (*Ross, 1976*; *Gray & Greeley, 1980*; *Arveson & Vendittis, 2000*). While propeller singing is caused by blades resonating at vortex shedding frequencies and emits strong tones between 100 and 1,000 Hz, propulsion noise is caused by shafts, gears, engines, and other machinery and has peak power below 50 Hz (*Richardson et al., 1995*). Overall, larger vessels generate more noise at low frequencies (<1,000 Hz) because of their relatively high power, deep draft, and slower-turning (< 250 rpm) engines and propellers (*Richardson et al., 1995*).

This low-frequency energy from ships is the principal source of ambient noise within the deep ocean from approximately 5–1,000 Hz (*Wenz, 1962*; *Urick, 1983*; *National Research Council et al., 2003*). Growth of the global shipping fleet and possibly the average size of ships has raised deep-ocean ambient noise levels in low-frequency bands near 40 Hz by up to 20 dB relative to pre-industrial conditions (*Hildebrand, 2009*) and 8–10 dB since the 1960s (*Andrew et al., 2002*; *McDonald, Hildebrand & Wiggins, 2006*).

As these ships enter shallow waters and traverse the estuarine habitat typically occupied by major ports, the noise they radiate may impact coastal marine life. Since many marine mammals rely on sound to find prey, moderate social interactions, and facilitate mating (*Tyack, 2008*), noise from anthropogenic sound sources like ships can interfere with these functions, but only if the noise spectrum overlaps with the hearing sensitivity of the marine mammal (*Southall et al., 2007*; *Clark et al., 2009*; *Hatch et al., 2012*).

Hearing sensitivity isn't yet characterized in Mysticetes (baleen whales), but based on their signals they are likely most sensitive at frequencies 10–10,000 Hz and therefore constitute a low-frequency functional hearing group (*Southall et al., 2007*). They typically emit signals with fundamental frequencies well below 1,000 Hz (*Cerchio, Jacobsen & Norris, 2001*; *Au et al., 2006*; *Munger et al., 2008*) although non-song humpback signals have peak power near 800 and 1,700 Hz (*Stimpert, 2010*) and humpback song harmonics extend up to 24,000 Hz (*Au et al., 2006*).

The frequency overlap of peak power in ship noise and baleen whale signals (and inferred maximum hearing sensitivity) is verified by observed behavioral and physiological responses of mysticetes to ship noise. As examples, the probability of detecting a blue whale D call increases in ship noise, suggesting a Lombard effect (*Melcon et al., 2012*) and *Rolland et al. (2012)* found decreased stress levels in North Atlantic right whales when ship noise was absent.

The potential impacts of ship noise can be assessed more confidently in Odontocetes (toothed whales) because they constitute mid-frequency or high-frequency functional hearing groups (*Southall et al., 2007*) in which auditory response curves have been obtained for many species. These curves show maximum auditory sensitivity near the

frequencies where toothed whale signals have peak power (*Mooney, Yamato & Branstetter, 2012*; *Tougaard, Wright & Madsen, 2014*)—at about 1,000–20,000 Hz for social sounds and 10,000–100,000 Hz or higher for echolocation.

Southern Resident killer whales (SRKWs) represent an endangered toothed whale species that inhabits an urban estuary in which shipping traffic is common and is very well characterized bioacoustically. Their auditory sensitivity, extrapolated from captive killer whales (*Hall & Johnson, 1972*; *Szymanski et al., 1999*), peaks at 15,000–20,000 Hz—a frequency range that overlaps with the upper range of their vocalizations and the lower range of their echolocation clicks. SRKW calls have fundamental frequencies at 100–6,000 Hz with harmonics extending up to 30,000 Hz (*Ford, 1987*). Their echolocation clicks are likely similar to those of salmon-eating northern resident killer whales which have a 40,000 Hz bandwidth and a mean center frequency of 50,000 Hz (*Au et al., 2004*). SRKWs whistle between 2,000 and 16,000 Hz (*Riesch, Ford & Thomsen, 2006*) with a mean dominant frequency of 8,300 Hz (*Thomsen, Franck & Ford, 2000*).

Behavioral responses to boat (as opposed to ship) noise have been documented in toothed whales, including SRKWs. For example, bottlenose dolphins whistle (at 4,000–20,000 Hz) less when exposed to boat noise at 500–12,000 Hz (*Buckstaff, 2004*) and Indo-Pacific bottlenose dolphins lower their 5,000–10,000 Hz whistle frequencies when noise is increased by boats in a band from 5,000 to 18,000 Hz (*Morisaka et al., 2005*). For every 1 dB increase in broadband underwater noise (1,000–40,000 Hz) associated with nearby boats, SRKWs compensate by increasing the amplitude of their most common call by 1 dB (*Holt et al., 2009*).

While the frequencies used by toothed whales are well above the peak power frequencies of ships, multiple lines of evidence suggest that ship noise spectra extend or should be expected to extend to higher frequencies. Laboratory experiments with cavitation and previous studies of submarines, torpedoes, and ships indicate that ship noise may extend as high as 160,000 Hz at the source.

Experiments confirm that cavitation generates high frequency noise up to at least 100,000 Hz (*Wenz, 1962*). Cavitation noise from spinning rods and water jets has spectral power that rises through low frequencies at a rate of 40 dB/decade to a peak near 1,000 Hz and thereafter descends at −20 dB/decade (*Mellen, 1954*; *Jorgensen, 1961*). Noise from foil cavitation also has peak spectral power at 1,000 Hz, as well as a secondary peak at 31,000 Hz (*Blake, Wolpert & Geib, 1977*). In the vicinity of the higher peak, 1/3-octave levels increase about 10 dB upon cavitation inception (*Blake, Wolpert & Geib, 1977*).

World War II studies of ship noise, particularly measurements of thousands of transits of hundreds of ships of all types, identified propeller cavitation as the dominant source of noise radiated by ships, including at high frequencies (*Dow, Emling & Knudsen, 1945*). In reviewing these studies *Ross (1976)* and *Urick (1983)* noted that increases of >40 dB in the 10,000–30,000 Hz band were diagnostic of cavitation inception on accelerating twin-screw submarines and *Urick (1983)* attributed a 1 dB/knot (2 dB per m/s) rise in torpedo spectrum levels from 10,000 to 75,000 Hz to propeller cavitation.

More recently, cavitation has been implicated in ship noise measurements made at close range (<1,000 m) which show levels between 1,000 and 60,000 Hz that not

only are significantly above background levels, but also rise with increased ship speed faster than at lower frequencies (*Arveson & Vendittis, 2000*; *Kipple, 2002*; *Hermannsen et al., 2014*). Even when portions of the high-frequency energy are excluded, broadband source levels of cavitating propellers are high. *Erbe & Farmer (2000)* reported median broadband (100–20,000 Hz) source levels for an icebreaker with a cavitating propeller of 197 dB re 1 μPa @ 1 m.

In the open ocean or on the outer continental shelf far from shipping lanes high-frequency noise radiated by a ship will be absorbed within about 10 km (*Erbe & Farmer, 2000*), often before reaching a species of concern. In urban estuaries, however, marine mammals are exposed to noise from ships at ranges of 1–10 km routinely, and less than 100 m occasionally. For example, SRKWs frequently transit Haro Strait within 10–300 m of the shoreline at Lime Kiln Point where they are about 2 km from the center of the northbound (nearest) shipping lane (Fig. 1). Since the absorption rate is only about 3 dB/km at 20,000 Hz, compared to 30 dB/km at 100,000 Hz (*Francois & Garrison, 1982*), ship noise near 20,000 Hz (where SRKWs are most sensitive) in such close quarters may retain the potential to mask echolocation clicks, as well as other high-frequency signals.

In an environment where SRKWs may already be food-stressed (*Ayres et al., 2012*) due to reduced populations of their primary prey—Chinook salmon (*Hanson et al., 2010*)—echolocation masking could have grave population-level consequences. The potential impacts of ship noise on foraging efficiency may be compounded by simultaneous masking of communication calls, some of which may help coordinate foraging or prey sharing (*Ford & Ellis, 2006*). One case study has suggested that ship noise may reduce foraging efficiency by 50% in Curvier Beaked whales (*Aguilar Soto et al., 2006*).

Motivated by the possible impacts of ship noise on odontocetes and the scarcity of ship noise measurements made at close range over the full range of frequencies used by SRKWs, we endeavor to estimate source spectrum levels up to 40,000 Hz for a wide variety of ships from measurements made at a range of less than a few kilometers. Our primary objective is to characterize ship noise at higher frequencies, specifically those important to killer whales. A secondary objective is to compare our results with previous studies in order to understand consistencies and possible biases in field measurements of ship noise.

METHODS

Our study site is an area of the inland waters of Washington State and British Columbia known as the Salish Sea. This urban estuary hosts the commercial shipping ports of Vancouver, Seattle, and Tacoma (see Fig. 1).

Shipping traffic primarily associated with Vancouver—about 20 large (>65 feet or 19.8 m) vessels per day (*Veirs & Veirs, 2006*)— transits Haro Strait, the core of the summertime habitat of the SRKWs (*Hauser et al., 2007*). Each ship typically raises sound pressure levels[1] near the shoreline about 20 dB re 1 μPa (RMS, 100–15,000 Hz) above background levels to about 115 dB for approximately 20 min/transit (*Veirs & Veirs, 2006*). We define ships as all vessels with overall length (LOA) greater than 65 feet (19.8 m); the remaining, shorter vessels (boats) are not characterized in this study.

[1] All decibels here are referred to 1 μPa and source levels to a distance of 1 m. After their first usage, the units of broadband and spectrum level decibels are generally suppressed.

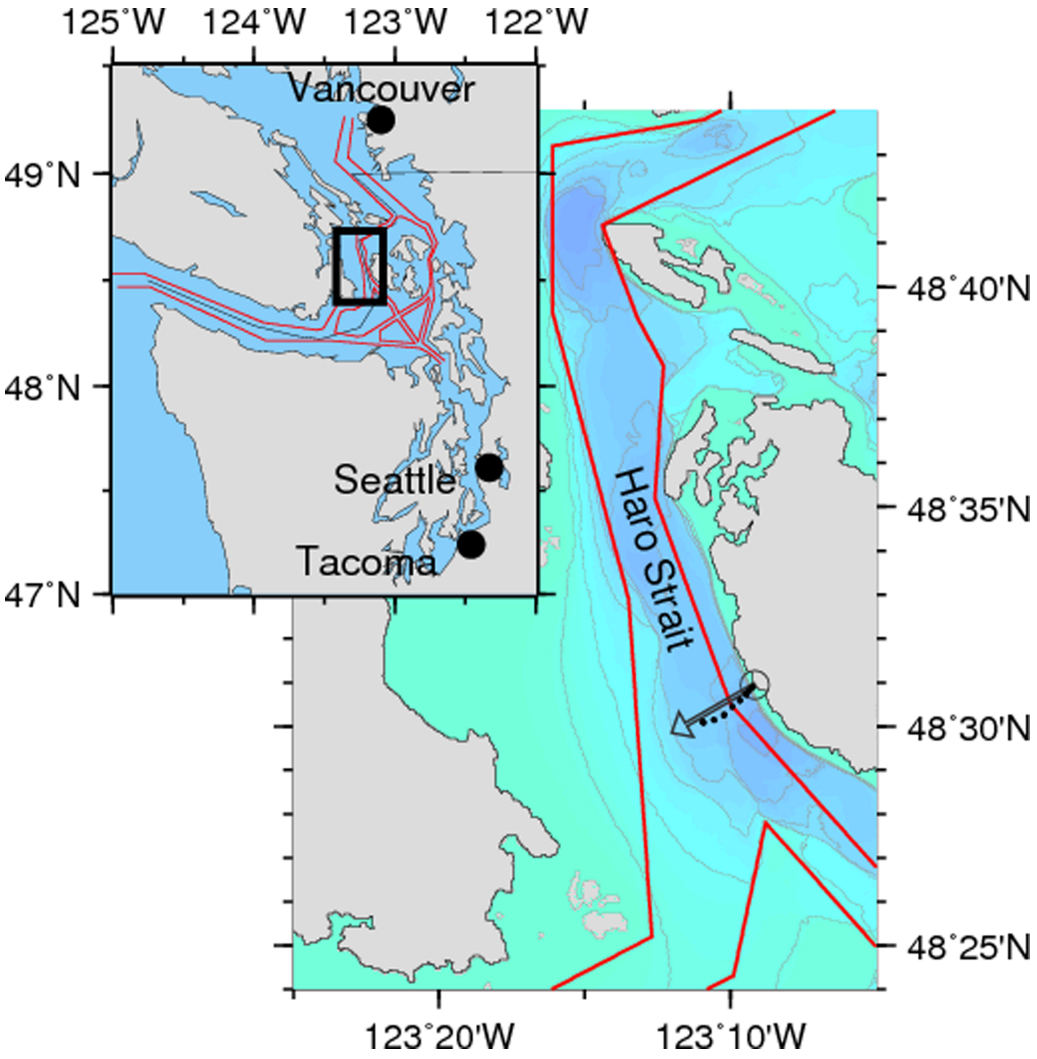


Figure 1 **Study site map.** Inset regional map shows the study area (black rectangle) and shipping lanes (in red) leading to the major ports of the Salish Sea. The 240° bearing (gray arrow) extends from the Lime Kiln hydrophone (gray circle) through the northbound shipping lane. Bathymetric contours (50 m) show that Haro Strait is a steep-sided 200–300 m-deep channel. Sound projection locations (black dots) are sites used for the transmission loss experiment.

We measured underwater noise radiated by these ships, collecting data continuously during 28 months between March 7, 2011, and October 10, 2013, except for occasional 1–2 day interruptions caused by power outages. About 3.5 months of data were excised due to systematic noise caused during equipment repairs made between July 22, 2011, and November 9, 2011. Consequently, we sampled every month of the year at least twice.

Study site

We deployed a calibrated hydrophone 50 m offshore of the lighthouse at Lime Kiln State Park in which The Whale Museum and Beam Reach maintain an acoustic observatory as part of the Salish Sea Hydrophone Network (orcasound.net). Midway along the west side of San Juan Island, Lime Kiln lighthouse sits on a point near the center of the

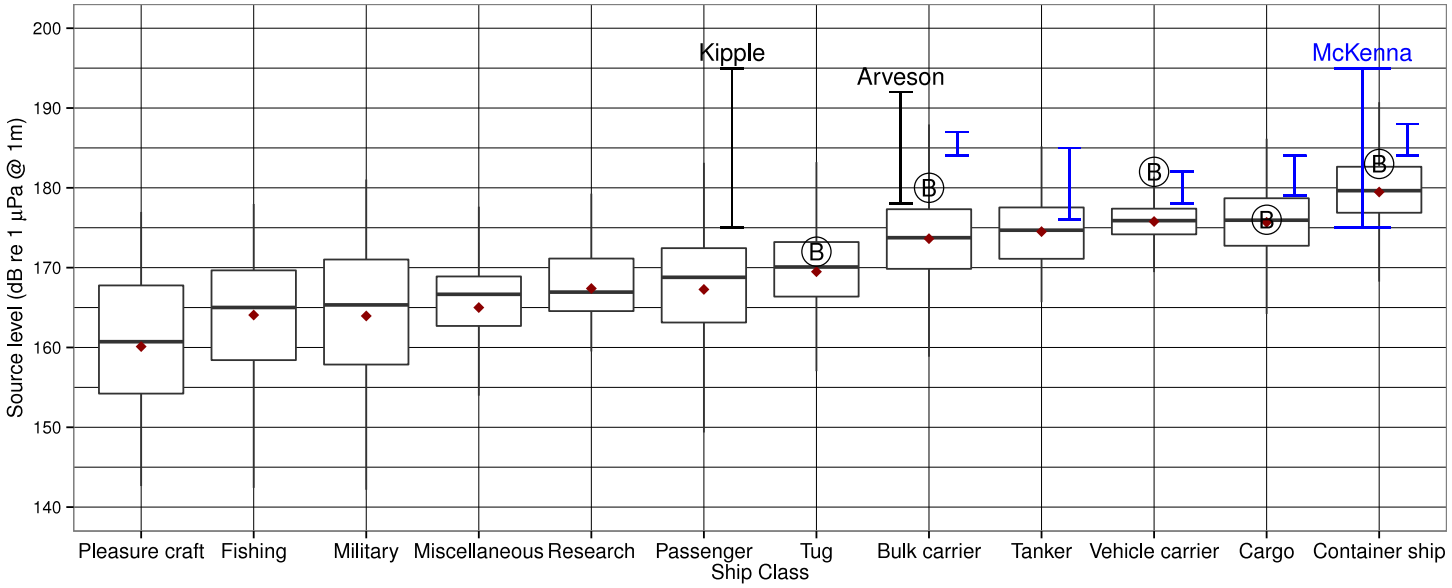


Figure 2 Comparison of source levels from different studies for various classes of ships. Broadband source level (*SL*) statistics for each ship class juxtaposed with results from recent studies of comparable classes. Bold horizontal lines are medians; gray box hinges are 25% and 75% quantiles; gray whiskers extend to the value that is most distant from the hinge but within 1.5 times the inter-quartile range (distance between the 25% and 75% quantiles); red dots are mean values from Table 2. Each encircled letter B represents a mean from *Bassett et al. (2012)*; blue vertical bars represent means from *McKenna et al. (2012)* with the container ship estimate of *McKenna, Wiggins & Hildebrand (2013)* labeled McKenna; black vertical bars represent estimates from *Kipple (2002)* and *Arveson & Vendittis (2000)*.

summertime habitat of the SRKWs (Fig. 1). While the killer whales sometimes swim directly over the hydrophone location, they more typically transit the site 100–300 m offshore where received levels of noise from the shipping lanes would be somewhat higher than those recorded in this study.

The hydrophone was secured to a PVC pipe projecting vertically from a cement-filled tire resulting in a position 1 m above the bottom at a depth of 8 m (below mean lower low water). A cable protected by irrigation pipe secured in the inter- and sub-tidal zones brought the signal to recording hardware within the lighthouse and also housed a saltwater ground wire that helped reduce system noise.

The local bathymetry on a transect perpendicular to the shoreline (240° bearing) and running from the hydrophone to the northbound shipping lane descends to deep (>200 m) water within 300 m of the shoreline. The nearshore region (<150 m from shore) has a substrate of boulders and gravel covered with marine vegetation and descends at a slope of about 20°. Further from shore the bottom descends at a slope of about 45°.

Relative to the northbound shipping lane the hydrophone position is 1.3 km from the eastern edge, 2.25 km from the center of the lane, and about 3.7 km from the center of the traffic separation zone. A histogram of the range to all ships in our database shows peaks at 2.3 and 5.0 km, corresponding with the middle of the north- and south-bound lanes, respectively.

Data acquisition

We made audio recordings of the signal from a Reson TC4032 hydrophone installed with a differential output (sensitivity of -164 ± 3 dB re 1 V/μPa from 5 to 125,000 Hz) that was amplified and then digitized by a MOTU Traveller sampling at 192,000 Hz with 16 bits per sample. The maximum signal that could be recorded without clipping was 140 dB.

A Windows XP computer analyzed and archived the recorded signal. We calibrated the recording system with the analog output of an Interoceans 902 (acoustic listening calibration system) while a ship was passing the lighthouse, thereby converting the samples to decibels (dB) referenced to 1 μPa (hereafter dB re 1 μPa). This procedure was carried out occasionally to check and make minor changes in the Reson calibration constant during the 28 month study period.

A Python program analyzed the digitized hydrophone signal. The program continuously computed running 2-second mean square voltage levels. Each hour the program archived the 2-second recordings that yielded the minimum and maximum averages. We used the minimum files to determine background noise levels.

Generally, all commercial ships over 300 tons are required to use the Automatic Identification System (AIS) to broadcast navigational data via VHF radio. The AIS carriage requirements of the US Coast Guard (33 CFR 164.46) and Canada within a vessel traffic service area like Haro Strait mean that some fishing and passenger vessels may be underrepresented in our data set. Each AIS-equipped ship transmits at least its identification number, location, course, and speed a few times each minute. The typical range over which these transmissions are detected is 45 km.

The Python program scanned the binary output of an AIS receiver (Comar Systems AIS-2-USB) located in the lighthouse. For each transmission received, the location of the ship was used to calculate its range (R) from the hydrophone. When R was less than 4 nautical miles (7.4 km), the program recorded the broadband received level every 0.5 nautical mile (926 m) as the ship approached and departed. When the ship crossed a line perpendicular to shore (at an azimuth angle of 240° true, see Fig. 1), the Python program stored a 30-second WAV file, the date and time, and the decoded ship metadata (ship ID number, range, speed over the ground (SOG), and course over the ground). Given the orientation of the northbound shipping lane, this procedure made it likely that we recorded the starboard beam aspect noise levels of each isolated ship near the closest point of approach. Finally, the program calculated the calibrated broadband received level using the Reson calibration constant and the RMS amplitude of the 30-second file.

To maximize the detection of any high-frequency signal generated by passing ships, and to reduce the spatial extent of our transmission loss experiment, we elected to compute source levels for only the closer, northbound portion of the traffic in Haro Strait. Southbound traffic was recorded, counted, and archived, but is not included in this analysis. For the northbound traffic presented herein, the mean and standard deviation of R is 2.30 ± 0.39 km, and the minimum and maximum R are 0.95 km and 3.65 km, respectively.

Data analysis

Isolation and identification

Archived WAV files and associated metadata were analyzed with a C++ program developed in the platform-independent Qt environment (qt-project.org). To measure the noise radiated by an individual ship, rather than multiple ships, the program used the AIS data to detect acoustically-isolated ships. A ship was deemed isolated if the previous and subsequent ships were at least 6 nautical miles (11.1 km) away from the hydrophone when the WAV file was recorded. It is only at closer range that human listeners can detect ship noise above ambient levels.

For each isolated ship, the program used the ship's identification (Maritime Mobile Service Identity, or MMSI) number to look up details about the ship from online web sites such as the Marine Traffic network (www.marinetraffic.com). These metadata, saved in a MySQL database, include (when available): MMSI, ship name, ship type, year built, length, breadth, dead weight, maximum and mean speed, flag, call sign, IMO, draft, maximum draft, and photographs.

We simplified 41 ship type categories returned from online queries into 12 general ship classes: bulk carrier (includes ore carriers); container; tug (includes multi-purpose offshore, pusher tug, and tender); cargo (includes other cargo, heavy lift, wood chip carrier); vehicle carrier (includes all roll-on roll-offs); tanker (includes crude oil, oil product, oil/chemical, chemical, and product tankers); military (includes Coast Guard, search and rescue); fishing (includes fish carrier, factory, fishing, fishing vessel, and trawler); passenger (includes cruise ships and ferries); miscellaneous (includes cable layer, reserved, unspecified, and well-stimulation); pleasure craft (includes sailing vessels, motor yacht, and yachts); and research.

Received levels

From each isolated ship's WAV file the RMS power spectral density (PSD) was calculated using a Fast Fourier Transform averaged over the 30-second duration of the file (Nyquist frequency of 96,000 Hz; 16,384 (2^{14}) sample overlapping Bartlett window). The bandwidth of each of the 8,192 frequency bins was 11.5 Hz. These RMS PSD (per Hz) values were calibrated by requiring that the integral of the PSD equal the calibrated broadband level associated with each WAV file. The resulting power spectral densities we call the total received spectrum levels.

The total received spectrum level is a composite of the power that originated from the ship and the power associated with the background noise at the time of the ship passage. To enable estimation of the background level at the time of ship passage we continuously observed 2-second sound samples, saving the lowest power 2-second sample every hour.

The subtraction of the estimated background received level (RL_B) from the total received spectrum level (RL_T) to determine the received spectrum level associated with the ship (RL_S) is based on the fact that when two or more waves pass at once, the pressure on the hydrophone (P) is the sum of the instantaneous pressure from each wave. The power that we calculate is proportional to the square of the pressure on the hydrophone

and is represented in decibels. These relationships apply both for the power at individual frequencies (PSD) and the total power (Pwr_T) integrated over all frequencies.

Following the nomenclature of *Erbe (2011)*,

$$Pwr_T(t) = k(P_S(t) + P_B(t))^2, \quad (1)$$

where k is a constant dependent on the construction of the hydrophone and t is time. Averaging over the 30 s of each WAV file, we assume that the pressure due to the ship at each moment in time is not correlated with the pressure due to other (background) noise sources. Thus, the power received from the ship is the average total power minus the average background power:

$$\langle Pwr_S \rangle = \langle Pwr_T \rangle - \langle Pwr_B \rangle . \quad (2)$$

We estimate Pwr_B for each passing ship as the average of the power in two samples—the quietest 2-second sample from the hour before the ship is recorded, and quietest from the hour after the ship passage.

On occasion during daylight hours, ship recordings contain noise from vessels unequipped with AIS (usually recreational motorboats and occasionally larger vessels operating without AIS). This contamination is limited to the 50, 75, and 95% quantiles above 20,000 Hz, has peak spectrum levels near 50,000 Hz—a frequency commonly used for depth sounders—and is rare, but we have nevertheless reduced it via a 2-step statistical process.

Since it is very rare to have motorboat noise overlapping with ship passage at night, we first determined the 95% quantile of each received spectrum level across all vessels recorded at night (hour of day greater than 19:00 or less than 07:00) and used it as a threshold above which contamination by boat noise may have occurred. Then we re-processed all ship transits, removing any data points for which the threshold was exceeded. Any recording in which at least 100 of the 8,192 spectral received levels were above threshold was omitted from further statistical analysis.

Through this robust statistics process, about 15% of transits were omitted, resulting in no difference between the ship population quantiles for ships that pass during the day versus the night. A sensitivity analysis shows that the process did not affect the 5%–75% quantiles and that the 95% quantile was reduced by less than 2 dB—and only above about 20,000 Hz. The high frequency peaks seen in the 95% quantile in Fig. 3 become sharper as the threshold is increased or the total number of vessels analyzed is decreased.

Finally, we report received levels (RL) in decibels relative to a reference pressure of 1 μPascal and estimate ship received levels as:

$$RL_S = 10\log_{10}\left(10^{RL_T/10} - 10^{RL_B/10}\right). \quad (3)$$

Often RL_T is much higher than RL_B at all frequencies. In such cases, subtraction of the background has little effect on RL_S. But for many ships RL_T is close to RL_B, at least at some frequencies. Therefore, we subtract the estimated background from the RL_T at all frequencies for every isolated ship, yielding the received spectrum level of ship noise, RL_S.

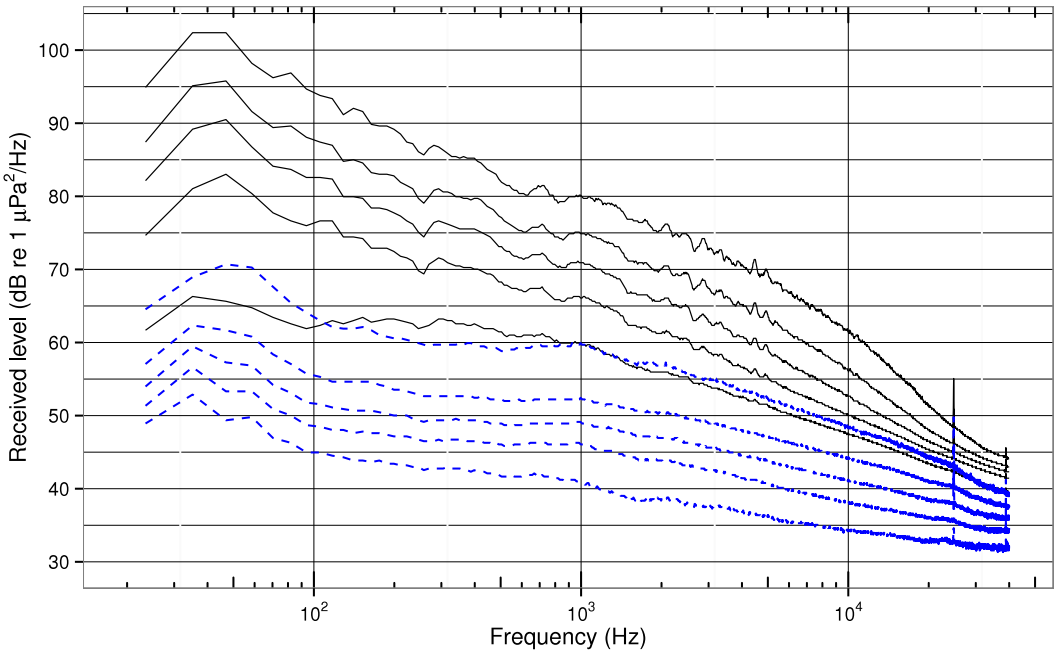


Figure 3 Quantiles of received spectra for background and ship noise. Quantiles (5, 25, 50, 75, & 95%) of background spectrum level (RL_B, dashed blue lines) and total received spectrum level for the entire ship population (RL_T, solid black lines).

We cannot determine RL_S if the associated RL_T is not greater than RL_B. Hence we require that RL_T at any given frequency must exceed a threshold of three times the background spectrum level at that frequency. We choose this factor (4.8 dB) by examining the statistics of typical ship and background recordings to assure that noise is unlikely to be taken as signal. We refrain from reporting ship source spectra above 40,000 Hz because the sample size in bands above this frequency falls below about 10% of the mean sample size in lower frequency bands. Furthermore, to calculate broadband source levels with or without absorption we integrate the spectrum levels only up to this 40,000 Hz upper limit.

Prior to the background subtraction, our data commonly contained narrow-band noise peaks near 25, 38, 43, 50 and 69 kHz in many of the background and total received spectrum level quantiles (Fig. 3). Unknown sources of transient systematic noise (most commonly near 77 kHz), typically lasted only a few days. Because these noise sources are narrow or brief, they contain little power. Also, since they occur in both the received level and background data, they tend to be removed through background subtraction, and therefore do not significantly contaminate the estimated source levels (Fig. 4). One exception is the peak near 25 kHz—likely associated with the Jim Creek Naval Radio Station (transmitting at 24.8 kHz)—which persists in many source level spectra, probably indicating that the submarine communications are intermittent, at times occurring during a ship passage but not during the corresponding background measurements.

Transmission loss experiment

To estimate the source spectrum level of isolated ships from RL_S we measured the transmission loss along the 240° true bearing line from the near-shore hydrophone at Lime

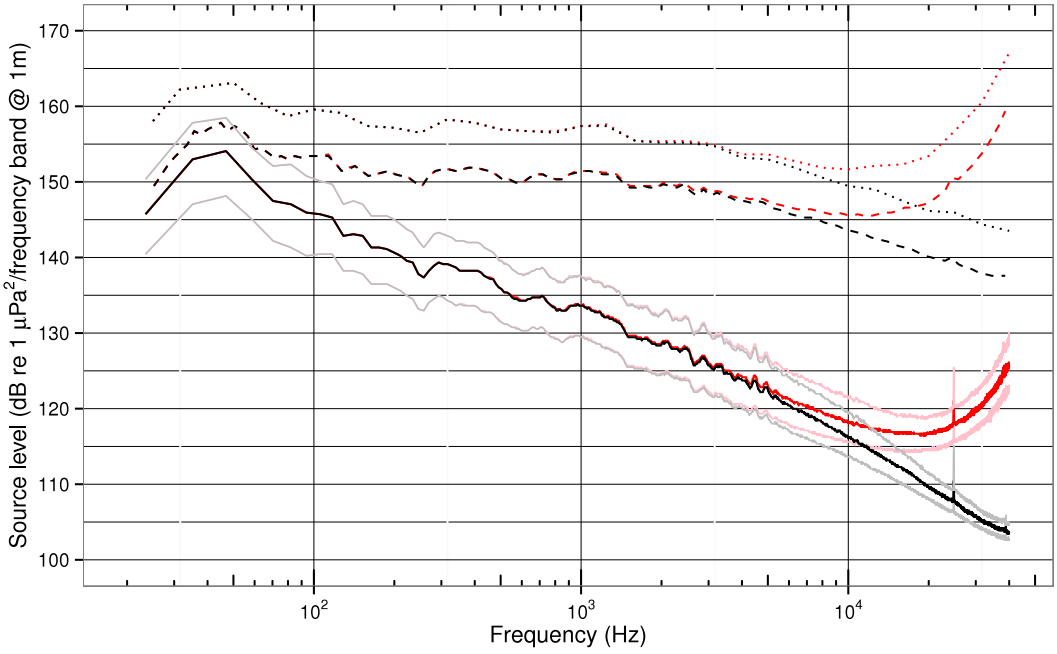


Figure 4 Ship noise source spectrum, 1/12-, and 1/3-octave levels. Source level (*SL*) spectra of the entire ship population in 1 Hz (solid), 1/12-octave (dashed), and 1/3-octave bands (dotted). Black curves are medians without absorption; red curves are medians with absorption. For the spectrum levels, we delineate 25 and 75% quantiles in lighter tones. Levels with absorption start to increase rapidly above 15,000–20,000 Hz for both the 1/12- and 1/3-octave bands.

Kiln into the northbound shipping lane (Fig. 1). The transmission loss is a combination of geometric spreading and frequency-dependent absorption. While Haro Strait has less distinct winter and summer sound speed profiles than other parts of the Salish Sea due to vertical mixing by tidal flow over bounding sills, to average out any seasonal effects we conducted our transmission loss experiment in the spring.

We determined the geometric spreading via a field experiment conducted in March, 2014, from a 10 m catamaran. We projected a sequence of 2-second tones (Table 1) using a Lubell 9816 underwater speaker lowered in a bifilar harness from the bows and attached to a power amplifier and a digital sound player. During each tone sequence, we noted the location of the projector on the sailboat's GPS and measured the projected sound level with the Interoceans 402 hydrophone, having positioned its calibrated hydrophone near the stern, about 10 m from the projector. We oriented the projection system toward the lighthouse as we played each sequence at the following distances from the projector to the Lime Kiln hydrophone: 290; 1,035; 1,446; and 2,893 m.

This study focuses on determining the source levels of ships that are northbound at Lime Kiln lighthouse. By limiting our analysis to northbound vessels we reduce the difficulty of determining accurate transmission loss by limiting the variation in range of the targets. Furthermore, our underwater speaker used to measure transmission loss did not have sufficient power especially at high frequencies (near 20,000 Hz) to provide detectable signals at ranges much larger than the 2,893 m range that brackets the more distant edge of the north bound traffic lane.

Table 1 Results of the transmission loss experiment. For each projected frequency, the geometric spreading rate (TL) is near-spherical, with an average slope of -18.6 ± 0.4 dB/decade.

Frequency (Hz)	TL (dB/decade)	Coefficient of determination
630	−18.85	0.926
1,260	−18.08	0.991
2,510	−18.99	0.986
5,000	−18.24	0.964
10,000	−18.37	0.974
15,000	−19.09	0.987
20,100	−18.67	0.971

We analyzed the spreading of the test tones by measuring the calibrated RMS level received at the Lime Kiln hydrophone for each tone at each distance. The received signal was determined by subtracting the calibrated background level from the received level of the corresponding tone (Eq. (3)). To determine the geometric spreading contribution to transmission loss, we added to the received signal levels the amount of absorption expected for each frequency and range (straight line path, R). Following *Francois & Garrison (1982)* we used R to calculate the absorption loss at each frequency. For our highest test tone frequencies and range, accounting for absorption added from 2 dB (at 10,000 Hz) to 8.6 dB (at 20,000 Hz) back into the received signal levels.

We used linear regression to model the absorption-corrected received signal levels as a function of the base 10 logarithm of the range from receiver to source in meters separately for each of our test tones. The slopes and goodness of fit are shown in Table 1. Since these slopes are not correlated with the frequency (correlation coefficient of 0.003), we average them and use the resulting near-spherical geometric spreading coefficient (transmission loss coefficient, TL) of -18.6 ± 0.4 dB/decade in $\log_{10}(R)$ to represent geometric spreading out to a distance of about 3 km. Also, as these slopes vary little over a factor of 30 in frequency, we assume that we can use this mean slope to extrapolate down from 630 Hz to our 20 Hz lower frequency cutoff and up from 20,000 Hz to our 96,000 Hz upper frequency Nyquist cutoff.

Source levels

We calculate source spectrum levels of ship noise without absorption (SL) in Eq. (4) and then with absorption (SL_a) in Eq. (5), determining α from *Francois & Garrison (1982)*.

$$SL = RL_S + 18.6\log_{10}(R) \tag{4}$$

$$SL_a = RL_S + 18.6\log_{10}(R) + \alpha(f)R. \tag{5}$$

We integrate the source spectrum levels from 11.5 Hz up to 40,000 Hz to compute broadband source levels (SL) (Table 2). We also integrate the source spectrum levels over both 1/3-octave and 1/12-octave bands with band centers determined by $f(i) = f_o 2^{\frac{i}{N}}$ where i is an integer and N is the number of partitions of each octave. This is

Table 2 Ship population statistics and mean broadband sound pressure levels (20–40,000 Hz). Though abbreviated in the table as dB, the units of the received signal levels (RL_S) are dB re 1 μPa and source levels have units of dB re 1 μPa @ 1 m. Variability is reported as a standard deviation of the mean, and speed over ground (SOG) is provided in m/s and knots.

Ship class	Isolated transits	% of total	Unique ships	RL_S dB	*SL* dB	*SOG* m/s	*SOG* knots
All classes combined	2,809		1,582	110 ± 7	173 ± 7	7.3 ± 2.0	14.1 ± 3.9
Bulk carrier	965	34.3	734	111 ± 6	173 ± 5	7.0 ± 0.8	13.7 ± 1.5
Container	529	18.8	207	116 ± 4	178 ± 4	9.9 ± 1.0	19.2 ± 1.9
Tug	337	12.0	85	108 ± 5	170 ± 5	4.2 ± 1.2	8.2 ± 2.3
Cargo	307	10.9	206	113 ± 5	175 ± 5	7.4 ± 1.2	14.4 ± 2.3
Vehicle carrier	187	6.6	111	113 ± 3	176 ± 3	8.7 ± 1.0	16.9 ± 1.8
Tanker	148	5.3	101	111 ± 5	174 ± 4	7.1 ± 0.7	13.8 ± 1.4
Military	113	4.0	19	99 ± 10	161 ± 10	5.7 ± 1.6	11.1 ± 3.1
Fishing	65	2.3	28	102 ± 9	164 ± 9	4.7 ± 1.1	9.1 ± 2.2
Passenger	49	1.7	31	104 ± 8	166 ± 8	7.4 ± 2.3	14.4 ± 4.5
Miscellaneous	41	1.4	21	101 ± 9	163 ± 9	5.8 ± 3.0	11.2 ± 5.8
Pleasure craft	41	1.5	35	97 ± 10	159 ± 9	6.4 ± 2.5	12.4 ± 4.9
Research	14	0.5	4	104 ± 6	167 ± 5	5.7 ± 0.9	11.1 ± 1.8

both consistent with ISO center frequencies (ISO 266) and allows comparison with the proposed annual mean noise thresholds at 63 and 125 Hz *Tasker et al. (2010)*; *Merchant et al. (2014)*. Finally, when plotting quantiles of levels we exclude the lowest frequency bin (11.5 Hz) because for some classes an insufficient number of ships passed the 4.8 dB re 1 μPa signal-noise threshold to estimate the 5% and 95% quantiles.

To facilitate comparison with past studies we generally present ship source spectrum levels as *SL*. However, due to the presence of high-frequency ship noise in our recordings and its potential impact on marine life exposed at close range, we also present absorption-corrected spectral power levels (SL_a) for the whole ship population.

RESULTS AND DISCUSSION

Ship traffic patterns

Combining all ship classes over the entire study, our data set describes 1,582 unique vessels that made a total of 2,809 isolated, northbound transits of the shipping lanes in Haro Strait (Table 2). The 2,809 isolated transits sample 17.1% of the total transits through Haro Strait (16,357, northbound and southbound) logged by our AIS system during the study period. Of 7,671 total northbound transits, 36% were sampled, suggesting that about 2/3 of the traffic in Haro Strait is not isolated. Dividing the total transits by the 850 day study period shows that the average daily ship traffic is 19.5 ships/day. This amount of traffic is comparable to previous estimates for Haro Strait: about 20 ships/day (*Veirs & Veirs, 2006*) and about 1 ship/hour (*Erbe, MacGillivray & Williams, 2012*).

About 1/3 of the isolated transits are bulk carriers and about 1/5 are container ships. The next 4 most prevalent ship classes—tugs, cargo ships, vehicle carriers, and tankers—constitute another 1/3 of the isolated transits. Of the remaining less-prevalent ship classes,

we sample military ships 113 times (19 unique vessels), and other ship classes 18–65 times.

Together, bulk carriers and container ships comprise more than half (53%) of the isolated shipping traffic in Haro Strait. About 3/4 of isolated bulk carrier transits are unique vessels, in contrast to container ships which are unique only about 40% of the time. This may indicate that the global bulk carrier fleet is larger than the container fleet, or that shipping economics or logistics limit the diversity of container ships transiting Haro Strait. For example, container ships may ply routes that are more fixed, and therefore repeat transits through Haro Strait more frequently than bulk carriers.

Those ship classes that have many isolated transits by a small number of unique ships offer us opportunities to study variability of noise from individual ships. Military vessels, a category with 19 unique ships sampled on 113 isolated transits, have about 7 isolated transits per unique ship, while tugs and research vessels have about 4 and container ships have about 3.

Broadband levels

Received levels

Broadband population mean received levels (RL_S, Table 2) vary between ship classes from a low of 97 dB (pleasure craft) to a high of 116 dB (container ships). Combining all classes, RL_S is 110 $\pm$ 7 dB which is 19 dB re 1 μPa above the mean background level (RL_B) of 91 $\pm$ 4 dB. These levels are comparable to anthropogenic and background received levels noted in previous studies at similar distances to shipping lanes and over similar frequency ranges (*Veirs & Veirs, 2006*; *McKenna et al., 2012*). While our RL_S from ships 0.95–3.65 km away is 10–22 dB lower than the 121–133 dB reported by *Bassett et al. (2012)*, only about 2 dB of this difference can be explained by the shorter distances to their ships (0.58–2.82 km).

Source levels (SL)

The mean broadband source level (SL, Table 2) for all ship classes combined is 173 $\pm$ 7 dB re 1 μPa @ 1 m. Comparing between ship classes, container ships have the highest SL at 178 dB. Other classes with $SL \geq 173$ dB include vehicle carriers, cargo ships, tankers, and bulk carriers. Tugs, research, and passenger vessels (primarily cruise ships, as there are no nearby ferry routes) have SL of 166–170 dB, while the remaining vessel classes have SL from 159–164 dB. This range of SL across classes (159–178 dB) overlaps the 170–180 dB range specified for small ships (lengths 55–85 m) by *Richardson et al. (1995)*. When frequency dependent absorption is included, mean broadband source levels increase by 0.5–1 dB (we have limited the upper frequency to 40,000 Hz).

Our range of mean values is similar to recent estimates of broadband source levels for similar-sized modern vessels, but for some classes other estimates are 1–11 dB higher than our estimates. Figure 2 depicts broadband SL statistics for each class we studied and juxtaposes the results from other studies of modern ships for comparable classes. Some of these studies are discussed below, partially to assess our results and partially to consider some of the common ways in which methods may differ between studies of ship noise: sample sizes, bandwidths, averaging times, calibration procedures, background

subtractions, absorption or other frequency-dependent corrections, geometric spreading rates, and ship characterization (e.g., classification, criteria for isolation, speed, and range).

Compared with mean broadband source levels (20–30,000 Hz, *TL* of −15, absorption assumed negligible) computed by *Bassett et al. (2012)* our means are 0–6 dB lower, depending on the class. The comparatively low values of our means cannot be explained by distinct methodology; their study used a narrower broadband bandwidth and a lower (modeled) transmission loss. The most likely explanation for the differences in most classes is a difference in distinct ship design and/or operating characteristics between Puget Sound and Haro Strait populations. There is some evidence that ships measured by *Bassett et al. (2012)* may have higher speeds than in our study. Of the 24 select ships for which *Bassett et al. (2012)* provide speed data, 38% have *SOG* greater than 1 standard deviation above our mean values for the corresponding class. The average elevation of *SOG* for those ships is +2.0 m/s (+3.8 knots).

Compared with broadband source levels (20–1,000 Hz, *TL* of −20) listed for 29 individual ships by *McKenna et al. (2012)* the mean values for equivalent classes in Table are 1–13 dB lower. These differences are also depicted in Fig. 2. Accounting for the difference in *TL* (1.4 dB/decade of range) between the studies would raise our *SL* values an average of 4.7 dB, thereby causing our inter-quartile range to overlap with or encompass the ranges of *McKenna et al. (2012)* for all comparable classes except bulk carriers. As with the *Bassett et al. (2012)* study, adjusting for differences in broadband bandwidth would raise their individual ship source levels even higher above our means, so cannot help explain the differences. Examining the *SOG* differences by class offers less of an explanation in this case; of the 29 ships, only 3 (about 10%) have speeds that exceed our mean *SOG* in the associated class, and only by an average of 1 m/s (2 knots).

A study of 593 container ship transits by *McKenna, Wiggins & Hildebrand (2013)* yielded a mean source level (20–1,000 Hz, *TL* of −20) for the population of 185 dB, 7 dB higher than our mean of 178 dB for 529 container ship transits. In Supplemental Information 1, *McKenna, Wiggins & Hildebrand (2013)* provide a mean speed of 10.5 ± 1.4 m/s—roughly 0.5 m/s above our container ship mean speed of 9.9 m/s—and an mean range of 3,246 ± 291 m (about 1 km larger than our mean range). The speed difference could only account for about 0.5 dB of the source level discrepancy between the studies, based on the +2.2 dB per m/s (+1.1 dB/knot) relationship between broadband source level and speed portrayed for a single ship in *McKenna, Wiggins & Hildebrand (2013)*.

Compared with broadband source levels (45–7,070 Hz) of individual vessels measured by *Malme, Miles & McElroy (1982)* and *Malme et al. (1989)* and tabulated by *Richardson et al. (1995)* our means for respective classes are 1 dB lower than a tug (171 dB at 5.0 m/s (9.7 knots)), 6 dB lower than a cargo ship (181 dB), and 12 dB lower than a large tanker (186 dB). These differences might be due to more modern ships decreasing their speed (at least while in coastal waters) or increasing their propulsion efficiency.

Kipple (2002) measured 6 cruise ships at a range of 500 yards and reported broadband source levels (10–40,000 Hz, *TL* of −20, absorption ignored) of 175–185 dB re 1 μPa 1 yard at 10 knots (5 m/s) and 178–195 dB re 1 μPa @ 1 yard at 14–19 knots (7–10 m/s). In comparison, our population of passenger ships (including cruise ships) has a mean *SL*

of 166 ± 8 dB re 1 μPa @ 1 m and a mean speed of 14.4 ± 4.5 knots. Thus, while the speeds tested by *Kipple (2002)* bracket our mean speed, our mean *SL* is 9–29 dB lower than their range of source levels. One possible explanation for this difference is an unspecified upward correction of received levels below 300 Hz that *Kipple (2002)* made to account for multipath propagation effects. This is substantiated by *Malme et al. (1989)*, who state that passenger vessels in Southeast Alaska have *SL* from 170 to180 dB, a range that falls between our mean and maximum *SL* for passenger vessels and mostly below the ranges given by *Kipple (2002)*.

Finally, *Arveson & Vendittis (2000)* measured a bulk carrier at 8–16 knots (4–8 m/s) and found broadband source levels (3–40,000 Hz, *TL* of −20) of 178–192 dB. The source levels they calculated for speeds of 12 knots (6 m/s) and 14 knots (7 m/s), 184 dB and 190 dB, respectively, are most comparable to our bulk carrier population with *SOG* of 7.0 ± 0.7 m/s. Without correction for the different transmission loss assumptions, our bulk carrier *SL* of 173 ± 5 dB is 11–17 dB below their levels.

While this pattern could be interpreted as an underestimation of *SL* by our methods, we believe our population statistics represent an accurate estimate of source levels for modern ships operating in coastal waterways. In almost all of the cases that we have discussed, the maximum discrepancy is less than 1.5 times the inter-quartile distance (25% vs 75% quantiles) for the comparable ship class (see Fig. 2). Exceptions are some of the louder container ships in *McKenna, Wiggins & Hildebrand (2013)* and vehicle carriers in *McKenna et al. (2012)*, the large tanker mentioned in *Richardson et al. (1995)*, the higher-speed cruise ships of *Kipple (2002)*, and the bulk carrier of *Arveson & Vendittis (2000)* when its speed was greater than 8 knots (4 m/s).

Even these exceptional upper values from the literature are almost completely contained within the distribution of our broadband *SL* population. Our maximum *SL* for a bulk carrier (191 dB) is 3.6 dB higher than the loudest bulk carrier tabulated in *McKenna et al. (2012)* and above the bulk carrier source levels obtained by *Arveson & Vendittis (2000)* at all speeds except 16 knots, or 8.2 m/s (192 dB). The loudest bulk carrier tabulated in *Bassett et al. (2012)* with source level of 182 dB is equal to the 95% quantile of *SL* within our bulk carrier class. The loudest ship tabulated by *Richardson et al. (1995)*, a tanker with *SL* of 186 dB, is only 0.8 dB above our loudest tanker. One explanation for this outlier is that the ship was a supertanker driven by a steam-turbine—and therefore may represent the "upper range of large merchant vessels" (*Malme et al., 1989*). Finally, our passenger vessel population has a 95% quantile of 177 dB and a maximum of 183 dB, a range that encompasses most of the slow ships and the lower portion of the faster ships assessed by *Kipple (2002)*.

Across all classes, the maximum broadband *SL* for an individual ship was 195 dB for a container ship, 7 dB above the highest overall values reported by *McKenna et al. (2012)* and *Bassett et al. (2012)*— both for container ships, as well. Our maximum is consistent with the study of 593 container ships by *McKenna, Wiggins & Hildebrand (2013)* in which the maximum source level was also 195 dB. Our second- and third-highest maxima within a class were from a bulk carrier (191 dB) and a cargo ship (186 dB). All other classes had

maximum $SL \leq 185$ dB m. The lowest maximum *SL* within a class was 176 dB for pleasure craft.

The range of minimum broadband *SL* across all classes in our study was from 130 dB for a cargo ship to 167 dB for a vehicle carrier. In comparison, *McKenna et al. (2012)* reported a minimum *SL* across all classes of 177 dB for a chemical tanker, while the minimum *SL* for a container ship in *McKenna, Wiggins & Hildebrand (2013)* was 176 dB. In contrast with the exact agreement of the maxima between our container ship population and the data set of *McKenna, Wiggins & Hildebrand (2013)*, this discrepancy of at least 9–10 dB in *SL* minima suggests that methodological differences between the studies may exert greater bias when ship signal levels are near background noise levels.

Ship speed

Averaged across all vessels, the *SOG* of isolated ships northbound in Haro Strait is 7.3 ± 2.0 m/s (14.4 ± 3.9 knots). This is higher than the mean of 10–12 knots (5.1–6.2 m/s) observed during WWII, but possibly lower than the post-war (mid-1970s) mean of about 15 knots (7.7 m/s) (*Ross, 1976*).

In our study, the fastest classes are container ships (mean *SOG* of 9.9 m/s) and vehicle carriers (8.7 m/s), while the slowest vessels are fishing boats (4.7 m/s) and tugs (4.2 m/s). For tankers, our *SOG* of 7.1 ± 0.7 m/s is slightly below the 7.2–8.2 m/s (14–16 knot) range reported by *Ross (1976)* for both "T2 tankers" in WWII and supertankers built after about 1960.

Overall, our data set samples a small range of ship speeds within any given class. Because Haro Strait is relatively long and straight, most vessels transit it without changing speed. Whether north- or south-bound, they have consistent *SOG* means and standard deviations. This low variability in speed limits our ability to search for relationships between noise and speed, but may help us discern in future work the influence of other variables—like propeller type, draft (loading), or maintenance levels—building on insights from *McKenna, Wiggins & Hildebrand (2013)*.

Relationship between speed and broadband source level

Upon linear regression of *SL* versus *SOG* for all data, we find a slope of +1.8 dB per m/s (+0.93 dB/knot). The coefficient of determination (R^2) for this fit explains only 27% of the variance in the data (assuming normal distribution). Furthermore, most of the variation in *SL* is likely driven by ship class (which was not controlled for in the regression), with little change in speed within ship class. Slopes vary from +0.2 to +3.4 dB per m/s between ship classes. Examination of repeated transits of individual ships shows that the variation in slope is high between individual ships within a class and the percent of variance explained is low. While slopes are positive for most individual ships, some are zero or negative. These variations indicate that the overall population slope should not necessarily be applied to all ship classes or individual ships, echoing the recommendations of *McKenna et al. (2012)*.

Received spectra

Most ships transiting Haro Strait raise background noise levels in the core summertime habitat of SRKWs at all measured frequencies (Fig. 3). Specifically, 95% of the ships

generate received spectrum levels at or above the 95% quantile of background levels from 20–96,000 Hz. Thus, at ranges of a couple kilometers, commercial ships cause significant underwater noise pollution not only at low frequencies, but also at high-frequencies.

The difference in median spectrum levels between ship and background noise levels is more than 30 dB below 100 Hz and gradually decreases to about 10 dB at 20,000 Hz. In the high frequency range of 20,000–96,000 Hz the median ship noise is elevated above median background spectrum levels by at least 5 dB. This significant elevation of background levels at high frequencies is what motivated us to account for absorption when computing ship source levels and is consistent with an observation by *Hildebrand et al. (2006)* of a single commercial ship in Haro Strait at a range of 442 m that elevated the ambient noise spectrum levels by as much as 30–40 dB across a broad band of the spectrum (60–75,000 Hz).

If we define the 5% quantile of background noise as an "ancient" ambient condition (*Clark et al., 2009*) then the typical (median) modern ship raises spectrum noise levels above ancient levels by 12–17 dB at frequencies used in killer whale echolocation (20,000–70,000 Hz) and by 17–35 dB at frequencies used in killer whale social vocalization (200–20,000 Hz). In the frequency range used by vocalizing baleen whales (20–200 Hz), the median ship spectrum noise levels are about 32–35 dB above the ancient ambient levels.

We gain additional confidence in the accuracy of our sound pressure levels (and implicitly our system calibration) by comparing the received spectrum levels in Fig. 3 with ambient noise spectra from other studies. Our background quantiles are bracketed by the average deep-water ambient noise levels associated with sea state 1–3, though the slope of our median curve from 1,000–10,000 Hz is −8 dB/decade, about half as steep as the open-ocean slope of −17 dB/decade *Urick (1983)*. The "usual lowest ocean noise" curve of Cato depicted in Plate 5 of *National Research Council et al., (2003)* is bounded by our 5 % and 25% quantiles from about 30 to 10,000 Hz. Two ambient noise spectra obtained in Haro Strait by *Hildebrand et al. (2006)* have levels that are bounded by our 5% and 95 % quantiles of background noise from 300 Hz to 30,000 Hz. The single ship spectrum (60 Hz–75,000 Hz) obtained opportunistically by *Hildebrand et al. (2006)* at a range of 442 m has levels that are greater than our 75% quantile of RL_B at all frequencies.

Similarly, our quantiles of total received spectrum level are consistent with previous studies. For example, the noise spectrum levels recorded in US bays and harbors during World War II by *Urick (1983)* are entirely bounded by our quantiles of RL_T from 100 Hz to 10,000 Hz. The peak levels (at about 50 Hz) of the shipping contribution to deep water ambient noise estimated by *Ross (1976)* for "remote, light, moderate, and heavy" traffic are approximately 71, 77, 85, and 95 dB, respectively; the upper three traffic levels are encompassed by our 5% and 95% quantiles, while the "remote" levels are no more than 2 dB below our 5% quantile. Finally, the quantiles of unweighted received spectrum levels in *Bassett et al. (2012)* peak near 50 Hz and have levels that are within about 5 dB of our levels for corresponding quantiles at all frequencies common to the two studies. Even at high-frequencies our data are consistent; *Knudsen, Alford & Emling (1948)* reported total received levels of 40–50 dB at 30,000 Hz in coastal waters, a range which brackets our quantiles at that frequency.

Source spectra

Median source spectra for the whole ship population are shown in Fig. 4 as spectrum, 1/12-octave, and 1/3-octave levels, with and without accounting for absorption. For the spectrum levels, we also present 25% and 75% quantiles.

Source spectrum levels without absorption

The median spectrum levels peak near 50 Hz at about 154 dB and decrease at higher frequencies with a slope of about −15 dB per decade (from 50–40,000 Hz). The 25% and 75% quantiles are 3–5 dB from the median below about 10,000 Hz, but at higher frequencies the difference decreases to about 1 dB re. In the region between 700 and 40,000 Hz the median spectrum has a subtle slope break near 5,000 Hz, with a slope of about −10 below and about −20 above.

Previous observations, models, and experimental results all help contextualize these whole-population spectrum levels. Unfortunately, many previous studies of ship noise are not comparable due to presenting species-specific band levels (e.g., *Hatch et al., 2012*) or band levels rather than spectrum levels, or other limitations: small sample size, non-overlapping frequency ranges, and ship classes with low diversity, distinct definitions, or incomparable ships (e.g., ice breakers in *Erbe & Farmer, 2000*).

One exception that allows comparison up to 1,200 Hz is the analysis of 54 ships at ranges of 360–1,800 m by *Wales & Heitmeyer (2002)*. Their measured average source spectrum levels are bounded by our 25% and 75% quantiles from 400 to 1,200 Hz. At lower frequencies (below 400 Hz) their mean levels exceed our 75% quantile by 2–20 dB (20 dB at 20 Hz; 5 dB at 50 Hz; and 2 dB at 100 Hz). Interestingly, their curve does not peak near 50 Hz, but instead continues rising as the frequency decreases to 30 Hz, the lowest frequency they measured. The slope of their mean curve is about −30 dB/decade below 100 Hz, and −20 dB/decade above. They note that the variance around their mean levels decreases with rising frequency from a standard deviation as high as 5.32 dB below 400 Hz to about 3.12 dB above it. This suggests that a partial explanation for the elevation of their mean values relative to our 75% quantile may be variability in low-frequency power between ships.

Models of ship noise that output spectrum levels provide another point of comparison. Our 50% and 75% quantiles are encompassed in the spectrum levels presented by *National Research Council et al., (2003)* for 3 classes of tankers, as well as merchant and fishing classes, based on the RANDI model (*Wagstaff, 1973*; *Breeding et al., 1994*) parameterized with data from *Emery, Bradley & Hall (2001)* and *Mazzuca (2001)*. The 25% quantile is also encompassed, except below 30 Hz. Below 300 Hz, our median values lie between the fishing and merchant class levels of *National Research Council et al., (2003)*; at higher frequencies—up to 1,000 Hz, the upper limit of their estimates—our median values are above their merchant class but below their intermediate tanker class (length 153–214 m, speed 7.7–9.3 m/s). Overall, this comparison suggests that our median source level spectra validate the RANDI model as parameterized in *National Research Council et al., (2003)* at intermediate frequencies (100–1,000 Hz), but below 100 Hz our median levels are lower

(by about 5–30 dB) than the RANDI model predicts for all classes except fishing vessels (length and speed bins of 15–46 m, 3.6–5.1 m/s).

Other noticeable differences between our population median spectrum levels and those modeled in *National Research Council et al., (2003)* are the frequency of the peak power, the general slope of the spectra above the peak, and secondary peaks resolved in our data. While our spectra peak near 50 Hz, the peak power in the spectra of *National Research Council et al., (2003)* occurs slightly lower, at 30 Hz. Between 100 and 1,000 Hz, the slope of our median spectrum is −12 dB per decade, nearly three times less steep than the slope of −35 dB per decade in *National Research Council et al., (2003)*. Our spectrum levels have detailed structure where the RANDI model curves of *National Research Council et al., (2003)* are smooth. Our quantiles show secondary power peaks between 80 and 1,100 Hz and many narrowband peaks in 1,100–10,000 Hz range, similar to the frequency dependence of spectral line complexity observed by *Wales & Heitmeyer (2002)*.

Experiments with cavitation provide a final comparison with our whole-population spectrum levels. Above 5,000 Hz the slope of our median spectrum matches the slope observed during cavitation of a spinning rod (*Mellen, 1954*) and a water jet (*Jorgensen, 1961*)——20 dB per decade, (or −6 dB per octave).

Source spectrum levels with absorption

The spectrum levels with absorption are indistinguishable from those without absorption below about 5,000 Hz. At higher frequencies, the SL_a median spectrum level curve diverges from the SL curve, and starts to rise rapidly at the 40,000 Hz cut-off of this study. The associated 25% and 75% quantiles are within 3–5 dB of the median values throughout the region of divergence.

These alternative source spectra look unfamiliar at high frequencies, and are not consistent with available data taken close (less than 500 m) to ships. For example, the single container ship measured at a range of 442 m by *Hildebrand et al. (2006)* in Haro Strait has a absorption-corrected source spectrum level of 108 dB re 1 μPa^2/Hz @1 m at 40,000 Hz—about 17 dB below our SL_a spectrum level at that frequency.

However, we believe the absorption-corrected spectra in Fig. 4 are rooted in accurate physics and we note that the spectrum levels of SL_a are in agreement with some measurements of underwater noise radiated during fully developed cavitation. For example *Lesunovskii & Khokha (1968)*, specify rotating bar noise spectrum levels of 95–115 dB at 10,000 Hz while our 25%–75% quantiles of SL_a spectrum level at that frequency are 114–120 dB. Similarly, *Blake, Wolpert & Geib (1977)* report noise levels from a cavitating hydrofoil of 75–110 dB re 1 μPa^2/Hz @ 1 yd at 31,500 Hz which is approaching our 25%–75% quantiles of SL_a at that frequency (120–125 dB re 1 μPa^2/Hz @ 1 m).

We expect that propeller cavitation noise intensity will be greater than laboratory measurements due to increased length scale and number of the blades on ships. Evidence from World War II studies of torpedo and submarine noise attributed to cavitation supports this expectation. Figures 10.21–10.23 of *Urick (1983)* show levels equivalent to or bracketing our SL_a spectrum levels: 24,000 Hz spectrum levels of 118 dB re 1 μPa^2/Hz @ 1 yd for a submarine cruising at 8 knots (4 m/s) near periscope depth; 25,000 Hz

spectrum levels of 100–130 dB re 1 μPa^2/Hz @ 1 yd for torpedos moving at 20–45 knots (10–23 m/s); and 20,000 Hz spectrum levels of 115–130 dB re 1 μPa^2/Hz @ 1 yd for a suite of torpedoes.

Source 1/12- and 1/3-octave levels

The median 1/12- and 1/3-octave level curves in Fig. 4 are elevated relative to the median spectrum levels and diverge from them above 50 Hz due to the integration of spectrum levels over bands that get progressively wider with increasing center frequency. Like the spectrum levels, these curves have a peak near 50 Hz. Peak values are 158 dB re 1 μPa^2 per band @ 1 m for the 1/12-octave levels and 163 dB for the 1/3-octave levels. Above 50 Hz, both curves have slopes of about −4 dB/decade from 100 to 5,000 Hz, −10 dB/decade from 5,000 to 40,000 Hz.

While we are unaware of a comparable aggregation of source spectra from multiple ship classes presented as 1/3-octave levels, there are many studies of individual ships or classes that present 1/3-octave source levels. We compare them here with the median 1/3-octave curve for our ship population because we present only spectrum levels when assessing inter- and intra-class differences in subsequent sections.

Our median 1/3-octave levels are entirely bounded by the estimated levels for 6 diverse ship types presented in Figure 3.14 of *Malme et al. (1989)* at all comparable frequencies (20–16,000 Hz). Similarly, our levels are within the estimated 1/3-octave source levels (10–10,000 Hz) summarized in Figure 6.5 of *Richardson et al. (1995)* for an ice breaker, a composite of supertankers, and a tug/barge at almost all frequencies. Only above about 2,000 Hz is our median curve slightly below comparable vessels described by *Richardson et al. (1995)*: ours is within 2 dB of their tug/barge levels, and no more than 10 dB below their supertanker levels. Overall, we find the consistency of our results with these two studies to be remarkable.

Comparing our median curve with the 7 ships (representing five of our classes) for which *McKenna et al. (2012)* presented 1/3-octave levels, our levels are 5–10 dB lower at all common frequencies (20–1,000 Hz). As discussed when presenting spectrum levels, we are not sure how to account for this difference, other than to recognize key differences between the studies: distinct transmission loss, our much larger sample size, and our higher diversity of classes.

Studies of ship noise in which speed was varied present a range of levels that is also consistent with our results. Compared with the maximum–minimum envelopes of 1/3-octave source levels (referenced to 1 yard) from 6 cruise ships presented by *Kipple (2002)* our 1/3-octave levels are within the envelope for both 10 knot (5 m/s) and 14–19 knot (7.2–9.8 m/s) samples, except below 25 Hz where our levels are lower by 1–7 dB. Our levels also fall within (but near the lower edge) of the range of 1/3-octave spectra reported by *Arveson & Vendittis (2000)* for a bulk carrier tested from 68 to 148 rpm.

Our 1/3-octave levels help validate the RANDI model used by *Erbe, MacGillivray & Williams (2012)* to compute 1/3-octave spectra for five ship length classes over a range of speeds observed in traffic off the coasts of British Columbia and Washington State. Overall, our median levels are entirely within the range of their estimated levels at all

modeled frequencies (10–2,000 Hz). More specifically, though, our median crosses their size-specific curves, because it has a less steep slope. Below 400 Hz our levels are bounded by their L1 and L3 classes (representing lengths less than 50 m); above 400 Hz our median levels are between their L4 and L5 classes (greater than 50 m).

An even more dramatic crossing of model curves by our median 1/3 octave source spectrum level curve is evident upon comparison with Figure 1 of *Williams et al. (2014)*. While our median source levels are equivalent to or bounded by the 1/3-octave levels for each of their modeled ship types (tug, cruise ship, container ship) near or below 250 Hz, at higher frequencies our levels exceed the modeled ones by 7–10 dB.

The crossing of such modeled spectra by our 1/3-octave median curve is one manifestation of a subtle slope difference between our results and previous studies (*Arveson & Vendittis, 2000*; *Kipple, 2002*; *Erbe, MacGillivray & Williams, 2012*; *Williams et al., 2014*). While *Arveson & Vendittis (2000)* observe slopes from above a 55 Hz cavitation "hump" up to about 30,000 Hz to be −10 dB/decade on a 1/3-octave plot, our slope over the same frequency range is shallower (−6.5 dB/decade) and we observe a slope break near 3,000 Hz. Below the break the slope is about −4.5 dB/decade, while above it is −10 dB/decade.

The similarity of our 1/3-octave levels with those from available studies at frequencies below 630 Hz (the lowest tone used in our transmission loss experiment) is the first evidence that our measurements of low-frequency radiated noise are accurate. The lower slope relative to other studies suggests that the ship population in this study is generating proportionally more high-frequency noise than ships in previous studies.

Source 1/12- and 1/3-octave levels with absorption

As with the spectrum levels, the 1/12- and 1/3-octave level curves with absorption are indistinguishable from those without absorption below 5,000 Hz. At higher frequencies, the SL_a median 1/12- and 1/3-octave levels rise to match the 50 Hz levels of the associated median *SL* curves near 35,000 Hz and then continue to increase at higher frequencies.

This means that when we account for absorption when computing 1/12- or 1/3-octave levels, modern ships radiate noise in high-frequency bands (centered near 35,000 Hz) at levels equivalent to the low-frequency maxima near 50 Hz. This surprising equivalency, and the theoretically even higher power levels in bands above 35,000 Hz, are important to consider when assessing the masking potential of ship noise in habitats close to or within shipping lanes for marine species that utilize high-frequency signals. Although it is novel to state that ship noise source levels have peak power at high- as well as low-frequencies, we provide these 1/12- and 1/3-octave noise levels to facilitate accurate modeling of acoustic impacts for species that have critical bands overlapping these octave bands (*Richardson et al., 1995*).

While the median 1/12-octave source levels reported by *Erbe & Farmer (2000)* for the cavitating propeller of an ice breaker are not comparable to any of our ship classes (and much higher—30 dB re 1 μPa^2 per band @ 1 m above our median level at their power peak near 500 Hz), we note that the slope of their median curve is −13 dB/decade from 1,000 to 10,000 Hz. Importantly, *Erbe & Farmer (2000)* is rare in stipulating that absorption

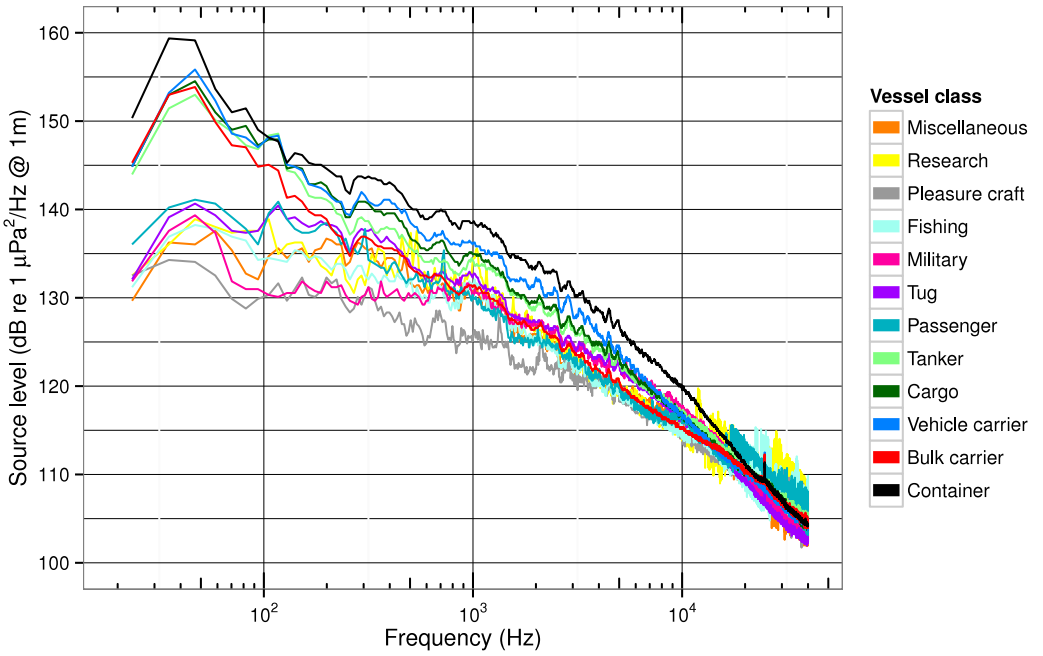


Figure 5 Median source spectra of ship noise for different classes of ships. Comparison of median source spectrum levels (without absorption) between ship classes.

was accounted for in computing source levels. Their slope is about twice as steep as our 1/12-octave median slope of −7 dB/decade in the same frequency range.

Finally, *Kipple (2002)* did not correct for absorption, but made measurements of cruise ship receive levels up to 40,000 Hz at short range (500 yards) and therefore provides a rare point of reference for our high-frequency SL_a levels. Their 1/3-octave band source levels at 40,000 Hz for a suite of cruise ships and speeds (10–19 knots; 5.1–9.7 m/s) vary from 133 to 154 dB re 1µPa @ 1 yard—values that approximately bracket our uncorrected *SL* levels but are 13–34 dB below our SL_a levels.

Spectral differences between ship classes

When the ship population is broken down by class (Fig. 5) the medians show a striking bifurcation. While all classes have similar median spectrum levels near 20,000 Hz, the curves diverge at lower frequencies, and below 200 Hz they bifurcate into high- and low-power groups. The high-power group has peak power of 153–159 dB near 50 Hz (just above the population median shown in Fig. 4) and consists of container ships, vehicle carriers, cargo ships, bulk carriers, and tankers. The low-power group has peak power of 134–141 dB near 50 Hz or just above 100 Hz—levels well below the population median or even 25% quantile—and consists of passenger vessels, tugs, military, research, fishing, miscellaneous, and pleasure vessels.

The 25%, median, and 75% spectrum levels at the power peak near 50 Hz in Fig. 4 bracket the 50 Hz levels of the high-power group of ships in Fig. 5. The median of the whole population is most similar to the spectra in the high-power group (e.g., the bulk carrier curve) because the aggregated sample size is much higher in the high-power group

than in the low-power one (see Table 2). Modelers interested in assessing impacts of specific ship classes, particularly those in the lower-power group, should not use the median or 25% quantile levels for the whole population, but instead select class-specific levels from the curves in Fig. 5.

Container ships have the highest median source spectrum level of all classes at almost all frequencies below 10,000 Hz with peak power of 159 dB near 40 Hz. This is likely because of their relatively large size and high mean speed (10 m/s) compared to pleasure craft or military ships—the classes with the lowest median power at all frequencies below 400 Hz.

Many of the ship classes show secondary peaks in the median spectrum levels from 100 to 5,000 Hz. For example, most classes show a 2 dB dip near 250 Hz and at least container ships, vehicle carriers, cargo ships, and tankers have peaks near 300, 700, and 1,000 Hz. There are also narrower peaks for these same classes between 1,000 and 10,000 Hz, most prominently at 2,000 Hz and near 3,000 Hz.

The variability of the median source level in each class decreases above 5,000 Hz and remains low until about 10,000 Hz. At higher frequencies (10,000–40,000 Hz) the variability increases again for most ship classes, but the degree of increase is a strong function of sample size within a class. While we know from examining spectrograms from individual ships that some of the narrow peaks are associated with active acoustic sources (depth sounders, scientific echosounders, and fish finders), in Fig. 5 the high variance above 10,000 Hz is due primarily to some ships having spectrum levels that do not meet the robust threshold at higher frequencies. Particularly in classes where the sample size is already small this leads to some high frequency bins having many fewer data points than adjacent bins which in turn results in more-variable median values across this high-frequency range.

The quantiles of source spectrum level by class in Fig. 6 provide further detail about inter-class differences. Comparing the 95% quantiles, container ships still have the highest peak power (165 dB) near 50 Hz, but bulk and vehicle carriers, cargo ships and tankers also have peak power greater than 160 dB. Other classes have peak power in the 95% quantiles near 50 Hz at spectrum levels that range from 156 dB (research) to 150 dB (tugs). Comparing the 5% quantiles, we expected that the military class would have the lowest levels due to more advanced ship-quieting technologies. While the military class levels are much lower than container ships (10 dB less at 1,000 Hz and 20 dB less at 100 Hz), other classes have even lower levels at those frequencies, particularly fishing vessels and pleasure craft.

Spectral variability within ship classes

All classes of ships have spectrum levels that vary more at low frequencies than at high frequencies (Fig. 6). Near 50 Hz there is a 15–35 dB difference between the 5% and 95% quantile levels. That difference decreases with rising frequency until above 20,000 Hz it is typically less than 10 dB.

Below 20,000 Hz, source level variability in Fig. 6 tends to be lower for the classes that have smaller speed over ground standard deviations and that have larger sample size as shown in Table 2. While container and cargo ships, bulk and vehicle carriers, and tankers have 95–5% spectrum level differences of about 15 dB, the other classes exhibit larger

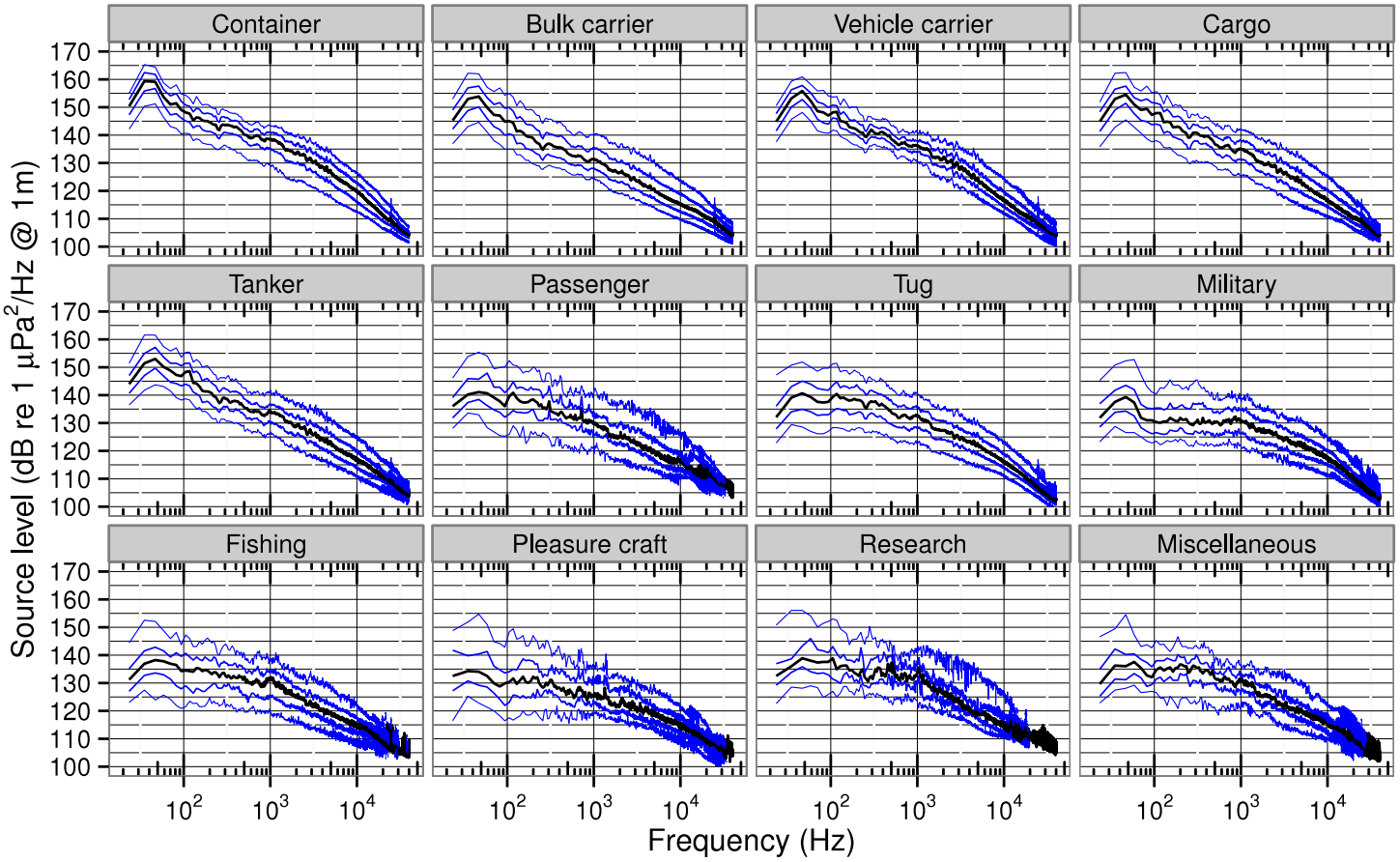


Figure 6 Quantiles of ship source spectra for different classes of ships. Quantiles of source spectrum levels for each class of ship. Median (50%) quantile (black) overlies 5, 25, 75, and 95% quantiles (blue).

differences up to 25–30 dB. The classes with the largest number of vessels are most uniform in their speed over ground and most consistent in their vessel design and operation. Tugs are a special case because there are many transits and their speed is not unusually variable, but their loading is. Our passenger vessels are all cruise ships and hence similar in design, but their speeds are quite variable as they adjust their arrival times in the Port of Vancouver. Finally, the small numbers of pleasure craft and vessels classed as miscellaneous are highly variable in both their designs and their operations.

Other studies have observed a similar pattern of source level variability with frequency. In mean source spectrum levels from 54 ships *Wales & Heitmeyer (2002)* noted higher, more-variable standard deviations from 30 to 400 Hz and lower, more-constant ones from 400 to 1,200 Hz. Figure 8 of *McKenna, Wiggins & Hildebrand (2013)* displays histograms of octave-band power for 593 container ships which have widths that decrease from about 35 dB in the 16 Hz band to 26 dB in the 500 Hz band.

One explanation for this pattern is that the low-frequency portion of ship noise spectra is influenced by diverse design and operational details (many sources of variability), while cavitation generates high-frequency broadband noise (including up to 100,000 Hz) no

matter its source. As mentioned in the introduction, there are many sources of ship noise below 1,000 Hz that should be expected to vary between individual ships in a particular class. Conversely, a wide range of vessels have been documented to radiate elevated high-frequency noise upon increased engine RPM or *SOG*—conditions reasonably associated with increased cavitation (*Erbe & Farmer, 2000*; *Kipple, 2002*; *Hildebrand et al., 2006*).

The literature offers a handful of spectra for particular classes that can be compared with the quantiles of Fig. 6. These spectra typically come from individual ships, though, so can only serve to verify the range of our quantiles, rather than assessing the accuracy of the quantiles themselves.

The spectrum levels provided by *McKenna et al. (2012)* for individual ships in comparable classes (a container ship, a vehicle carrier, two bulk carriers, and a few tankers) all fall within a few dB of our 95% quantile. Only their bulk carrier deviates from this pattern with levels near 100 Hz higher by about 10 dB. Overall, the broadband and spectrum levels of ships associated with the port of Los Angeles (*McKenna et al., 2012*) are most comparable to the noisiest 5% of ships transiting Haro Strait.

Similarly, the source spectrum levels for a single container ship measured in the middle of Haro Strait by *Hildebrand et al. (2006)* also fall within the 5% and 95% quantiles of our cargo class (from 90 Hz to 40,000 Hz). The alignment of such individual ship spectra within the quantiles of their associated class at all common frequencies—and most importantly at frequencies below that of our lowest transmission loss test tone—helps verify our extrapolation of the near-spherical spreading we observed from 630 to 20,100 Hz to all frequencies reported in our study.

We take this spectral consistency across multiple classes as evidence that the ship noise received at our nearshore hydrophone has not undergone shallow water attenuation. While normal mode theory (*Urick, 1983*) would predict a cutoff frequency of about 50 Hz if our hydrophone were in a shallow channel 8 m deep, that is not the bathymetric situation at our study site. Instead, Haro Strait is a 250–300 m deep channel with a steep western wall of sparsely sedimented solid rock (*Jones & Wolfson, 2006*) and our hydrophone is positioned near the top of the wall where the offshore bottom slope is 20–30°. In this situation, *Jones & Wolfson (2006)* expect not only destructive interference at ranges much greater than the source depth, but also upslope enhancement. In our transmission loss experiment, we did not observe any frequency dependent attenuation consistent with these phenomena. Furthermore, the theoretical cutoff frequency for a 250 m deep channel is 1.5 Hz (*Urick, 1983*), well below our lowest measured frequency band. We therefore argue that any effects of interference or backscatter are averaged out in our study, primarily because each isolated ship ensonifies the full width of this reverberating channel and moves 150–300 m during a 30-second recording (1–2 times the 130 m wavelength or our lowest measured frequency, 11.5 Hz).

CONCLUSIONS

Having ensured our samples were isolated (uncontaminated by noise from other ships or boats) and subtracted estimated background levels, we are confident that median

received levels of ship noise in the core of SRKW critical habitat are elevated above median background levels not only at low frequencies (20–30 dB from 100 to 1,000 Hz), but also at high frequencies (5–13 dB from 10,000 to 40,000 Hz). Thus, underwater noise radiated by modern ships extends to high frequencies just as boat noise does (*Erbe, 2002*; *Kipple & Gabriele, 2004*; *Hildebrand et al., 2006*). Earlier studies have also observed this aspect of ship noise, but with smaller sample size, over different frequency ranges and less diverse ship classes (*Kipple & Gabriele, 2004*; *Hildebrand et al., 2006*; *Bassett et al., 2012*), and/or in received rather than source levels (*Hermannsen et al., 2014*).

Such ship noise has the potential to mask odontocete signals, especially in coastal environments where shipping lanes are close enough to the shoreline (<10 km) that high frequency sound is not fully absorbed. In the summertime habitat of the endangered SRKWs ship noise may interfere not only with SRKW communication (vocalizations) but also foraging and navigation (echolocation clicks).

Average broadband received levels (11.5–40,000 Hz) for the entire ship population are 110 ± 7 dB and ranged from 97 ± 10 dB for pleasure craft to 116 ± 4 dB for container ships. The range of *RL* for container ships (112–120 dB) show that levels received by SRKWs along the coastline at Lime Kiln from some container ships occasionally meet or exceed the 120 dB broadband threshold currently used by NOAA to define level B harassment from non-impulsive noise in the US

Ships northbound in Haro Strait exhibit moderate speeds with low variability (*SOG* of 7.3 ± 2.0 m/s or 14.1 ± 3.9 knots). Nevertheless, there is enough variation in speed across the whole population to reveal a linear relationship between received level and speed with a slope of +1.8 dB per m/s. This suggests a potential mitigation strategy for the average ship—slowing down—that has been recommended previously as an operational ship quieting option (*Southall & Scholik-Schlomer, 2008*). This strategy has other environmental benefits, like reducing collision risks, and is consistent with recent industry efforts to increase fuel efficiency (e.g., the "slow steaming" initiative of Maersk). For a passenger ship measured at speeds of 9–18 knots (4.6–9.3 m/s) during WWII *Ross (1976)* shows in Figure 8.19 that reducing speed lowers source spectrum levels by at about 1.5 dB/knot (2.9 dB per m/s) at all frequencies, but most notably lowers them by about 3.0 dB/knot (5.8 dB per m/s)—both at high frequencies (above 10,000 Hz) and at low frequencies (less than 100 Hz).

Average broadband source levels were 173 ± 7 dB for the population. Comparing broadband source levels between ship classes, container ships have the highest mean *SL* of 178 ± 4 dB. Therefore, assuming near-spherical transmission loss, marine life within a couple kilometers of shipping lanes will commonly receive noise levels above NOAA's 120 dB threshold. At ranges less than about a kilometer, receive levels from many ships in Haro Strait will exceed the 130–150 dB modeled ship noise (10–50,000 Hz) dose associated with minor changes in northern resident killer whale behavior (*Williams et al., 2014*).

At distances of less than about a kilometer, it is likely that received 1/12- or 1/3-octave band levels at high frequencies are equal or greater than they are at low frequencies. Further research should measure ship spectrum levels at ranges of a few hundred meters in order

to more fully quantify the high frequency (40,000–100,000 Hz) components of ship sound signatures.

Models of noise impacts in habitat containing shipping lanes will be more accurate if parameterized with spectral data, as opposed to broadband levels. Since we observe spectral variability between and within the 12 classes of vessels in this study, most prominently the bifurcation at low frequencies between classes, such models should use the class-specific spectrum level quantiles if possible, rather than the whole-population spectrum and band level medians we have presented.

Our broadband, spectrum, 1/12-octave, and 1/3-octave source levels for the whole population have median values that are comparable to the literature, with a few exceptions that we believe are due primarily to methodological differences. Some past analyses may not have made all recommended corrections (*TC43 Acoustics, 2012*); most commonly, methods sections are ambiguous about the definition and subtraction of background noise levels from total received levels prior to source level computations. It is also possible that these exceptions are due to sampling ship populations that are distinct (being composed of different individual ships/classes and/or operating differently). Even though our sample size is larger than most previous studies, we estimate that we sampled only about 1.6% of the 86,942 ships in the 2012/2013 global fleet (*UNCTD, 2013*). In any case, since our source level quantiles have slightly lower levels than some studies, particularly at low frequencies, they can be taken as a conservative characterization of the current fleet when developing ship noise models or policies.

One subtle pattern we note is that compared to some previous measurements and models, our median source spectrum levels are relatively low below 200 Hz and relatively high above 20,000 Hz. One implication of this is that noise models using previous measurements may overestimate the low-frequency noise levels of some ship types and underestimate high-frequency noise levels. Such flattening of the spectral slope in more modern ships is described in Figure 8.20 of *Ross (1976)* which shows source spectrum levels (below 100 Hz and from 1,000 to 20,000 Hz) elevated 1–3 dB in large populations of post-War versus WWII-era vessels. Some studies show a flattening of spectra above 100–1,000 Hz as ship and engine speed increases (*Ross, 1976*; *Arveson & Vendittis, 2000*; *Kipple, 2002*). We speculate that this historical trend may be continuing and recommend further investigation of the evolution of both ship speed (*Leaper, Renilson & Ryan, 2014*) and the mitigation of low-frequency internal noise on ships for human health reasons.

We recommend that future ship noise studies statistically characterize populations of ships—both their broadband and spectrum source levels. Having struggled to discern which studies in the literature are comparable to our results, we also suggest that future method sections be explicit about ship classification, calibration procedures, background subtraction and/or criteria for isolation from other sources, models and/or measurements of transmission loss, band width(s) and centers, absorption, and any other corrections. Metadata should include statistical representations of ship speeds and measurement ranges. Many studies are ambiguous about some of these details which complicates replication, comparison of results, and formation of hypotheses about observed differences.

Future work should also assess covariates other than speed, such as size, as well as azimuthal and temporal variability in source spectrum levels. We know from years of listening to live audio streams of Salish Sea ship noise (free via orcasound.net) that there is great temporal variability in the noise radiated by many ships. A small percentage of ships emit periodic strong mid-frequency tones that are likely caused by singing propellers (*Ross, 1976*). Our next step is to explore such temporal variations in amplitude and frequency, identify statistical outliers that may represent extreme masking cases, and further investigate possible governing variables, including speed, class, azimuth, and loading.

The variability we observe within ship classes indicates opportunities for reducing noise in ships, particularly those associated with the upper quantiles in each class. While the details of the spectral and temporal variability of noise from an individual ship may be important to a receiving species, metrics for measuring and regulating underwater noise will practically involve some temporal averaging, and possibly integration over bands wider than 1 Hz. We suggest a reasonable time scale for averaging ship noise is seconds or minutes, rather than a year as stipulated in the European Union's Marine Strategy Framework Directive 2008/56/EC (*Tasker et al., 2010*). Additionally, based on the received signal above background noise that we observe at high frequencies, we recommend that future guidelines for monitoring ship noise raise the upper frequency limit of recording systems from 20,000 Hz (*Dekeling et al., 2014*) to at least 50,000 Hz. As Registered Ship Classification Societies continue to issue underwater radiated noise notations, we hope that these data can be used to assess their validity.

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Competing Interests

The authors declare there are no competing interests.

Author Contributions

- Scott Veirs and Val Veirs conceived and designed the experiments, performed the experiments, analyzed the data, contributed reagents/materials/analysis tools, wrote the paper, prepared figures and/or tables, and reviewed drafts of the paper.
- Jason D. Wood conceived and designed the experiments, performed the experiments, analyzed the data, contributed reagents/materials/analysis tools, wrote the paper, and reviewed drafts of the paper.

Data Availability

The following information was supplied regarding data availability:
http://www.beamreach.org/data/staff-research/ship-noise/.

Supplemental Information

Supplemental information for this article can be found online at http://dx.doi.org/10.7717/peerj.1657#supplemental-information.

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Exhibit 15

regulatory taking has occurred because applying the OTARD rules in this situation will promote the important government interests of increasing competition and encouraging the deployment of advanced communication technology; economic harm need not be considered because no one has the right to operate part 15 devices such as Wi-Fi free of interference; and no one has a reasonable expectation to generate revenue from the use of unlicensed spectrum.

Ordering Clauses

13. Pursuant to section 1.4000(d) of the Over-the-Air Reception Devices Rule, 47 CFR 1.4000(d), and section 1.2 of the Commission's rules, 47 CFR 1.2, that the Petition for Declaratory Ruling filed by Continental Airlines, Inc. on July 8, 2005 is granted.

14. This Memorandum Opinion and Order does not change any rules, it grants a Petition for Declaratory Ruling, no Congressional Review requirements are necessary.

Federal Communications Commission.

Marlene H. Dortch,

Secretary.

[FR Doc. E6–20142 Filed 11–28–06; 8:45 am]

BILLING CODE 6712–01–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 226

[Docket No. 060228057–6283–02; I.D. 022206D]

RIN 0648–AU38

Endangered and Threatened Species; Designation of Critical Habitat for Southern Resident Killer Whale

AGENCY: National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Commerce.

ACTION: Final rule.

SUMMARY: We, the National Marine Fisheries Service (NMFS), issue a final rule designating critical habitat for the Southern Resident killer whale (Orcinus orca) distinct population segment (DPS). Three specific areas are designated, (1) the Summer Core Area in Haro Strait and waters around the San Juan Islands; (2) Puget Sound; and (3) the Strait of Juan de Fuca, which comprise approximately 2,560 square miles (6,630 sq km) of marine habitat. We considered the economic impacts and impacts to national security, and concluded the benefits of exclusion of 18 military sites, comprising approximately 112 square miles (291 sq km), outweighed the benefits of inclusion because of national security impacts.

We solicited comments from the public on all aspects of the proposed rule. An economic analysis, biological report, and Endangered Species Act (ESA) report were available for comment along with the proposed rule. The supporting documents have been finalized in support of the final critical habitat designation.

DATES: This rule becomes effective December 29, 2006.

ADDRESSES: The final rule, maps, and supporting documents used in preparation of this final rule, as well as comments and information received, are available on the NMFS Northwest Region website at *http://www.nwr.noaa.gov/.*

FOR FURTHER INFORMATION CONTACT: Lynne Barre at (206) 526–4745, or Marta Nammack at (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Background

Under the ESA, we are responsible for determining whether certain species, subspecies, or distinct population segments (DPS) are threatened or endangered, and designating critical habitat for them (16 U.S.C. 1533). In November 2005, we listed the Southern Resident killer whale DPS as endangered under the ESA (70 FR 69903; November 18, 2005). At the time of listing, we also announced our intention to propose critical habitat for the Southern Resident killer whale. Critical habitat for Southern Residents was proposed on June 15, 2006 (71 FR 34571).

Killer Whale Natural History

Three distinct forms of killer whales, termed residents, transients, and offshores, are recognized in the northeastern Pacific Ocean. Resident killer whales in U.S. waters are distributed from Alaska to California, with four distinct communities recognized: Southern, Northern, Southern Alaska, and Western Alaska (Krahn *et al.*, 2002; 2004). Resident killer whales are fish eaters and live in stable matrilineal pods. The Southern Resident DPS consists of three pods, identified as J, K, and L pods, that reside for part of the year in the inland waterways of Washington State and British Columbia (Strait of Georgia, Strait of Juan de Fuca, and Puget Sound), principally during the late spring, summer, and fall (Ford *et al.*, 2000; Krahn *et al.*, 2002). Pods visit coastal sites off Washington and Vancouver Island (Ford *et al.*, 2000), but travel as far south as central California and as far north as the Queen Charlotte Islands. Offshore movements and distribution are largely unknown for the Southern Resident DPS.

Detailed information on the natural history of Southern Residents is included in the Proposed Conservation Plan for Southern Resident Killer Whales (Orcinus orca) available at *http://www.nwr.noaa.gov/* and was summarized in the biological report and the proposed rule to designate critical habitat (71 FR 34571; June 15, 2006).

Summary of Comments and Responses

We requested comments on the proposed rule to designate critical habitat for Southern Resident killer whales (71 FR 34571; June 15, 2006). To facilitate public participation, the proposed rule was made available on our regional web page and comments were accepted via standard mail, e-mail, and through the Federal eRulemaking portal. In addition to the proposed rule, several draft documents supporting the proposal, including a biological report, an economic report, and a report supporting NMFS' conclusions under Section 4(b)(2) of the ESA, were posted. We obtained independent peer review of the draft biological report (NMFS, 2006a) and draft Economic Analysis (NMFS, 2006b) and incorporated the peer review comments into the documents prior to dissemination in support of the proposed rule. Two public hearings were held on July 12, 2006, in Seattle and July 13, 2006, in Friday Harbor, WA, and the public comment period closed on August 14, 2006.

We have considered all public comments, and they are addressed in the following summary. We have assigned comments to major issue categories and, where appropriate, have combined similar comments.

Physical or Biological Features Essential for Conservation (Primary Constituent Elements)

Comment 1: In our proposed listing determination for killer whales, we identified potential Primary Constituent Elements (PCEs) of critical habitat, including "Sound levels that do not exceed thresholds that inhibit communication or foraging activities or result in temporary or permanent hearing loss." Many commenters expressed concern that the proposed critical habitat designation did not include sound as a PCE. These commenters pointed out that killer

whales rely on sound to navigate, forage, mate, avoid predators, and communicate with one another. One commenter noted research findings that vessel effects and acoustic disturbance are stressors on killer whales. Another commenter pointed to study findings that suggest killer whales abandon certain habitats when confronted with introduced noise. These commenters argued that NMFS should consider sound an element of the physical environment of water, just as NMFS considers water quality, prey, and passage habitat conditions. Commenters pointed out that underwater, sound travels farther than above water, and, therefore, should be considered differently. Others pointed out that sound is a commonly accepted pollutant, and should be treated as such in the critical habitat designation. They also pointed to the inclusion of sound as a concern in NMFS' proposed Conservation Plan for Southern Residents and the 2004 Status Review. The commenters were particularly concerned with the impact of military sonar in Puget Sound on Southern Residents. Several commenters also mentioned the 2003 USS Shoup incident that reportedly affected Southern Resident behavior in the Sound as evidence of the harmful impacts of military sonar in the Sound. Other commenters focused on ambient noise and the noise from specific projects underway in the Sound as concerns for Southern Residents. They felt that excluding sound as a PCE would allow these activities to continue unmonitored for sound levels. One commenter argued that NMFS should extend critical habitat to the shoreline to prevent the impacts of noise related to nearshore activities on killer whales. These commenters requested NMFS reconsider sound as a PCE due to its importance to the species and create sound thresholds to enable enforcement of potential regulations.

Response: We acknowledge the many observations about the potential for sound to startle or even physically injure killer whales. These effects, however, are direct effects to the animal itself and not to its habitat. The agency has already conducted several ESA section 7 consultations on construction activities, and measures were included in the action to avoid direct impacts to the whales. Regarding the comment in support of enforceable regulations to protect killer whales from sound, we have sound thresholds that we consider to be harassment under the Marine Mammal Protection Act (MMPA). We also recently announced our intention to consider new criteria to determine what constitutes "take" under the MMPA and ESA, through preparation of an environmental impact statement (70 FR 1871; January 11, 2005). As that process unfolds, we may consider additional regulations to protect Southern Residents from harmful sounds.

Continuous sounds may interfere with the whales' echolocation and communication. At this time, however, we lack sufficient information to include sound as a PCE of killer whale critical habitat. We will continue to consider sound in any future revisions of the critical habitat designation.

Geographical Area Occupied by the Species

Comment 2: We received many comments regarding the proposal to designate critical habitat in waters deeper than 20 feet (6.1 m) based on extreme high water. The majority of commenters felt that we should include waters shallower than 20 feet (6.1 m) because killer whale prey, particularly salmon, occupy these waters, and these areas are essential to the conservation of the Southern Residents. The importance of these habitats for salmon and forage fish was the predominant argument for including shallow waters as critical habitat for Southern Residents. Several commenters argued against our assessment that the Southern Residents' size prevents them from occupying shallow waters, pointing to the activities of other killer whales that use shallow waters for rubbing on rock bottoms and for foraging on marine mammals as evidence of killer whales' ability to occupy shallow waters. In contrast, there were commenters who supported our determination that there is very little evidence to indicate that the whales occupy shallow waters.

Commenters also cited the lack of a barrier between shallow and deep waters and mentioned that human activities occurring in shallow waters inevitably affect Southern Residents in deeper waters. Of particular concern was the fact that much of the pollution in the Sound enters through shallow waters and that excluding these waters from designation would limit our ability to address polluting activities. Commenters believed that including shallow waters in the critical habitat designation would increase the clean-up priority of contaminated sediments and limit industrialization. Some commenters listed specific projects in shallow waters that pose pollution and noise threats to Southern Residents. These commenters felt that including shallow waters would allow closer regulation of these projects to prevent harmful impacts on the deeper water habitat of Southern Residents. One commenter believed that including shallow water in critical habitat is necessary to ensure water quality and prey sustainability, two of the PCEs identified by NMFS.

In addition, several commenters asserted that it would be difficult to determine a 20–foot (6.1–m) depth contour relative to extreme high water because such a line is not commonly found on reference maps and charts. We received suggestions that using the shoreline as the critical habitat boundary would make it easier for the public to understand the boundaries of critical habitat and for Federal action agencies to evaluate their projects and effects on critical habitat.

Response: The overwhelming majority of comments focused on the importance of shallow nearshore waters for salmon and forage fish species. In the critical habitat proposal, we did not consider shallow waters (i.e., nearshore areas between the line of extreme high tide and a depth of 20 feet (6.1 m) relative to this line) of Puget Sound to be within the geographical area occupied by Southern Resident killer whales. While we acknowledged observations of transient whales beaching themselves to attack marine mammals, and those of Northern Residents using shallow areas at rubbing beaches, we did not have any similar accounts for Southern Resident whales and so requested additional information on use of shallow waters from the public during the comment period.

We received comments providing some information on Southern Resident killer whale use of shallow waters. One researcher and several other individuals submitted accounts and photos of Southern Resident whales using specific shallow areas, though it was not clear if these areas were less than 20 feet (6.1 m) deep based on extreme high water. We specifically requested public comments on use of shallow areas, and the limited information received is not sufficient to consider all shallow areas as occupied.

Joint NMFS-U.S. Fish and Wildlife Service (FWS) regulations provide that we will designate unoccupied areas as critical habitat only upon a finding that the currently occupied habitat is inadequate for conservation (50 CFR 424.12(e)). At this time we lack sufficient information to determine that the currently occupied habitat is inadequate and that additional unoccupied habitat in the shallow areas less than 20–feet (6.1 m) deep is essential for conservation of the species. We will consider any new information

indicating that the current occupied habitat is a limiting factor for recovery as more research is conducted.

The final critical habitat designation is consistent with the proposed rule and does not include waters shallower than 20 feet (6.1 m) based on extreme high water. Tidal fluctuations vary at locations throughout the critical habitat areas, but generally, the shallow areas not included in the critical habitat designation are very shallow (5–10 feet) (1.5–3m) in some tidal conditions and can even be exposed at very low tides. During some tidal conditions these areas are not accessible by the whales, and we do not have data indicating that these areas are frequently used by whales.

Regarding the importance of using lines found on standard maps, we agree it can be problematic to draw a line at the 20–foot (6.1 m) depth because standard topographic maps and nautical charts do not always depict such a line. The line of extreme high water, however, can be determined using visual cues (Cowardin *et al.*, 1979; Ritter *et al.*, 1996) and using site-specific tidal information and similar depth contours (e.g., 20 feet or 6.1 meters) found on maps and nautical charts to evaluate if their activities are taking place in or may affect designated critical habitat deeper than 20 feet (6.1 m) at extreme high water. Thus, Federal agencies can determine whether their proposed actions may affect critical habitat, and the public and other entities can discern where habitat critical to Southern Resident killer whales has been designated.

In our proposed rule, we estimated the total area and shoreline proposed for designation using readily available Geographic Information System (GIS) data depicting Washington shorezones (Berry *et al.*, 2000). These data are widely used by various state and Federal agencies in Puget Sound to locate and evaluate projects and activities in the nearshore zone. The GIS data approximate the line of ordinary high water, but do not include bathymetry, so we did not attempt to subtract the areas shallower than 20 feet (6.1 m), though areas shallower than 20 feet are not designated as critical habitat in this final rule. We have used the same dataset to make calculations supporting this final critical habitat designation.

Prior to issuing proposed critical habitat, we did make some modifications to the GIS data described above, notably, the exclusion of estuarine and freshwater areas upstream of river and creek mouths. In re-evaluating the nearshore areas proposed for critical habitat, we identified several small or shallow inlets, harbors, coves and bays, some with very narrow entrances, and obtained more detailed sighting information to assist with drawing a shoreline boundary for some areas. In most cases, the whales had not been sighted within the small water bodies (e.g., Drayton Harbor, Wescott Bay, Guthrie Cove, Tulalip Bay, Port Gardner/eastern side of Jetty Island, Chapman Cove, Big Fishtrap Inlet, Gull Harbor, Rocky Bay at the mouth of Rocky Creek, Taylor Bay, Mayo Cove, Horsehead Bay, Wollochet Bay, Mystery Bay, Eagle Harbor, Jarrell Cove and Sequim Bay), so we have further modified the GIS data to excise these areas, totaling approximately 15 square miles (39 sq. km), in the final designation. We did include several small harbors where we had reports of Southern Resident whales at the harbor entrances (e.g., Keystone Harbor, Gig Harbor).

Not designating waters shallower than 20 feet (6.1 m) (based on extreme high water) as critical habitat does not preclude consultation on activities that occur in these shallow nearshore areas. ESA section 7's requirement that Federal agencies ensure their actions aren't likely to adversely modify critical habitat applies equally to actions occurring outside as to actions occurring within designated critical habitat.

Comment 3: Many commenters argued for including Hood Canal (Canal) in the critical habitat designation. Commenters reported sightings of Southern Residents in the Canal, and asserted that until the 1980s Southern Residents regularly visited the Canal, making the Canal part of the home range of the species. These commenters felt we used too short of a time frame in our assessment and that a longer time frame of up to 20 years would result in the inclusion of Hood Canal in the designation. Others noted that transient killer whales use the Canal frequently, and, therefore, it should be designated critical habitat. Some commenters expressed concern that exclusion from designation would allow further development of the Canal, strip mining, industrial harbor pollution, continued sewer runoff into the Canal, and heavy commercial traffic, harming the Canal's ecosystem, contributing to low oxygen levels, and further discouraging Southern Residents from using its waters. Many commenters felt that Hood Canal and its salmon populations should be a top concern for NMFS, predicting that with salmon recovery in the waterway, Southern Residents would return to seek out prey. These commenters felt strongly that protecting Southern Resident food sources, specifically salmon, was reason enough to designate Hood Canal critical habitat. All of these commenters believe Hood Canal is essential to the recovery of Southern Residents.

Response: Section 3(5)(A) of the ESA defines critical habitat as areas either occupied or not occupied by the species "at the time it is listed." We relied on the best available information on killer whale distribution to develop the proposed critical habitat areas. The sighting data we received from the Whale Museum included sightings of Southern Residents from 1990–2003, which was the most reliable information in their long-term database. Whales were identified by pod when possible, and sightings of transients, northern residents, and offshore whales were not included in the Whale Museum data set. There were no sightings of Southern Resident killer whales reported in Hood Canal from 1990–2003. In addition to the sighting data, we received one report of a sound recording made in Hood Canal from 1995, which was confirmed as calls of Southern Residents. Based on the one recording, we did not consider Hood Canal as occupied by the species at the time of listing. Commenters compared the one occurrence of Southern Residents in Hood Canal in 1995 to the areas in South Puget Sound that also had small numbers of sightings. The Puget Sound sightings, however, were often more than one sighting, were more recent, and were contiguous with areas of greater numbers of sightings. In contrast, Hood Canal has a narrow entrance, and its waters are not adjacent to areas with regular sightings.

The information we received during the public comment period included three additional sightings of killer whales in Hood Canal with sufficient information (photos, sound recordings, detailed field notes) to confirm that they were Southern Residents. The sound recording was made in 1958, the photograph was taken in 1973, and the detailed account was from a sighting in 1977. In addition, there were many anecdotal accounts of groups of whales with larger group sizes than are typical for transient whales and may have been Southern Residents spanning the 1940's–1980's. In the past, we have considered opportunistic or historical information on a specicies' occupied habitat when current documentation is not available. However, for Southern Residents, we have a more recent sighting record from the Whale Museum. Even if we increased the time span under consideration to 20 years, it would not add any confirmed sightings of Southern Residents in Hood Canal at

the time of listing. At this time, there are not sufficient data to consider Hood Canal as occupied at the time of listing.

The commenters also argued that if Hood Canal is not currently considered "occupied by the species," it should still be designated as critical habitat because it contains the PCEs necessary for conservation (i.e., prey), and it is essential for conservation. Joint NMFS-U.S. Fish and Wildlife Service (FWS) regulations provide that we will designate unoccupied areas as critical habitat only upon a finding that the currently occupied habitat is inadequate for conservation (50 CFR 424.12(e)). At this time we lack sufficient information to determine that the currently occupied habitat is inadequate and that additional unoccupied habitat in Hood Canal is essential for conservation of the species. We will consider any new information indicating that the current occupied habitat is a limiting factor for recovery as more research is conducted.

We appreciate the efforts by the Hood Canal community to gather the historical information on killer whale use of the area. If, as some predict, the whales do return to Hood Canal in response to increasing populations of prey species, we will continue to work with the local community to gather information and reevaluate the importance of Hood Canal as Southern Resident habitat.

Specific Areas

Comment 4: Several commenters urged us to designate areas as critical habitat for killer whales if they are essential for salmon conservation, based on a variety of theories. Some commenters pointed out that nearshore areas and/or freshwater areas that support salmon contain physical or biological features essential for conservation of killer whales (those features being salmon, or the features that support salmon). Some commenters urged us to consider nearshore areas, bays, and even freshwater areas as unoccupied areas "essential for conservation" of the whales - one stating that the statutory provision regarding "physical or biological features" applies to both occupied and unoccupied areas and another stating that there is no statutory requirement for unoccupied areas to contain physical or biological features. One commenter stated that because nearshore and offshore waters are connected, it is arbitrary to draw a line separating the two (that is, the line we proposed at the 20–foot (6.1 m) depth).

Response: The presence of salmon in densities and/or bathymetric conditions that make them available to killer whales appears to be the primary factor determining what areas the whales are likely to occupy. The fact that this essential feature is also present in areas the whales cannot occupy does not make those outside areas "occupied" in the statutory sense. Nor does the fact that those unoccupied areas may be essential to salmon make them essential to killer whale conservation. Joint NMFS-U.S. Fish and Wildlife Service (FWS) regulations provide that we will designate unoccupied areas as critical habitat only upon a finding that the currently occupied habitat is inadequate for conservation (50 CFR 424.12(e)). At this time we lack sufficient information to determine that the currently occupied habitat is inadequate and that additional unoccupied habitat is essential for conservation of the species. We will consider any new information indicating that the current occupied habitat is a limiting factor for recovery as more research is conducted.

No matter where the line is drawn to delineate a specific area, there will be activities occurring outside of the delineated area that may affect the features within the area. When prey items are a biological feature that moves freely in and out of the geographical area occupied by the species, it creates a situation in which there is a "biological feature" outside the occupied specific areas. This fact does not make line-drawing arbitrary because the statute requires us to designate as critical habitat specific areas occupied by the species that contain those physical and biological features essential to conservation and may require special management considerations or protection, or unoccupied areas essential to the conservation of the species. Here we have chosen a reasonable line on a map (as our regulations require) to clearly identify "specific areas within the geographical area occupied by the species." Moreover, section 7's requirement that Federal agencies ensure their actions are not likely to adversely modify critical habitat apply equally to actions occurring outside and within designated critical habitat. We have identified a depth contour of 20 feet (6.1 m) based on extreme high water for the final critical habitat. We believe this is a reasonable way to delineate a "specific area within the geographical area occupied by the species."

Comment 5: Many commenters requested that we include the offshore waters of Washington, Oregon, and California in the critical habitat designation. One commenter recommended we begin our designation at a reasonable depth and extend it to five miles (8.0 km) offshore to adequately protect waters used by Southern Residents. Many comments specifically requested that the Olympic Coast National Marine Sanctuary be included in the critical habitat designation. Most felt there was sufficient evidence to include offshore waters in the critical habitat designation at this time. Others encouraged us to conduct additional research on the winter coastal habitat of Southern Residents to gather information to support expansion of the critical habitat designation in the future.

Response: In the proposed rule, we identified the data gaps regarding distribution of Southern Residents in coastal and offshore waters and uncertainty regarding the important habitat features of these areas. At this time, we do not feel there is sufficient data to identify the specific areas in offshore waters in which the essential habitat features are found. This concern applies equally to the Olympic Coast National Marine Sanctuary and to other offshore areas. There is an active research program underway to gather information and fill in these data gaps, and we will consider any new information on coastal and offshore habitats that becomes available.

Special Management Considerations

Comment 6: We received a number of comments on the threats to the Southern Resident killer whales and suggestions for management actions that could be taken. These included: concerns regarding fisheries management to ensure sufficient prey for the whales; high pollution levels in Puget Sound and the sewage dumping practices of particular areas; stress from whale watching and other vessels; and potential effects from research practices and oil spills.

Response: For each of the specific areas proposed for critical habitat designation, we identified the PCEs and their special management considerations, which generally are the same concerns as those expressed by commenters. We will also consider the comments pertaining to specific threats to the whales and their habitat and potential management actions in developing a recovery plan for Southern Resident killer whales.

Activities That May Be Affected

Comment 7: One commenter requested at least a partial list of the type of projects that would likely require ESA section 7 consultation to assist agencies and project sponsors.

Another commenter suggested that Federal hydropower projects should

also be considered because of their potential to affect abundance of killer whale prey. Several commenters encouraged us to explore a Federal nexus under section 7 that would allow us to address vessels in Puget Sound.

Response: We provided a list of activities that may be affected by this designation, including, but not limited to, fishery management practices, vessel traffic, dredging and disposal, sub-marine cable/pipline installation and repair, oil and gas exploration, pollutant discharge, and oil spill prevention and response. If hydropower actions can be shown to significantly reduce the abundance of salmon available to the whales in designated critical habitat, they could adversely modify that habitat. As noted in response to Comment 8 below, most hydropower operations in the range of salmon and steelhead are already subject to modifications to protect listed salmon and steelhead. We will work with the Coast Guard and other agencies that oversee vessel activities to explore actions regarding vessels that may require section 7 consultation under the ESA.

Application of ESA section 4(b)(2)

Economic Impacts

Comment 8: We received several comments requesting that we include additional quantified estimates of economic impacts of designating critical habitat for Southern Resident killer whales in the economics report. One commenter objected to the focus of the economic analysis on potential impacts to fisheries. One commenter suggested Federal hydropower projects be considered under section 7 of the ESA and economic impacts of those consultations be considered in the economic analysis. Other commenters requested inclusion of costs associated with water quality and stormwater management and noise-producing activities, such as construction. Another suggested that information about economic costs associated with climate change be included.

Response: The range of economic costs estimated for critical habitat designation was related to possible reductions in harvest of prey species. While the economic analysis may appear to focus on potential impacts to fisheries, the economic report addresses other impacts such as those to water quality which could not be quantified. The inability to quantify these costs does not reduce their relative importance. In the ESA section 4(b)(2) report, we acknowledge that there are also additional costs associated with prey in addition to harvest, though we could not attribute these costs to the designation of critical habitat for Southern Resident killer whales. In designating critical habitat for the Puget Sound Chinook ESU, there were over $70,000,000 of economic impacts identified for the designated areas. Examples of other programs affecting salmon habitat include Shared Strategy for salmon recovery and Puget Sound Action Team and Puget Sound Partnership efforts to improve conditions in Puget Sound, which may cost hundreds of millions of dollars.

In the case of hydroelectric projects, particularly the Federal projects the commenter identified, many hydroelectric project modifications to protect salmon and steelhead are already required to protect ESA-listed salmon or steelhead. Along the entire West Coast, nearly all salmon-bearing streams are home to listed salmon and steelhead (only coastal streams in Western Washington contain no listed salmon or steelhead). To the extent there is a Federal nexus on hydropower operations affecting these listed salmon and steelhead, the Federal agency involved must ensure its actions aren't likely to jeopardize the listed salmonids or adversely modify their critical habitat. As a result, hydropower operations that might affect the abundance of killer whale prey (including those in the Columbia River basin) are already modified to protect salmon and their critical habitat. It would be inappropriate to attribute the cost of modifications to killer whale critical habitat designation when they are already required to protect salmon and steelhead; however, if additional project modifications are required to prevent reductions of prey abundance for Southern Resident killer whales in designated critical habitat, these impacts would be attributable to this designation.

Regarding water quality, we lack sufficient information at this time to determine which contaminants are likely to be the focus of future ESA section 7 consultations and what threshold levels are appropriate to protect Southern Residents. Until we have better information about the number and type of section 7 consultations on water quality management, and the extent of changes that may be required as a result of those consultations, it would be speculative to try to estimate associated costs. We do not have a consultation history for killer whales that would provide information on changes that might be required in water quality management to protect killer whale habitat from adverse modification. Nor do we have information that would allow us to estimate with any confidence what those changes might be. One commenter suggested that we rely on the consultation history of salmon to estimate economic costs for water quality management. However, there are different contaminants of concern for salmon, and, as noted above, costs associated with salmon consultations would not be appropriate to count twice. Impacts from Southern Resident critical habitat designation will likely come in areas different than those that stem from salmon protection and recovery.

There are likely to be significant costs associated with construction activities as a result of our listing of Southern Resident killer whales because these sound-producing activities have a direct effect on the whales, as described in our response to Comment 1. We have already conducted several ESA section 7 consultations on construction activities, and measures were included in the action to avoid direct impacts to the whales. Because we consider such sound to be an impact on the whales rather than on the whales' habitat, however, we did not include the costs associated with these measures in our analysis of the economic impacts of designation.

At this time it would be too speculative to try to determine what management changes may be required for salmon and steelhead in response to climate change.

Comment 9: One commenter questioned the information in the economics report regarding stormwater outfalls, including the number of outfalls listed, and suggested we consider the contaminant levels for individual outfalls and sources rather than the number of outfalls or the agency responsible for managing the outfalls.

Response: We recognize that the quantity and quality of stormwater, not the number of outfalls, will determine what changes would need to be made, if any, as a result of critical habitat designation. We also recognize that outfalls without any Federal nexus will not be subject to an ESA section 7 consultation. We included the number of outfalls that might be subject to consultation in the draft economics report, where such numbers were available, to give the decision maker some context for considering the potential impact of critical habitat designation, as required by ESA section 4(b)(2). In light of this comment, we have removed the table from the

economics report showing the number of outfalls.

Comment 10: Commenters suggested that additional information on the economic benefits of recovered Southern Resident and salmon populations be included in the report.

Response: While there may be studies that may provide some information relevant to estimating the benefits of recovered Southern Resident killer whale and salmon populations, there is insufficient information to estimate the incremental benefits (in addition to the current salmon recovery efforts) of critical habitat designation for Southern Residents on the status of Southern Resident and Pacific Northwest salmon populations.

Comment 11: One commenter objected to the inclusion of polycyclic aromatic hydrocarbons (PAH) as a contaminant of potential concern to Southern Resident killer whales in the economic report. The commenter acknowledged that PAHs are mentioned in the conservation plan, but that since they were not specifically addressed in the listing or biological report, like other contaminants such as polychlorinated biphenyls (PCB) and dichloro-diphenyl-trichloroethane (DDT), they should therefore not be included in the economic analysis.

Response: While we concur with the commenter that PCBs and other contaminants pose a greater risk to Southern Residents than PAHs, PAHs are still a concern and we have modified the biological report to ensure it clearly reflects this concern. Exposure to PAHs can be chronic or acute in the case of an oil spill. Although there are few studies of PAH levels and effects in wild marine mammals and no studies linking PAHs to the decline in the Southern Residents, there are concerns regarding carcinogenic effects of high levels of PAHs in some marine mammals (e.g., beluga whales). PAHs were not specifically identified as a primary concern in the listing of Southern Residents, but their inclusion in the conservation plan and the economic report indicates that they may be a concern for Southern Residents. No specific costs were associated with inclusion of PAHs in the economic report.

National Security Impacts

Comment 12: Many commenters disagreed with the decision to exclude 18 military sites on the basis of national security. Commenters requested that we review and offer explanations for the exclusion of each facility on a case-by-case basis, balancing national security interests with those of Southern Residents. Reducing the size of exemptions, limiting the degree of the exemptions, or entering into an agreement with the Navy to address their activities were several of the recommendations of commenters. Many of the commenters expressed concern about non-military activities that occur in the exempt areas and whether they would be subject to critical habitat regulations. These commenters hoped we could find a way to protect Southern Residents from harmful, non-military activities in these zones. An additional concern for these commenters was the impact of military sonar. We received recommendations that the military increase its efforts to protect killer whales when conducting tests, using passive sonar to locate whales and avoid sonar usage when whales are in potentially harmful proximity to the military vessel.

Response: In an appendix to the ESA Section 4(b)(2) report, we provided detailed information on each of the military sites and summarized the national security concerns raised by the Department of Defense (DOD). We concluded that the national security impacts outweighed the benefits to the species. There is no mechanism in the ESA to exclude just the military and not other Federal agencies from the impacts of critical habitat designation. The exclusion of the military sites from critical habitat designation, however, does not mean that Federal actions in those areas are exempt from all consultation obligations under section 7 of the ESA. Federal agencies must ensure their actions do not jeopardize the continued existence of listed species - a requirement that applies regardless of whether specific areas are designated as critical habitat. We will continue to be concerned about activities that harm Southern Resident killer whales and their habitat, regardless of whether that habitat is designated. We expect that where critical habitat is designated, it will more precisely focus our analysis on how the action will alter the habitat and how that will affect the ability of the habitat to support species' conservation.

Regarding sonar use, the Navy has operating procedures in place to reduce the risk to marine mammals, and these are included in the Proposed Conservation Plan for Southern Resident Killer Whales (available at *www.nwr.noaa.gov*). As stated above, the military exclusions from critical habitat designation do not affect the Navy's obligations under section 7 of the ESA to consult on Federal actions that may affect Southern Resident killer whales regardless of whether they occur in designated critical habitat.

Comment 13: We received several requests for additional exclusions based on impacts to national security. Commenters requested exclusions for refineries and ports in Puget Sound. Refinery operators requested exclusions because of their role in producing the petroleum products used by the U.S. military. These commenters felt that being subject to critical habitat consultations would limit the ability of refineries to efficiently provide oil to the military in a situation of national security. They also argued critical habitat designations would affect security, maintenance, operations and emergency preparedness at refineries. Those requesting national security exemptions for the ports located in Puget Sound argued that ports play an essential role in protecting the United States from terrorist threats because they are a primary entry and exit point. The commenters also argued there would be economic impacts to designating critical habitat in ports, making the ports less competitive. The commenters felt that, given that Southern Residents do not often use port waters, and many of the areas are already designated as critical habitat for Chinook salmon, an additional critical habitat designation would impact ports and not offer benefits to killer whales.

Response: We concluded that the national security benefits of exclusion outweighed the conservation benefits of designation for 18 military sites. The Navy and Army provided information on the direct and potentially substantial impacts to national security including preventing, restricting, or delaying training or testing exercises or access to sites; restricting, or delaying activities associated with vessel/facility maintenance and ordnance loading; and delaying response time for ship deployments and overall operations. The DOD did not identify any concerns regarding impacts to national security beyond those at their sites. National security is the primary mission for the military, and we considered the high priority placed on national security when weighing the benefits of exclusion against conservation benefits. Refineries and ports, however, are commercial operations, and the national security concerns associated with these sites are a part of their overall activities. We consider that designating critical habitat in these areas will provide some conservation benefit through ESA section 7 consultations on refinery and port actions that may impact habitat by affecting prey availability, contaminant levels, or passage. There was

insufficient information to demonstrate that any national security benefits outweigh the conservation benefits.

National Environmental Protection Act of 1969 (NEPA)

Comment 14: We received one comment arguing that the agency must comply with the NEPA to inform the public and help ensure that critical habitat designations do not result in unintended environmental consequences.

Response: We believe that in *Douglas County* v. *Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied, 116 S.Ct. 698 (1996), the Ninth Circuit Court of Appeals correctly interpreted the relationship between NEPA and critical habitat designation under the ESA. The Court rejected the suggestion, identical to that raised by commenters, that irreconcilable statutory conflict or duplicative statutory procedures are the only exceptions to application of NEPA to Federal actions. The Court held that the legislative history of the ESA demonstrated that Congress intended to displace NEPA procedures with carefully crafted procedures specific to critical habitat designation. Further, the Douglas County Court held that the critical habitat mandate of the ESA conflicts with NEPA in that, although the Secretary may exclude areas from critical habitat designation if such exclusion would be more beneficial than harmful, the Secretary has no discretion to exclude areas from designation if such exclusion would result in extinction. The Court noted that the ESA also conflicts with NEPA's demand for impact analysis, in that the ESA dictates that the Secretary "shall" designate critical habitat for listed species based upon an evaluation of economic and other "relevant" impacts, which the Court interpreted as narrower than NEPA's directive. Finally, the Court, based upon a review of precedent from several circuits including the Fifth Circuit, held that an environmental impact statement is not required for actions that do not change the physical environment.

Delay Designation Pending Resolution of Legal Issues

Comment 15: One commenter requested that we delay designation of critical habitat until clarification of outstanding legal issues, including litigation over the listing of the Southern Resident DPS and the definition of "adverse modification" of critical habitat, are resolved.

Response: Litigation is currently pending that challenges our listing of Southern Resident killer whales as endangered under the ESA [Washington State Farm Bureau and Building Industry Association of Washington v. NMFS]. Pending a decision on that challenge, the whales are listed, and the ESA requires that we designate critical habitat within one year of listing. Past court decisions on the agency's regulatory definition of adverse modification have no effect on the statutory requirement to designate critical habitat.

Coordination with Canada

Comment 16: We received a number of comments regarding the use of Canadian waters by Southern Residents. These commenters felt we should coordinate with Canada on our efforts for protecting Southern Residents and their habitat.

Response: We have some sighting data for Southern Residents in Canadian waters, and while our regulations limit us to designating critical habitat in areas under U.S. jurisdiction, we will continue to coordinate with Canada on both critical habitat designated in U. S. waters and recovery planning on both sides of the border.

Critical Habitat Identification and Designation

Section 3 of the ESA defines critical habitat as "(i) the specific areas within the geographical area occupied by the species, at the time it is listed * * *, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed * * *, upon a determination by the Secretary that such areas are essential for the conservation of the species." Section 3 of the ESA (16 U.S.C. 1532(3)) also defines the terms "conserve," "conserving," and "conservation" to mean: "to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary."

Section 4 of the ESA requires that, before designating critical habitat, we consider economic impacts, impacts on national security, and other relevant impacts of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of exclusion outweigh the benefits of designation, unless excluding an area from critical habitat will result in the extinction of the species concerned. Once critical habitat is designated, section 7(a)(2) of the ESA requires that each Federal agency, in consultation with us and with our assistance, ensure that any action it authorizes, funds, or carries out is not likely to result in the destruction or adverse modification of critical habitat.

Physical or Biological Features Essential to Conservation (Primary Constituent Elements)

Joint NMFS-FWS regulations for listing endangered and threatened species and designating critical habitat at 50 CFR 424.12(b) state that the agencies "shall consider those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection (hereafter also referred to as "Essential Features' or "Primary Constituent Elements'/PCEs')." Pursuant to the regulations, such requirements include, but are not limited to, the following: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally, (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. These regulations state that we shall focus on essential features within the specific areas considered for designation. These features "may include, but are not limited to, the following: spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, geological formation, vegetation type, tide, and specific soil types."

Fish are the major dietary component of resident killer whales in the northeastern Pacific, with 22 species of fish and 1 species of squid (Gonatopsis borealis) known to be eaten (Scheffer and Slipp, 1948; Ford *et al.*, 1998; 2000; Ford and Ellis, 2005; Saulitis *et al.*, 2000). Observations from this region indicate that salmon are clearly preferred as prey (Ford *et al.*, 1998; Ford and Ellis, 2005) and are likely consumed in large amounts, as indicated by the estimates of total salmon consumed by the Southern Resident killer whale DPS. Sufficient prey abundance is necessary to support individual growth to reach sexual maturity and reproduction, including lactation and successful rearing of calves.

In addition to a sufficient biomass of prey species, the prey must not have

amounts of contaminants that exceed levels that can cause mortality or reproductive failure in Southern Residents. Because of their long life span, position at the top of the food chain, and their blubber stores, killer whales accumulate high concentrations of contaminants. Organochlorines, such as PCBs and DDT, and many other chemical compounds including polychlorinated napthalenes, brominated flame retardants, PAHs, dioxins, furans, and heavy metals, are a concern because of their ability to induce immune suppression, reproductive impairment, or other physiological damage, as observed in several species of marine mammals (Albers and Loughlin, 2003; Boland *et al.*, 1998; Bergman *et al.*, 1992; De Guise *et al.*, 2003; Jepson *et al.*, 1999; Reijinders, 2003; Ross, 2002).

To move between important habitat areas, find prey, and fulfill other life history requirements, the Southern Resident killer whales require open waterways that are free from obstruction. In-water structures that block passage, for example, could affect Southern Resident killer whale movement.

Killer whale habitat use is dynamic, and specific breeding, calving, or resting areas have not been documented. Births occur largely from October to March, but may take place in any month (Olesiuk *et al.*, 1990), and, therefore, potentially in any part of the whales' range. Southern Residents are highly mobile and can travel up to 100 miles (160 km) in a 24–hour period (Baird, 2000), allowing rapid movements between areas. These movements likely coincide with prey concentrations. Individual knowledge of productive feeding areas and other special habitats is probably important in the selection of locations visited and is likely a learned tradition passed from one generation to the next (Ford *et al.*, 1998).

Based on this natural history of the Southern Resident killer whales and their habitat needs, the physical or biological features of Southern Resident killer whale habitat are:

(1) Water quality to support growth and development;

(2) Prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and

(3) Passage conditions to allow for migration, resting, and foraging.

Geographical Area Occupied by the Species

Photo-identification studies, tracking by boats, and opportunistic sightings have provided considerable information on the ranges and movements of Southern Resident killer whales since the early 1970s. Ranges are best known from late spring to early autumn (May-September), when survey effort is greatest. During this period, all three Southern Resident pods- J, K and L- are regularly present in the Georgia Basin (defined as the Georgia Strait, San Juan Islands, and Strait of Juan de Fuca) (Heimlich- Boran, 1988; Felleman *et al.*, 1991; Olson, 1998; Osborne, 1999).

While in inland waters during summer months, all of the pods concentrate their activity in Haro Strait, Boundary Pass, the southern Gulf Islands, the northeastern end of the Strait of Juan de Fuca, and several localities in southern Georgia Strait (Heimlich-Boran, 1988; Felleman *et al.*, 1991; Olson, 1998; Ford *et al.*, 2000). Pods commonly occur and are observed foraging in areas where salmon frequent, especially during the times of year salmon are migrating to their natal rivers (Heimlich-Boran, 1986, 1988; Nichol and Shackleton, 1996). Notable concentrations include Haro Strait and Boundary Passage, the southern tip of Vancouver Island, Swanson Channel off North Pender Island, and the mouth of the Fraser River delta, which is visited by all three pods in September and October (Felleman *et al.*, 1991; Ford *et al.*, 2000). These sites are major corridors for migrating salmon.

Individual pods are generally similar in their preferred areas of use (Olson, 1998), although some seasonal and temporal differences exist in areas used. All three pods typically arrive in May or June and spend most of their time in inland waters until departing in October or November. However, K and L pods make frequent trips lasting a few days to the outer coasts of Washington and southern Vancouver Island during this time period (Ford *et al.*, 2000). During early autumn, Southern Resident pods, especially J pod, routinely expand their movements into Puget Sound, probably to take advantage of chum and Chinook salmon runs (Osborne, 1999). Additional recent studies have identified finer scale pod differences in seasonal movement patterns and use of core areas (Hauser, 2006).

There are no confirmed sightings of Southern Resident killer whales inside Hood Canal in the 1990–2003 sighting database. On one occasion in 1995, acoustic recordings from Dabob Bay were identified as J pod vocalizations (Unger, 1997). Although additional historical sightings and recordings from the 1970s and earlier were provided during the comment period, we do not consider this sufficient evidence of presence to find Hood Canal "within the geographical area occupied by the species at the time of listing." (Transient killer whales, in contrast, have been observed in Hood Canal on multiple occasions and have remained in Hood Canal for extended periods in the last several years.)

In the critical habitat proposed rule we did not consider extremely shallow waters of Puget Sound (less than 20 feet (6.1 m) deep relative to the extreme high water line) to be within the geographical area occupied by the species and requested information during the public comment period. The public and a scientific researcher provided accounts and photographs of Southern Resident killer whales using some shallow areas. The information received is not sufficient to consider all shallow areas as occupied. The final critical habitat designation is consistent with the proposed rule and does not include waters shallower than 20 feet (6.1 m) based on extreme high tide. Tidal fluctuations vary at locations throughout the critical habitat areas, but generally the shallow areas not included in the critical habitat designation are very shallow (5–10 feet (1.5–3 m)) in some tidal conditions and can even be exposed at very low tides. During some tidal conditions these areas are not accessible by the whales, and we do not have data indicating that these areas are frequently used by whales. We used this same shoreline data for the final rule, which is readily available from the Washington Department of Natural Resources, to display and calculate the critical habitat areas as we did in the proposed rule.

During the late fall, winter, and early spring, the ranges and movements of the Southern Residents are less well known. J pod continues to occur intermittently in the Georgia Basin and Puget Sound part of this time, but its location during apparent absences is uncertain (Osborne, 1999). One sighting of this pod was made off Cape Flattery, Washington, in March 2004 (Krahn *et al.*, 2004). Prior to 1999, K and L pods followed a general pattern in which they spent progressively smaller amounts of time in inland waters during October and November and departed them entirely by December of most years (Osborne, 1999). Sightings of both groups passing through the Strait of Juan de Fuca in late fall suggested that activity shifted to the outer coasts of Vancouver Island and Washington (Krahn *et al.*, 2002), although it is unclear if the whales spend a substantial portion of their time in this area or simply transit to other locations.

While there are considerable data on the use of inland waters of Washington, there is very little information on the movements of Southern Resident killer whales off the coast. Areas of activity of all pods are virtually unknown during their absences from inland waters. In the last 30 years of study, there are only 28 confirmed sightings in outside waters (Krahn *et al.*, 2004; NWFSC unpubl. data). The majority of these sightings were opportunistic, with most occurring within 10 miles (16.1 km) of shore, and we do not know how far from shore the Southern Residents range. Several new sightings occurred during the last five years, when effort was increased with dedicated ship surveys and expanded volunteer coastal sighting networks. Our knowledge of the southern and northern boundaries of the range has expanded with these new sightings from California and the Queen Charlotte Islands in recent years. At this time there are few data on how the whales are using offshore areas; however, some of the sightings included observations of feeding.

There is an active research effort underway to identify coastal and offshore distribution of Southern Residents. We have increased outreach efforts to gather sighting information from coastal communities, vessel operators, and pilots along the coasts of Oregon, Washington, and British Columbia. In addition, researchers are conducting dedicated ship surveys to locate the whales and observe their activities outside of Puget Sound. The research program is a long-term effort, but we hope to greatly increase the number of coastal observations in the next five years. As new information is collected on the coastal and offshore distribution and habitat use, we hope to fill in the data gaps about the important habitat features of these coastal and offshore areas.

NMFS regulations at 50 CFR 424.12(h) state: "Critical habitat shall not be designated within foreign countries or in other areas outside of United States jurisdiction." Although the Southern Residents' range includes inland waters of Canada, we are not proposing these areas for designation.

Specific Areas within the Geographical Area Occupied by the Species

We reviewed the available information on Southern Resident distribution, habitat use, and habitat needs in a biological report to assist in identifying critical habitat (NMFS, 2006a). Within the geographical area occupied by the Southern Resident killer whales we have identified three specific areas that contain essential habitat features. We have divided the inside waters of Washington State into specific areas based on the habitat features and the use patterns of the Southern Resident killer whales.

We analyzed Southern Resident killer whale sightings data from The Whale Museum (Osborne, 2005; The Whale Museum Orca Master, 1990–2003) to assist in identifying specific areas based on habitat use patterns by the whales. The Whale Museum data are predominantly opportunistic sightings from a variety of sources, including public reports, commercial whale watching industry pager system, Soundwatch, Lime Kiln State Park land-based observations, and compilations of independent researcher reports. The whales are identified as belonging to a particular pod when possible, and sightings of transient or offshore whales are not included in the database. The data set does not account for level of effort by season or location, and, therefore, the sampling and data are biased (Osborne, 2005). The 1990–2003 Whale Museum data set is, however, the most comprehensive long-term data available to evaluate broad-scale whale distribution in inland waters at this time (with a total number of sighting records of 22,509). In order to evaluate frequency of use, our analysis of the sightings was limited to one unique location sighting, per location, per day to reduce the bias introduced by multiple sightings of the same whales in the same location on the same day (total number of unique sightings per day is 11,836). For the majority of the killer whale sightings the location reported was not an exact point location (Lat./Long.), and all locations were subsequently assigned to a center point in a quadrant system (Osborne, 2005). Almost half of the data is from the Whale Watch pager system created by the commercial whale watch industry and available to subscribers. A validation of recent pager data revealed greater than 90 percent accuracy in locating whales (Hauser *et al.*, 2006).

From the sightings and other data, we identified three "specific areas," within the geographical area occupied by the species, that contain PCEs. We considered presence and movements of the whales, behavioral observations and studies, and other information to verify that one or more of the physical or biological features, or PCEs, can be found in these three areas. In some cases where direct data on PCEs were not available, we relied on distribution patterns of the whales to infer presence of PCEs.

Area 1. Core Summer Area - Bordered to the North and West by the U.S./Canadian border, Area 1 includes the waters surrounding the San Juan Islands, the U.S. portion of the Southern Strait of Georgia, and areas directly offshore of Skagit and Whatcom counties. Prey species, one of the PCEs, are present in Area 1. Runs of salmon passing through Area 1 include Chinook, chum, coho, pink, and sockeye salmon, which have all been identified as prey for Southern Residents (Ford *et al.*, 1998; Ford and Ellis, 2005; NWFSC, unpubl. data). The Strait of Juan de Fuca, Haro Strait, and Georgia Strait are relatively narrow channels and concentrate salmon returning from the Pacific Ocean to spawn in U.S. and Canadian rivers. In particular, Area 1 lies near the mouth of the Fraser River, which has the largest salmon runs in the Georgia Basin/Puget Sound region (Northcote and Atagi, 1997).

Occurrence of Southern Residents in Area 1 coincides with concentrations of salmon. Southern Resident killer whales have been sighted in Area 1 during every month of the year, but sightings are more consistent and concentrated in the summer months of June through August. The Whale Museum database from 1990–2003 contains 11,836 unique sightings after duplicate locations on the same date are excluded. Of these, 8,508 are in U.S. waters, and 85 percent of the U.S. sightings are in Area 1. Although sighting effort in Area 1 is extensive during the summer months as compared to other areas, which biases the data, the strength of the summer use pattern would undoubtedly persist if accounting for sighting effort. The largest number of sightings in Washington's inland waters is from Haro Strait off the west side of San Juan Island. There are over 1,200 unique sightings from 1990–2003 in one quadrant off the west side of San Juan Island.

Much of the behavioral research on Southern Residents takes place within Area 1. Southern Residents are observed exhibiting a variety of behaviors in this area, including travel, forage, social, and play behaviors. Resident whales spend 50–67 percent of their time foraging (Heimlich Boran, 1988; Ford, 1989; Morton, 1990; Felleman *et al.*, 1991). Opportunities to forage are presumed to be a major factor attracting Southern Residents to Area 1, particularly in the summer months when it is considered a primary feeding area for all three pods (J, K, and L).

Area 2. Puget Sound - south from Deception Pass Bridge, entrance to Admiralty Inlet, Hood Canal Bridge. Southern Resident killer whale occurrence in Area 2 has been correlated with fall salmon runs, a prey-

related PCE. Feeding has been observed in Area 2 (NWFSC, unpubl. data), though few behavioral studies have been conducted in this area. During the fall, Southern Residents, especially J pod, expand their movements into Puget Sound, likely taking advantage of chum and Chinook salmon runs (Osborne, 1999). A fall chum run was suggested as the likely reason for an extended presence of members of L pod in Dyes Inlet during October and November of 1997.

Southern Resident killer whales have been sighted in parts of Area 2 in all seasons despite limited search effort. The presence of Southern Residents in Area 2 is intermittent, with the smallest number of sightings in May-July. There are different sighting patterns in Area 2 for the three pods. In the most southern portion of Area 2, south of Tacoma Narrows Bridge, there have been only a small number of Southern Resident sightings from October-January, with one additional sighting in April.

Area 3. Strait of Juan de Fuca - Deception Pass Bridge, San Juan and Skagit County lines to the northeast, entrance to Admiralty Inlet to the southeast, U.S./Canadian border to the north, Bonilla Point/Tatoosh Island line to the West. All pods regularly use the Strait of Juan de Fuca for passage from Areas 1 and 2 to outside waters in the Pacific Ocean. Area 3 is predominantly a passage used to access outer coastal water feeding grounds, including Swiftsure and La Perouse Banks, off Tofino, British Columbia, and off Westport, as well as other areas with unknown usage, such as the coast of northern California. Recent observations at Westport coincided with presence of a spring Chinook salmon run, although other species were also likely present (NWFSC, unpubl. data). The presence of migrating salmonids in the Strait of Juan de Fuca suggests that feeding might occur during times the whales are transiting. However, the whales are not known to spend long periods in localized areas in the Strait. Sightings of the Southern Residents in Area 3 are limited, particularly on the U.S. side of the international boundary, as there is little observation effort in the area, particularly to the west toward the Bonilla Point/Tatoosh Island line. Even with a small number of actual sightings, we can infer that the whales are using this corridor, and the passage PCE is present in Area 3 based on the inland and coastal sightings of whales. The Strait of Juan de Fuca is not the only transit corridor between inland waters and coastal British Columbia, and the whales occasionally use the Strait of Georgia and Johnstone Strait in Canadian waters as an alternate route.

Special Management Considerations

The specific areas within the geographical area occupied by a species meet the definition of critical habitat only if they contain physical or biological features that "may require special management considerations or protection." Agency regulations at 50 CFR 424.02(j) define "special management considerations or protection" to mean "any methods or procedures useful in protecting physical and biological features of the environment for the conservation of listed species." Several forms of human activity have the potential to affect the habitat of killer whales and, specifically, the PCEs that are essential to their conservation.

Most salmon stocks throughout the Northwest are at a fraction of their historic levels. Historically, overfishing was a major cause of decline. More recently the major cause is loss of freshwater habitat. Poor ocean conditions over the past two decades reduced populations already weakened by the degradation and loss of freshwater and estuary habitat, fishing pressures, hydropower system management, and hatchery practices.

Continued regulation of contaminants and pollution in Puget Sound is also necessary to protect the prey PCE for Southern Residents through management schemes, such as the National Pollutant Discharge Elimination System (NPDES). Contaminants enter marine waters and sediments from numerous sources, but are typically concentrated near areas of high human population and industrialization. Once in the environment these substances proceed up the food chain, accumulating in long-lived top predators like Southern Resident killer whales. Chemical contamination through the food chain continues to be a potential threat to Southern Resident killer whales, despite the enactment of modern pollution controls in recent decades, which were successful in reducing, but not eliminating, the presence of many contaminants in the environment.

Oil spills are another source of contamination that can have long-lasting impacts on habitat (although the primary concern with oil spills is the potential for direct injury to the whales). The Environmental Protection Agency and U.S. Coast Guard oversee the Oil Pollution Prevention regulations promulgated under the authority of the Federal Water Pollution Control Act. There is a Northwest Area Contingency Plan, developed by the Northwest Area Committee, which serves as the primary guidance document for oil spill response in Washington and Oregon.

Southern Residents are highly mobile and use a variety of areas for foraging and other activities, as well as for traveling between these areas. Human activities can interfere with movements of the whales and impact the passage PCE. In particular, vessels may present obstacles to whale passage, causing the whales to swim further and change direction more often, which potentially increases energy expenditure for whales and impacts foraging behavior (although this effect of vessels is primarily a direct effect on the whales rather than an effect on their habitat).

The PCEs identified for this designation may require special management considerations or protection. Fishery management, vessel activities, and water quality management are all activities that have the potential to affect the PCEs by altering prey abundance, prey contamination levels, and passage between areas. The proposed rule included information regarding which features may require special management considerations or protection for each of the three specific areas designated as critical habitat (71 FR 34571; June 15, 2006).

Coastal and Offshore Areas

We have few data on Southern Resident distribution and habitat use of coastal and offshore areas in the Pacific Ocean. While we know that the whales occupy these waters for a portion of the year and they are considered part of the geographical area occupied by the species, we do not have detailed information about distribution, behavior, and habitat. While we can infer that some of the PCEs, such as prey, must be present to support the whales, we do not have sufficient data to describe them adequately and identify "specific areas" with those features. Based on the difficulties of determining the presence of the PCEs in specific offshore areas, we cannot assess the human activities affecting them or the special management considerations for their protection. At this time we are not designating coastal or offshore areas, though we do recognize that they are important for the Southern Resident killer whales. There is an active research program to fill the data gaps regarding coastal and offshore distribution and habitat features, and we anticipate obtaining additional data in the coming years. We will consider new information as it becomes available to

inform future considerations of critical habitat for Southern Residents.

Unoccupied Areas

ESA section 3(5)(A)(ii) further defines critical habitat to include "specific areas outside the geographical area occupied" if the areas are determined by the Secretary to be "essential for the conservation of the species." Regulations at 50 CFR 424.12(e) specify that NMFS "shall designate as critical habitat areas outside the geographical area presently occupied by a species only when a designation limited to its present range would be inadequate to ensure the conservation of the species." At the present time we have not identified any areas outside the geographical area occupied by the species that are essential for its conservation, and, therefore, we are not designating any unoccupied areas.

Activities That May be Affected

Section 4(b)(8) of the ESA requires that we describe briefly and evaluate, in any proposed or final regulation to designate critical habitat, those activities that may destroy or adversely modify such habitat or that may be affected by such designation. A wide variety of activities may affect critical habitat and, when carried out, funded, or authorized by a Federal agency, require an ESA section 7 consultation. Such activities include, but are not limited to, fishery management practices, vessel traffic, dredging and disposal, sub-marine cable/pipeline installation and repair, oil and gas exploration, pollutant discharge, and oil spill prevention and response.

This critical habitat designation will provide Federal agencies, private entities, and the public with clear notification of critical habitat for Southern Resident killer whales and the boundaries of the habitat. This designation will also assist Federal agencies and others in evaluating the potential effects of their activities on critical habitat and in determining if ESA section 7 consultation with NMFS is needed. Consistent with recent agency guidance on conducting adverse modification analyses (NMFS, 2005), we will apply the statutory provisions of the ESA, including those in section 3 that define "critical habitat" and "conservation," to determine whether a proposed action might result in the destruction or adverse modification of critical habitat.

Application of ESA Section 4(b)(2)

Section 4(b)(2) of the ESA provides that the Secretary shall consider certain impacts before designating critical habitat: "the Secretary shall designate critical habitat . . . on the basis of the best scientific data available and after taking into consideration the economic impact, impact to national security, and any other relevant impact of specifying any particular area as critical habitat." The Secretary has the discretion to exclude an area from designation if he determines the benefits of exclusion (that is, avoiding the impact that would result from designation) outweigh the benefits of designation based upon best scientific and commercial data. The Secretary may not exclude an area from designation if exclusion will result in the extinction of the species. Because the authority to exclude is discretionary, exclusion is not required for any area.

Section 4(b)(2) of the ESA calls for balancing the benefits of designation against the economic, national security, and other benefits of exclusion, and our considerations under section 4(b)(2) were described in the proposed rule and in a supporting report (NMFS, 2006c). We considered the conservation benefits to the species of designating areas, the economic benefits of excluding each of the three areas, and the national security benefits of excluding 18 particular military sites owned or controlled by the DOD.

Benefits of Designation

The primary benefit of designation is that section 7 of the ESA requires all Federal agencies to ensure their actions are not likely to destroy or adversely modify the designated habitat. This is in addition to the requirement that all Federal agencies ensure their actions are not likely to jeopardize the species' continued existence. Another benefit of designation is that it provides notice of areas and features important to species conservation, and information about the types of activities that may reduce the conservation value of the habitat, which can be effective for education and outreach. Critical habitat designation may also trigger protection under state or local regulations.

In addition to the direct benefits of critical habitat designation to the killer whales, there may be ancillary benefits. These other benefits may be economic in nature, or they may be expressed through beneficial changes in the ecological functioning of Puget Sound. For example, Puget Sound supports an active whale watching industry, and so an increase in the killer whale population could increase the economic value of that activity. Another example could be the increased viability of Puget Sound salmon populations if their harvest is reduced to assure a larger prey supply for killer whales. Yet another example could be reduced levels of pollution in Puget Sound.

At this time we lack information that would allow us either to quantify or monetize the benefits of designation for the whales, and have determined the qualitative conservation benefits of designating each of the three particular areas identified as critical habitat for Southern Residents. We assessed the benefit of designating the three areas based on: the physical or biological features of each area, the Southern Residents' use of each area (including how frequently they are present), the Federal activities in each area that might trigger an ESA section 7 consultation, the likelihood that we would seek a modification of those activities, the strength of the connection between those activities and habitat modification, and educational effects of designation. These considerations for each area are summarized in tables in the 4(b)(2) report (NMFS, 2006c) and the proposed rule (71 FR 34571; June 15, 2006).

The benefit of designation also depends on the inherent conservation value of the area. The habitat areas for these killer whales are unique and irreplaceable. It is difficult to separate the value of any one of the areas: each of the three areas supports a distinct aspect of the whales' life history, and the conservation function of each area complements the conservation function of the others. Therefore, designation of each particular area benefits the conservation function of the other areas. For all of the reasons discussed, we consider the benefit of designation of each area to be high.

Economic Impacts (Economic Benefits of Exclusion)

An economic report describes in detail the actions we assumed may be affected, the potential range of changes we might seek in those actions, and the estimate of economic impacts that might result from such changes. For salmon fishing, we considered it too speculative to predict any particular level of reduction, and so considered the total value of salmon fishing in Puget Sound. If any reduction in fishing were to be required as a result of critical habitat designation, it would be some portion of that total. We considered it too speculative at this time to postulate likely consultations on water quality management actions, and what changes we might seek in those actions. Although we were only able to quantify the baseline for any economic impacts for potential modifications to fishing, this does not imply that harvest is the most important activity affecting the

abundance of the salmon PCE. As noted previously, salmon abundance is affected by a host of activities, which would be considered in ESA section 7 consultations. In the ESA section 4(b)(2) report we acknowledge that there are additional costs for programs associated with salmon conservation and and habitat restoration aside from costs associated with any harvest reduction, although we could not attribute these costs to the designation of critical habitat for southern resident killer whales. In addition, if fisheries were impacted, any potential reductions in harvest would be evaluated to ensure that they were consistent with the ESA, treaty fishing rights, treaty trust obligations, and relevant court cases.

Balancing the Benefits and Economic Impacts of Designation

Section 4(b)(2) of the ESA requires that we balance the benefit of critical habitat designation against the economic benefit of exclusion for each particular area. The benefit to the species of designation depends upon the inherent conservation value of the area, the seriousness of the threats to that conservation value, and the extent to which an ESA section 7 consultation or the educational aspects of designation will address those threats. If a threat bears a closer relationship to the adverse modification prohibition of section 7, we can begin to understand and give weight to the incremental benefit of designation beyond the protection provided by listing and the jeopardy prohibition. We have identified the threats that face each area and the likelihood that the adverse modification prohibition will enhance our ability to address those threats.

We listed the whales as endangered, citing, among other reasons, "the ongoing and potentially changing nature of pervasive threats, in particular, disturbance from vessels, the persistence of legacy toxins and the addition of new ones into the whales' environment, and the potential limits on prey availability (primarily salmon) given uncertain future ocean conditions." As described above, designation of critical habitat will enhance our ability to address some of these threats, either through an ESA section 7 consultation or through ongoing public outreach and education. Because some of these threats bear a stronger relationship to adverse modification than to jeopardy, we also believe there is an incremental benefit of designation beyond the protection afforded by the jeopardy prohibition.

As stated above, the benefit of designation also depends on the inherent conservation value of the area. The habitat areas for these killer whales are unique and irreplaceable. It is difficult to separate the value of any one of the areas: each of the three areas supports a distinct aspect of the whales' life history, and the conservation function of each area complements the conservation function of the others. Therefore, designation of each particular area benefits the conservation function of the other areas. For all of the reasons discussed above, we consider the benefit of designation of each area to be high.

The benefit of exclusion of an area depends on some of the same factors - the likelihood of an ESA section 7 consultation and the extent to which an activity is likely to change as a result of that consultation. As with the benefit of designation side of the equation, if a threat bears a closer relationship to the adverse modification prohibition of section 7, we can begin to understand and give weight to the incremental cost of designation (benefit of exclusion) beyond the cost associated with listing and the jeopardy prohibition. In balancing the potential costs of designation, we also considered the nature of the threats and the relevance of section 7's adverse modification prohibition to each threat. Because adverse modification and jeopardy bear an equally strong relationship to fishing, and because some changes in fishing are likely as a result of consultation, we gave these costs of designation moderate weight. We recognize that adverse modification bears the strongest relationship to water quality management, but we presently lack sufficient data to estimate an economic impact. We also recognize that we have not monetized (quantified) the costs that may be associated with the education benefit of designation with respect to vessel traffic.

We conclude that the economic benefits of excluding each particular area do not outweigh the conservation benefits of designating each particular area as critical habitat, given the endangered status of the whales, the uniqueness of the habitat, the fact that threats to habitat were a primary concern leading to our endangered finding, and the fact that designation will enhance the ability of an ESA section 7 consultation to protect the habitat.

Impacts on National Security

Prior to listing Southern Resident killer whales under the ESA, we contacted the DOD by letter and identified 18 military sites, previously addressed during salmon and steelhead habitat designations, that potentially overlapped with areas under consideration for Southern Resident killer whale critical habitat: (1) Naval Undersea Warfare Center, Keyport; (2) Naval Ordnance Center, Port Hadlock (Indian Island); (3) Naval Fuel Depot, Manchester; (4) Naval Air Station, Whidbey Island; (5) Naval Station Everett; (6) Naval Hospital Bremerton; (7) Fort Lewis (Army); (8) Pier 23 (Army); (9) Puget Sound Naval Ship Yard; (10) Strait of Juan de Fuca naval air-to-surface weapon range, restricted area; (11) Strait of Juan de Fuca and Whidbey Island naval restricted areas; (12) Admiralty Inlet naval restricted area; (13) Port Gardner Naval Base restricted area; (14) Port Orchard Passage naval restricted area; (15) Sinclair Inlet naval restricted area; (16) Carr Inlet naval restricted area; (17) Port Townsend/Indian Island/Walan Point naval restricted area; and (18) Crescent Harbor Explosive Ordnance Units Training Area.

These 18 military sites overlap with areas we found to meet the definition of critical habitat for the Southern Resident killer whale DPS. These 18 sites include shore-based facilities, nearshore areas around structures such as docks and piers, and offshore areas in Puget Sound where the Navy has security restrictions, and they cover approximately 112 square miles (291 sq km) out of the total 2,687 square miles (6,959 sq km) under consideration as critical habitat for Southern Residents. The total area considered was recalculated for the final rule and was updated from 2,676 square miles (6,931 sq km) in the proposed rule, to 2,687 square miles (6,959 sq km) for the final rule. The shore-based sites cover 81 miles (130 km) of shoreline out of the total 2,081 miles (3,349 km) of shoreline considered for critical habitat designation.

The DOD confirmed that the 18 sites are owned or controlled by the DOD, identified the types of military activities that take place in the areas, and provided an assessment as to whether designation of critical habitat would affect military readiness. The Army and Navy concluded that critical habitat designation at any of these sites would likely impact national security by diminishing military readiness. The DOD requested that we consider conducting an ESA section 4(b)(2) analysis to determine whether all of the sites could be excluded from designation because the benefits of exclusion outweigh the benefits of designation. The possible impacts to national security include: preventing, restricting, or delaying training or

testing exercises or access to sites; restricting or delaying activities associated with vessel/facility maintenance and ordnance loading; and delaying response times for ship deployments and overall operations.

Balancing the Benefits of Designation with National Security Impacts

The benefit of excluding these particular areas is that the DOD would only be required to comply with the jeopardy prohibition of ESA section 7(a)(2) and not the adverse modification prohibition. The DOD maintains that the additional commitment of resources in completing an adverse modification analysis, and any change in its activities to avoid adverse modification of critical habitat, would likely reduce its readiness capability. Given that the DOD is currently actively engaged in training, maintaining, and deploying forces in the current war effort, this reduction in readiness could reduce the ability of the military to ensure national security.

We assessed the benefit of designating these areas of overlap based on: the physical or biological features of each area, the Southern Residents' use of each area (including how frequently they are present), the Federal activities in each area that might trigger an ESA section 7 consultation, the likelihood that we would seek a modification of those activities, and the strength of the connection between those activities and habitat modification. The benefit of designation is that the section 7 requirement regarding adverse modification would focus our section 7 consultations on essential physical and biological features of the whales' habitat, particularly where the Federal activity has a more direct impact on habitat features and a less direct impact on individual killer whales.

We considered the overlap of killer whale habitat within the boundaries of military sites; the conservation value of that habitat; and the types of Federal activities in those areas that would likely undergo ESA section 7 consultation. We also considered the high priority placed on national security, the potential for critical habitat designation to have some impact on military readiness, and the fact that, collectively, these areas represent relatively small percentages of the total habitat and none of them are located in Area 1, the core summer area. Based on our consideration of these factors, we conclude that the national security benefits of exclusion outweigh the conservation benefits of designation for each of the 18 sites, and we are not designating these DOD sites as critical habitat.

ESA Section 4(b)(2) Conclusions

We conclude that the economic benefits of excluding each particular area do not outweigh the conservation benefits of designating each particular area as critical habitat, given the endangered status of the whales, the uniqueness of the habitat, the fact that threats to habitat were a primary concern leading to our endangered finding, and the fact that designation will enhance the ability of an ESA section 7 consultation to protect the habitat.

We considered the overlap of killer whale habitat within the boundaries of military sites; the conservation value of that habitat; and the types of Federal activities in those areas that would likely undergo ESA section 7 consultation. We also considered the high priority placed on national security, the potential for critical habitat designation to have some impact on military readiness, and the fact that, collectively, these areas represent relatively small percentages of the total habitat and none of them are located in Area 1, the core summer area. Based on our consideration of these factors, we conclude that the national security benefits of exclusion outweigh the conservation benefits of designation for each of the 18 sites, and we are not designating these DOD sites as critical habitat.

We did not identify other relevant impacts of designation beyond economic impacts and impacts on national security.

Critical Habitat Designation

We are designating approximately 2,560 square miles (6,630 km) of marine habitat within the area occupied by Southern Resident killer whales in Washington. The proposed areas are occupied and contain physical or biological features that are essential to the conservation of the species and may require special management considerations or protection. Some of these areas overlap with military sites, which are not designated as critical habitat because they were determined to have national security impacts that outweigh the benefit of designation and were therefore excluded under ESA section 4(b)(2). We determined that the economic benefits of exclusion of any of the areas do not outweigh the benefits of designation, and we are therefore not excluding any areas based on economic impacts. Section 4(b)(2) does not allow the agency to exclude areas if exclusion will result in extinction of the species. We are excluding only a small percentage of the whales' habitat because of impacts to national security. Given this small percentage, we conclude that the exclusion of these areas will not result in extinction of the Southern Resident killer whale DPS. No unoccupied areas are currently designated as critical habitat.

Required Determinations

Regulatory Planning and Review

This final rule has been determined to be significant for purposes of Executive Order (E.O.) 12866. A final economic report and ESA section 4(b)(2) report document our consideration of alternatives to rulemaking as required by this Executive Order. We have analyzed the economic effects of various management scenarios. These are described in the economic report supporting this rulemaking, available at *http://www.nwr.noaa.gov/*.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA)(5 U.S.C. 601 *et seq.*, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency publishes a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). We have prepared a final regulatory flexibility analysis (FRFA), which is part of the Economic Analysis (NMFS, 2006b). The FRFA incorporates the Initial Regulatory Flexibility Analysis (IRFA), which was part of the draft economic analysis that accompanied the proposed rule to designate critical habitat. The FRFA also incorporates comments received on the IRFA and on the economic impacts of the rule generally. Responses to comments are provided above in the preamble to the rule, and any necessary corresponding changes were made to the FRFA. The analysis is summarized below.

A statement of the need for and objectives of this final rule is provided earlier in the preamble and is not repeated here. This final rule will not impose any recordkeeping or reporting requirements.

At the present time, insufficient information exists regarding the cost structure and operational procedures and strategies in the sectors that may be directly impacted by the critical habitat designation. Further, significant

uncertainty exists regarding the activities that may trigger an ESA section 7 consultation or how those activities may be modified as a result of consultation. Bearing in mind these limitations, we considered which of the potential economic impacts we analyzed might affect small entities. These estimates should not be considered exact estimates of the impacts of critical habitat to individual businesses. There are 344 entities engaged in fishing activities in the region, 332 of which are considered "small entities."

Although ESA section 7 consultations may also occur on water quality management activities, at this time it is too speculative to estimate the type and number of activities and the potential modifications that could result from a consultation.

The RFA, as amended by SBREFA, requires us to consider alternatives to the proposed regulation that will reduce the impacts to small entities. We considered and rejected the alternative of not designating critical habitat for Southern Resident killer whales because such an approach does not meet the legal requirements of the ESA. We also considered alternatives in which each of the three critical habitat areas is excluded under section 4(b)(2) of the ESA. Each of these alternatives may have minimized impacts on small businesses by reducing consultation costs and potential project modifications necessitated pursuant to section 7(a)(2) of the ESA once an area is designated as critical habitat. As described earlier in this rulemaking, the magnitude of these impacts is difficult to predict. However, because we did not find that the economic benefits of exclusion outweigh the benefits of designation for any of the three specific areas, we did not have discretion to exclude any these areas pursuant to the ESA. We therefore rejected each of these alternatives as inconsistent with the ESA.

E.O. 13211

On May 18, 2001, the President issued an Executive Order on regulations that significantly affect energy supply, distribution, and use. E.O. 13211 requires agencies to prepare Statements of Energy Effects when undertaking any action that promulgates or is expected to lead to the promulgation of a final rule or regulation that (1) is a significant regulatory action under E.O. 12866 and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy.

We have considered the potential impacts of this action on the supply, distribution, or use of energy and find the designation of critical habitat will not have impacts that exceed the thresholds identified above (NMFS, 2006b).

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act, we make the following findings:

(a) This final rule will not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon state, local, tribal governments, or the private sector and includes both "Federal intergovernmental mandates" and "Federal private sector mandates." These terms are defined in 2 U.S.C. 658(5) (7). "Federal intergovernmental mandate" includes a regulation that "would impose an enforceable duty upon State, local, or tribal governments' with two exceptions. It excludes "a condition of Federal assistance." It also excludes "a duty arising from participation in a voluntary Federal program," unless the regulation "relates to a then-existing Federal program under which $500,000,000 or more is provided annually to state, local, and tribal governments under entitlement authority, "if the provision would "increase the stringency of conditions of assistance" or "place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding" and the state, local, or tribal governments "lack authority" to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. "Federal private sector mandate" includes a regulation that "would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance; or (ii) a duty arising from participation in a voluntary Federal program." The designation of critical habitat does not impose a legally binding duty on non-Federal government entities or private parties. Under the ESA, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities which receive Federal funding, assistance, permits or otherwise require approval or authorization from a Federal agency for an action may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply; nor would critical habitat shift the costs of the large entitlement programs listed above to state governments.

(b) Due to the prohibition against take of this species both within and outside of the designated areas, we do not anticipate that this final rule will significantly or uniquely affect small governments. As such, a Small Government Agency Plan is not required.

Takings

In accordance with E.O. 12630, the final rule does not have significant takings implications. A takings implication assessment is not required. The designation of critical habitat affects only Federal agency actions. Private lands do not exist within the proposed critical habitat and therefore would not be affected by this action.

Federalism

In accordance with E.O. 13132, this final rule does not have significant federalism effects. A federalism assessment is not required. In keeping with Department of Commerce policies, we have requested information from, and will continue to coordinate this critical habitat designation with, appropriate state resource agencies in Washington. The designation may have some benefit to state and local resource agencies in that the areas essential to the conservation of the species are more clearly defined, and the PCEs of the habitat necessary for the survival of the Southern Resident killer whales are specifically identified. While making this definition and identification does not alter where and what federally sponsored activities may occur, it may assist local governments in long-range planning (rather than waiting for case-by-case ESA section 7 consultations to occur).

Civil Justice Reform

In accordance with E.O. 12988, the Department of Commerce has determined that this final rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Executive Order. We

are designating critical habitat in accordance with the provisions of the ESA. This final rule uses standard property descriptions and identifies the PCEs within the designated areas to assist the public in understanding the habitat needs of Southern Resident killer whales.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This final rule does not contain new or revised information collection for which OMB approval is required under the Paperwork Reduction Act. This final rule will not impose recordkeeping or reporting requirements on state or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act of 1969 (NEPA)

NMFS has determined that an environmental analysis as provided for under NEPA for critical habitat designations made pursuant to the ESA is not required. See *Douglas County* v. *Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied, 116 S.Ct. 698 (1996).

Government-to-Government Relationship With Tribes

The long-standing and distinctive relationship between the Federal and tribal governments is defined by treaties, statutes, executive orders, judicial decisions, and agreements, which differentiate tribal governments from the other entities that deal with, or are affected by, the Federal Government. This relationship has given rise to a special Federal trust responsibility involving the legal responsibilities and obligations of the United States toward Indian Tribes and the application of fiduciary standards of due care with respect to Indian lands, tribal trust resources, and the exercise of tribal rights. E.O. 13175 (Consultation and Coordination with Indian Tribal Governments) outlines the responsibilities of the Federal Government in matters affecting tribal interests.

None of the designated critical habitat occurs on tribal lands. However, critical habitat does overlap with Usual and Accustomed hunting and fishing grounds. The designation of critical habitat for Southern Resident killer whales has the potential to affect tribal trust resources, particularly in relation to salmon, an important tribal resource and PCE for the whales. Should it be necessary to reduce Puget Sound fisheries, a reduction in tribal fisheries would only occur consistent with the principles established in the Secretarial Order, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act." We will continue to consult with affected tribes regarding designated critical habitat.

References Cited

A complete list of all references cited in this rulemaking can be found on our website at *http://www.nwr.noaa.gov/* and is available upon request from the NMFS office in Seattle, Washington (see **ADDRESSES**).

List of Subjects in 50 CFR Part 226

Endangered and threatened species.

Dated: November 21, 2006.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

■ For the reasons set out in the preamble, part 226, title 50 of the Code of Federal Regulations is amended to read as follows:

PART 226—DESIGNATED CRITICAL HABITAT

■ 1. The authority citation of part 226 continues to read as follows:

Authority: 16 U.S.C. 1533.

■ 2. Add § 226.206, to read as follows:

§ 226.206 Critical habitat for the Southern Resident killer whale (*Orcinus orca*).

Critical habitat is designated for the Southern Resident killer whale as described in this section. The textual descriptions of critical habitat in this section are the definitive source for determining the critical habitat boundaries. The overview map is provided for general guidance purposes only, and not as a definitive source for determining critical habitat boundaries.

(a) *Critical Habitat Boundaries.* Critical habitat includes three specific marine areas of Puget Sound, Washington, within the following counties: Clallam, Jefferson, King, Kitsap, Island, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom. Critical habitat includes all waters relative to a contiguous shoreline delimited by the line at a depth of 20 feet (6.1 m) relative to extreme high water in each of the following areas:

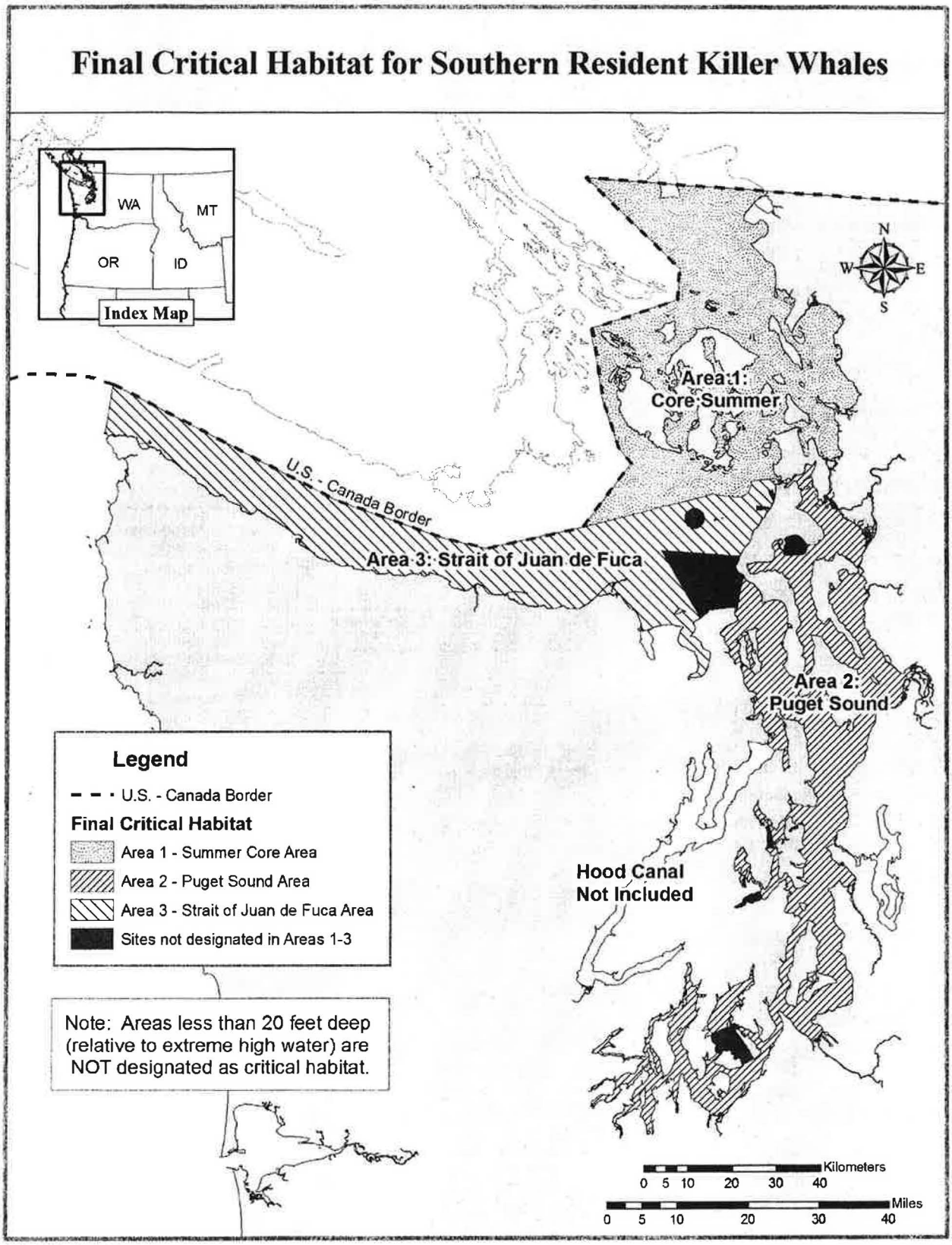
(1) *Summer Core Area:* All U.S. marine waters in Whatcom and San Juan counties; and all marine waters in Skagit County west and north of the Deception Pass Bridge (Highway 20) (48°24′ 25″ N./122°38′35″ W.).

(2) *Puget Sound Area:* All marine waters in Island County east and south of the Deception Pass Bridge (Highway 20) (48°24′ 25″ N./122°38′35″ W.), and east of a line connecting the Point Wilson Lighthouse (48°8′39″ N./122°45′12″ W.) and a point on Whidbey Island located at 48°12′30″ N./122°44′26″ W.; all marine waters in Skagit County east of the Deception Pass Bridge (Highway 20) (48°24′ 25″ N./122°38′35″ W.); all marine waters of Jefferson County east of a line connecting the Point Wilson Lighthouse (48°8′39″ N./122°45′12″ W.) and a point on Whidbey Island located at latitude 48°12′30″ N./122°44′26″ W., and north of the Hood Canal Bridge (Highway 104) (47°51′36″ N./122°37′23″ W.); all marine waters in eastern Kitsap County east of the Hood Canal Bridge (Highway 104) (47°51′36″ N./122°37′23″ W.); all marine waters (excluding Hood Canal) in Mason County; and all marine waters in King, Pierce, Snohomish, and Thurston counties.

(3) *Strait of Juan de Fuca Area:* All U.S. marine waters in Clallam County east of a line connecting Cape Flattery, Washington (48°23′10″ N./124°43′32″ W.), Tatoosh Island, Washington (48°23′30″ N./124°44′12″ W.), and Bonilla Point, British Columbia (48°35′30″ N./124°43′00″ W.); all marine waters in Jefferson and Island counties west of the Deception Pass Bridge (Highway 20) (48°24′ 25″ N./122°38′35″ W.), and west of a line connecting the Point Wilson Lighthouse (48°8′39″ N./122°45′12″ W.) and a point on Whidbey Island located at 48°12′30″ N./122°44′26″ W.

(b) An overview map of final critical habitat for the Southern Resident killer whale follows.

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(c) *Primary Constituent Elements.* The primary constituent elements essential for conservation of the Southern Resident killer whale are:

(1) Water quality to support growth and development;

(2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and (3) Passage conditions to allow for migration, resting, and foraging.

(d) *Sites owned or controlled by the Department of Defense.* Critical habitat does not include the following areas owned or controlled by the Department of Defense, or designated for its use, in the State of Washington, including shoreline, nearshore areas around structures such as docks and piers, and marine areas:

(1) Naval Undersea Warfare Center, Keyport;

(2) Naval Ordnance Center, Port Hadlock (Indian Island);

(3) Naval Fuel Depot, Manchester;

(4) Naval Air Station, Whidbey Island;

(5) Naval Station, Everett;

(6) Naval Hospital Bremerton;

(7) Fort Lewis (Army);

(8) Pier 23 (Army);

(9) Puget Sound Naval Ship Yard;

(10) Strait of Juan de Fuca naval air-to-surface weapon range, restricted area;

(11) Strait of Juan de Fuca and Whidbey Island naval restricted areas;

(12) Admiralty Inlet naval restricted area;

(13) Port Gardner Naval Base restricted area;

(14) Port Orchard Passage naval restricted area;

(15) Sinclair Inlet naval restricted area;

(16) Carr Inlet naval restricted area;

(17) Port Townsend/Indian Island/ Walan Point naval restricted area; and

(18) Crescent Harbor Explosive Ordnance Units Training Area.

[FR Doc. 06–9453 Filed 11–28–06; 8:45 am]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 060808213–6300–02; I.D. 073106C]

RIN 0648–AU56

Magnuson-Stevens Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; 2006 Georges Bank Cod Fixed Gear Sector Operations Plan and Agreement and Allocation of Georges Bank Cod Total Allowable Catch

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NMFS announces partial approval of an Operations Plan and Sector Contract titled "GB Cod Fixed Gear Sector Operations Plan and Agreement" (together referred to as the Sector Operations Plan), and the associated allocation of Georges Bank (GB) cod, consistent with regulations implementing Amendment 13, as modified by Framework Adjustment (FW) 42 to the Northeast (NE) Multispecies Fishery Management Plan (FMP) for fishing year (FY) 2006. The intent of this action is to allow regulated harvest of NE multispecies by the GB Cod Fixed Gear Sector (Fixed Gear Sector), consistent with the objectives of the FMP.

DATES: Effective November 22, 2006, through April 30, 2007.

ADDRESSES: Copies of the Sector Operations Plan and the Environmental Assessment (EA) are available upon request from the NE Regional Office at the following mailing address: George H. Darcy, Assistant Regional Administrator for Sustainable Fisheries, NMFS, Northeast Regional Office, 1 Blackburn Drive, Gloucester, MA 01930. These documents may also be requested by calling (978) 281–9315.

FOR FURTHER INFORMATION CONTACT: Mark Grant, Fishery Management Specialist, phone (978) 281–9145, fax (978) 281–9135, e-mail *Mark.Grant@NOAA.gov.*

SUPPLEMENTARY INFORMATION: The final rule implementing Amendment 13 to the FMP (69 FR 22906, April 27, 2004) specified a process for the formation of sectors within the NE multispecies fishery and the allocation of total allowable catch (TAC) or days-at-sea (DAS) for specific NE multispecies, implemented restrictions that apply to all sectors, and authorized the first sector of the FMP (the GB Cod Hook Gear Sector). The final rule implementing FW 42 (71 FR 62156, October 23, 2006) creates the Fixed Gear Sector, the second approved sector of the FMP. Creation of the Fixed Gear Sector authorizes the Regional Administrator to allocate a GB cod TAC to the Fixed Gear Sector and exempt members from FMP restrictions on an annual basis.

In accordance with the regulations that specify the process of sector approval, and in anticipation of approval of the Fixed Gear Sector, the Fixed Gear Sector submitted an initial version of the Sector Operations Plan and EA to NMFS on February 1, 2006. A final version was submitted on September 18, 2006. According to these documents, the Fixed Gear Sector will be overseen by a Board of Directors and a Sector Manager. Consistent with Amendment 13, the cod TAC for the Fixed Gear Sector is based upon the number of participants and their historic landings of GB cod. In addition, participating vessels will be required to fish under their Amendment 13 DAS allocations to account for any incidental groundfish species that they may catch while fishing for GB cod. The GB cod TAC is a "hard" TAC, meaning that, once the TAC is reached, Fixed Gear Sector vessels may not fish under a DAS, possess or land GB cod or other regulated species managed under the FMP (regulated species), or use gear capable of catching groundfish (unless fishing under charter/party or recreational regulations) for the remainder of the fishing year.

Each Fixed Gear Sector member will be required to fish with jigs, demersal longline, handgear or gillnets; remain in the Fixed Gear Sector for the entire fishing year; and be confined to fishing in the Sector Area, which is that portion of the GB cod stock area north of 39o 00' N. lat. and east of 71o 40' W. long. Fixed Gear Sector members will be required to comply with all pertinent Federal fishing regulations, unless specifically exempted by a Letter of Authorization (LOA), and with the provisions of the approved Operations Plan. Fixed Gear Sector members will be exempted from the GB cod possession limits, the requirements of the GOM cod trip limit exemption program, and the GB Seasonal Closure Area (when fishing with hook gear).

On August 22, 2006, a proposed rule was published in the **Federal Register** (71 FR 48903) that requested comments on the Operations Plan and EA. The

Exhibit 16

Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not a significant regulatory action under Executive Order 12866.

Under RCRA 3006(b), EPA grants a State's application for authorization as long as the State meets the criteria required by RCRA. It would thus be inconsistent with applicable law for EPA, when it reviews a State authorization application, to require the use of any particular voluntary consensus standard in place of another standard that otherwise satisfies the requirements of RCRA. Thus, the requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply. As required by section 3 of Executive Order 12988 (61 FR 4729, February 7, 1996), in issuing this rule, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct. EPA has complied with Executive Order 12630 (53 FR 8859, March 15, 1988) by examining the takings implications of the rule in accordance with the ''Attorney General's Supplemental Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings'' issued under the Executive Order. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*).

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this document and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2). This action, nevertheless, will be effective 60 (sixty) days after publication pursuant to the procedures governing immediate final rules.

List of Subjects in 40 CFR Part 271

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous waste, Hazardous waste transportation, Indian lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements.

Authority: This action is issued under the authority of sections 2002(a), 3006 and 7004(b) of the Solid Waste Disposal Act as amended 42 U.S.C. 6912(a), 6926, 6974(b).

Dated: November 9, 2005.

Robert W. Varney,

Regional Administrator, EPA New England.

[FR Doc. 05–22891 Filed 11–17–05; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 224

[Docket No. 041213348–5285–02; I.D. 110904E]

RIN 0648–AS95

Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NOAA's National Marine Fisheries Service (NMFS) is issuing a final determination to list the Southern Resident killer whale distinct population segment (DPS) as endangered under the Endangered Species Act of (ESA) 1973. Following an update of the status review of Southern Resident killer whales (*Orcinus orca*) under the ESA, NMFS published a proposed rule to list the Southern Resident killer whale DPS as threatened on December 22, 2004. After considering public comments on the proposed rule and other available information, we reconsidered the status of Southern Residents and are issuing a final rule to list the Southern Resident killer whale DPS as an endangered species. The prohibition on take of an endangered species will go into effect at the time this final rule is effective (see **DATES**).

DATES: This final rule is effective February 16, 2006.

ADDRESSES: Comments and materials received, as well as supporting documentation used in the preparation of this final rule, are available for public inspection by appointment during normal business hours at the NMFS, Protected Resources Division, 7600 Sand Point Way NE, Seattle, WA, 98115. The final rule, references and other materials relating to this determination can be found on our website at *www.nwr.noaa.gov*.

FOR FURTHER INFORMATION CONTACT: Ms. Lynne Barre at the address above or at (206) 526–4745, or Ms. Marta Nammack, Office of Protected Resources, Silver Spring, MD (301) 713–1401, ext. 180.

SUPPLEMENTARY INFORMATION:

Background

On May 2, 2001, we received a petition from the Center for Biological Diversity and 11 co-petitioners (CBD, 2001) to list Southern Resident killer whales as threatened or endangered under the ESA. On August 13, 2001, we provided notice of our determination that the petition presented substantial information indicating that a listing may be warranted and requested information to assist with a status review to determine if Southern Resident killer whales warranted listing under the ESA (66 FR 42499). To assist in the status review, we formed a Biological Review Team (BRT) of scientists from our Alaska, Northwest, and Southwest Fisheries Science Centers. We convened a meeting on September 26, 2001, to gather technical information from co-managers, scientists, and individuals having research or management expertise pertaining to killer whale stocks in the North Pacific Ocean. Additionally, the BRT discussed its preliminary scientific findings with Tribal, State and Canadian co-managers on March 25, 2002. The BRT considered information from the petition, the September and March meetings, and comments submitted in response to our information request in preparing a final scientific document on Southern Resident killer whales (NMFS, 2002).

After conducting the status review, we determined that listing Southern Resident killer whales as a threatened or endangered species was not warranted because Southern Resident killer whales did not constitute a species as defined by the ESA. The ESA's definition of species includes subspecies and ''distinct population segments.'' The agency considers a group of organisms to be a DPS when it is both discrete from other populations and significant to the taxon to which it belongs (61 FR 4722; February 7, 1996). We considered Southern Resident killer whales in the context of the global taxon (i.e., all killer whales worldwide) and found that the population did not meet the significance criterion for consideration as a DPS. The finding, along with supporting documentation, was published on July

1, 2002 (67 FR 44133). The 2002 status review and other documents supporting the "not warranted" finding are available on the internet (see Electronic Access). Because of the uncertainties regarding killer whale taxonomy (i.e., whether the killer whale should be considered as one species or as multiple species and/or subspecies), we announced we would reconsider the taxonomy of killer whales within 4 years.

The scientific information evaluated during the ESA status review indicated that Southern Resident killer whales may be depleted under the Marine Mammal Protection Act (MMPA). We initiated consultation with the Marine Mammal Commission (Commission) in a letter dated June 25, 2002, and published an advance notice of proposed rulemaking (ANPR) on July 1, 2002 (67 FR 44132), to request pertinent information regarding the status of the stock and potential conservation measures that may benefit these whales. After considering comments received in response to the ANPR and from the Commission, we published a proposed rule to designate the Southern Resident stock of killer whales as depleted (68 FR 4747; January 30, 2003) and solicited comments on the proposal. Based on the best scientific information available, consultation with the Commission, and consideration of public comment, we determined that the Southern Resident stock of killer whales was depleted under the MMPA (68 FR 31980; May 29, 2003) and announced our intention to prepare a Conservation Plan. We published a Notice of Availability of a Proposed Conservation Plan for Southern Resident Killer Whales on October 3, 2005 (70 FR 57565).

On December 18, 2002, the Center for Biological Diversity (and other plaintiffs) challenged our "not warranted" finding under the ESA in U.S. District Court. The U.S. District Court for the Western District of Washington issued an order on December 17, 2003, which set aside our "not warranted" finding and remanded the matter to us for redetermination of whether the Southern Resident killer whales should be listed under the ESA (Center for Biological Diversity v. Lohn, 296 F. Supp. 2d. 1223 (W.D. Wash. 2003)). The District Court held that "[w]hen the best available science indicates that the 'standard taxonomic distinctions' are wrong . . . NMFS must rely on the best available science."

As a result of the court's order, we reconvened a BRT in 2004 to consider new scientific and commercial data available since 2002 and update the status review for Southern Residents. We announced the status review update and requested that interested parties submit pertinent information to assist us with the update (69 FR 9809; March 2, 2004). In addition, we co-sponsored a Cetacean Taxonomy workshop in 2004, which included a special session on killer whales. The papers and reports from the workshop were made available to the BRT.

In August 2004, we met with Washington State and Tribal co-managers to provide information on the status review update and receive comments. These comments were evaluated by the BRT, which then prepared a final status review document for Southern Resident killer whales (NMFS, 2004). The BRT agreed that Southern Residents likely belong to an unnamed subspecies of resident killer whales in the North Pacific, which includes the Southern and Northern Residents, as well as the resident killer whales of Southeast Alaska, Prince William Sound, Kodiak Island, the Bering Sea and Russia (but not transients or offshores). The BRT concluded that the Southern Residents are discrete and significant with respect to the North Pacific resident taxon and therefore should be considered a DPS. In addition, the BRT conducted a population viability analysis which modeled the probability of species extinction under a range of assumptions. Based on the findings of the status review and an evaluation of the factors affecting the DPS, we published a proposed rule to list the Southern Resident killer whales as threatened on December 22, 2004 (69 FR 76673).

Natural History of Killer Whales

Killer whales are one of the most strikingly pigmented of all cetaceans, making field identification easy. Killer whales are black dorsally and white ventrally, with a conspicuous white oval patch located slightly above and behind the eye. A highly variable gray or white saddle is usually present behind the dorsal fin. Sexual dimorphism occurs in body size, flipper size, and height of the dorsal fin. More detailed information regarding this species' distribution, behavior, genetics, morphology, and physiology are contained in the BRT's status review documents (NMFS, 2002, 2004) and the Washington State Status Report for the Killer Whale (Wiles, 2004).

Killer whales are classified as top predators in the food chain and are the world's most widely distributed marine mammal (Leatherwood and Dahlheim, 1978; Heyning and Dahlheim, 1988). Although observed in tropical waters and the open sea, they are most abundant in coastal habitats and high latitudes. In the northeastern Pacific Ocean, killer whales occur in the eastern Bering Sea (Braham and Dahlheim, 1982) and are frequently observed near the Aleutian Islands (Scammon, 1874; Murie, 1959; Waite *et al.*, 2001). They reportedly occur year-round in the waters of southeastern Alaska (Scheffer, 1967) and the intercoastal waterways of British Columbia and Washington State (Balcomb and Goebel, 1976; Bigg *et al.*, 1987; Osborne *et al.*, 1988). There are occasional reports of killer whales along the coasts of Washington, Oregon, and California (Norris and Prescott, 1961; Fiscus and Niggol, 1965; Rice, 1968; Gilmore, 1976; Black *et al.*, 1997; NMFS, 2004), both coasts of Baja California (Dahlheim *et al.*, 1982), the offshore tropical Pacific (Dahlheim *et al.*, 1982), the Gulf of Panama, and the Galapagos Islands. In the western North Pacific, killer whales occur frequently along the Russian coast in the Bering Sea, the Sea of Okhotsk, the Sea of Japan, and along the eastern side of Sakhalin and the Kuril Islands (Tomilin, 1957). There are numerous accounts of their occurrence off China (Wang, 1985) and Japan (Nishiwaki and Handa, 1958; Kasuya, 1971; Ohsumi, 1975). Data from the central Pacific are scarce. They have been reported off Hawaii, but do not appear to be abundant in these waters (Tomich, 1986; Caretta *et al.*, 2001).

The killer whale is the largest species within the family Delphinidae. Various scientific names have been assigned to the killer whale (Hershkovitz, 1966; Heyning and Dahlheim, 1988). These various names can be explained by sexual and age differences in the size of the dorsal fin, individual variations in color patterns, and the cosmopolitan distribution of the animals. The genus *Orcinus* is currently considered monotypic with geographical variation noted in size and pigmentation patterns. Two proposed Antarctic species, *O. nanus* (Mikhalev *et al.*, 1981) and *O. glacialis* (Berzin and Vladimirov, 1982; Berzin and Vladimirov, 1983), both appear to refer to the same type of smaller individuals. However, because of significant uncertainties regarding the limited specimen data, these new taxa have not been widely accepted by the scientific community. New observations of color pattern, size, habitat and feeding ecology have led to the conclusion that there are three types of killer whales in Antarctica (Pitman and Ensor, 2003). Recent genetic investigations note marked differences between some forms of killer whale

(Hoelzel and Dover, 1991; Hoelzel *et al.*, 1998; Barrett-Lennard, 2000; Barrett-Lennard and Ellis, 2001). Killer whale taxonomy was reviewed as part of the "Workshop on Shortcomings of Cetacean Taxonomy in Relation to Needs of Conservation and Management" held on April 30 – May 2, 2004 in La Jolla, California, and the results were published in a report (Reeves *et. al.*, 2004).

Ecotypes of Killer Whales

Killer whales in the Eastern North Pacific region (which includes the Southern Resident killer whales) have been classified into three forms, or ecotypes, termed residents, transients, and offshore whales. Significant genetic differences occur among resident, transient, and offshore killer whales (Stevens *et al.*, 1989; Hoelzel and Dover, 1991; Hoelzel *et al.*, 1998; Barrett-Lennard, 2000; Barrett-Lennard and Ellis, 2001; Hoelzel *et al.*, 2002). The three forms also vary in morphology, ecology, and behavior. All of these characteristics play an important role in determining whether the monotypic species *O. orca* can be subdivided under the ESA.

Resident Killer Whales

Resident killer whales in the Eastern North Pacific are noticeably different from both the transient and offshore forms. The dorsal fin of resident whales is rounded at the tip and falcate (curved and tapering). Resident whales have a variety of saddle patch pigmentations with five different patterns recognized (Baird and Stacey, 1988). Resident whales occur in large, stable pods with membership ranging from 10 to approximately 60 whales. Their presence has been noted in the waters from California to Alaska. The primary prey of resident whales is fish. A recent summary of the differences between resident and transient forms is found in Baird (2000).

Resident killer whales in the North Pacific consist of the following groups: Southern, Northern, Southern Alaska (includes Southeast Alaska and Prince William Sound whales), western Alaska, and western North Pacific Residents. The Southern Resident killer whale assemblage contains three pods-- J pod, K pod, and L pod--and is considered a stock under the MMPA. Their range during the spring, summer, and fall includes the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait. Their occurrence in the coastal waters off Oregon, Washington, Vancouver Island, and more recently off the coast of central California in the south and off the Queen Charlotte Islands to the north has been documented. Little is known about the winter movements and range of the Southern Resident stock. Southern Residents have not been seen to associate with other resident whales, and mitochondrial and nuclear genetic data suggest that Southern Residents interbreed with other killer whale populations rarely if at all (Hoelzel et al., 1998; Barrett-Lennard, 2000; Barrett-Lennard and Ellis, 2001).

Transient Killer Whales

Transient whales occur throughout the Eastern North Pacific with a preference towards coastal waters. Their geographical range overlaps that of the resident and offshore whales. Individual transient killer whales have been documented to move great distances reflecting a large home range (Goley and Straley, 1994). There are several differences between transient and resident killer whales; these have most recently been summarized by Baird (2000). The dorsal fin of transient whales tends to be more erect (i.e., straighter at the tip) than those of resident and offshore whales. Saddle patch pigmentation of Transient killer whales is restricted to three patterns (Baird and Stacey, 1988). Pod structure is small (e.g., fewer than 10 whales) and dynamic in nature. The primary prey of transient killer whales is other marine mammals. Transient whales are not known to intermix with resident or offshore whales. Recent genetic investigations indicate that up to three genetically different groups of transient killer whales exist in the eastern North Pacific (the "west coast" Transients, the "Gulf of Alaska Transients" and the AT1 pod) (Barrett-Lennard, 2000; Barrett-Lennard and Ellis, 2001).

Offshore Killer Whales

Offshore killer whales are similar to resident whales, but can be distinguished (i.e., their fins appear to be more rounded at the tip with multiple nicks on the trailing edge, smaller overall size, less sexual dimorphism), but these characteristics need to be further quantified. Offshore whales have been seen in considerably larger groups (up to 200 whales) than residents or transients have. They are known to range from central coastal Mexico to Alaska and occur in both coastal and offshore waters (300 miles off Washington State). While foraging, it is assumed that the main target is fish, but observations of feeding events are extremely limited. Offshore whales are not known to intermingle with resident or transient whales. Genetic analysis indicates that offshore whales are substantially reproductively isolated from other killer whale populations (Barrett-Lennard, 2000; Hoelzel *et al.*, 2004).

Summary of Comments Received in Response to the Proposed Rule

NMFS held public hearings and meetings in February 2005 to provide information on the proposed listing under the ESA, answer questions, and receive comments. We received 34 written comments from government agencies, non-profit groups and members of the public, as well as peer review comments. An additional 1,292 form letters were submitted via e-mail. All of the comments supported listing Southern Resident killer whales under the ESA, with the exception of three comments, two of which addressed issues other than the listing and one which stated "no comment."

A joint NMFS/FWS policy requires us to solicit independent expert review from at least three qualified specialists, concurrent with the public comment period (59 FR 34270, July 1, 1994). We solicited technical review of the proposed listing determinations from 10 independent experts selected from the academic and scientific community. In December 2004 the Office of Management and Budget (OMB) issued a Final Information Quality Bulletin for Peer Review establishing minimum peer review standards, a transparent process for public disclosure, and opportunities for public input. We received comments from one of the independent experts from whom we had requested technical review of the proposed listing determinations. The independent expert reviewer was generally supportive of the scientific principles underlying the DPS determination and proposed listing determination. The reviewer, however, went on to consider the status of all North Pacific resident whales, and suggested that the extinction of Southern Resident killer whales would lead to a significant gap in the range of all North Pacific residents, indicating that all residents should be considered endangered (see comment 6 and response). There was substantial overlap between the comments from the independent expert reviewer and the substantive public comments. The comments were sufficiently similar that we have responded to the reviewer's comments through our general responses below.

Comment 1: The majority of commenters, including the peer reviewer, supported a listing of Southern Resident killer whales as endangered rather than threatened. Arguments for an endangered listing

included: the BRT's statement that the Southern Residents are "at risk for extinction;" the high likelihood of extinction for some scenarios in the population viability analysis; the small population size; the susceptibility to catastrophic events; the fact that Canada and Washington State consider the Southern Residents endangered; comparisons to criteria used for other species of whales (for example, in the Recovery Plan for the North Atlantic Right Whale (*Eubalaena glacialis*)(NMFS, 2005)); criteria used by other organizations (for example, the World Conservation Union criterion that populations with fewer than 50 mature individuals are critically endangered (NMFS, 2004)); the recent fluctuations in abundance, including a significant decline; and the pervasive nature and uncertainty of the factors that may be causing population fluctuations or keeping the population at low levels of abundance.

Response: In our proposed rule we acknowledged the factors pointing to a conclusion that Southern Resident killer whales are "in danger of extinction," but also recognized the mitigating factors pointing instead to a conclusion that they are not yet in danger, though likely to become so in the foreseeable future. After balancing the conflicting factors, we gave greater weight to the mitigating factors and proposed a threatened determination. However, after considering information received during the comment period and peer review process, and re-analyzing the factors affecting the Southern Residents, we agree it is appropriate to give greater weight to the threats facing the Southern Resident DPS, and are now listing the DPS as endangered in this final rule.

We continue to disagree that many of the reasons offered by commenters compel a finding under the ESA that the Southern Resident killer whale DPS is "in danger of extinction" as opposed to "likely to become an endangered species." The BRT was not making a legal finding when it characterized the Southern Residents as "at risk for extinction." Such a characterization is equally consistent with a determination that the population is likely to become an endangered species in the foreseeable future. Population viability analysis is a useful tool for many purposes, but should be used cautiously in making a determination that a given population is "in danger of extinction," as the peer reviewer observed, because of numerous uncertainties. While some of the scenarios had a high probability of extinction, others did not. We are also not persuaded that the small population size alone, its susceptibility to catastrophic events, or the comparison to other criteria (such as the IUCN or Right Whale criteria) compel a determination of "endangered." The DPS we have delineated is likely naturally small, even at historical levels, and accordingly would always face some level of demographic, stochastic and catastrophic risks. The fact that other entities might classify the population in a certain way is useful information but does not determine the outcome of an inquiry under the standards of the ESA.

Other information provided during the comment period and peer review process, however, compelled us to give greater weight to the threats facing the Southern Resident DPS than to the mitigating factors. The peer reviewer and others highlight the ongoing and potentially changing nature of pervasive threats, in particular, disturbance from vessels, the persistence of legacy toxins and the addition of new ones into the whales' environment, and the potential limits on prey availability (primarily salmon) given uncertain future ocean conditions. The peer reviewer correctly observed that these risks are unlikely to decline (and are likely to increase) in the future. The small number of reproductive age males and high mortality rates for this group are also a concern. And while the population of Southern Residents is not naturally large, the intensity of the threats is increased by the small number of animals currently in the population. The combination of factors responsible for past population declines are unclear, may continue to persist and could worsen before conservation actions are successful, which could potentially preclude a substantial population increase.

In sum, our analysis concluded that the risks to the Southern Resident killer whale DPS represent both "current [and] threatened destruction or modification of the species' habitat," and, to a lesser extent, "overutilization" both for commercial and recreational purposes that are likely contributing to the fluctuations in abundance and exacerbating the risk of extinction naturally faced by a small population. After reconsidering the statutory factors listed in section 4(a)(1) in light of the peer reviewer and public comments, and reevaluating our initial balancing of the risks and mitigating factors, we have determined that Southern Residents are "in danger of extinction."

Comment 2: Several commenters and the peer reviewer suggested that critical habitat was necessary for the recovery of Southern Residents and urged NMFS to designate critical habitat for Southern Resident killer whales as soon as possible. Specific suggestions for critical habitat areas were general and included "most of Puget Sound," "Puget Sound and the Straits of Georgia and Juan de Fuca" and "all internal waters of Washington State."

Response: We concur that designating critical habitat is useful for the recovery of Southern Resident killer whales. In our proposal to list the Southern Resident DPS, we included information on potential physical and biological features that are essential to conservation and that may require special management considerations. We requested comments on the appropriateness of considering the suggested features to assist in developing a proposal for critical habitat designation. We have reviewed the comments provided and the best available scientific information on "essential features", and we are developing a proposal for critical habitat for Southern Resident killer whales.

Comment 3: Several commenters and the peer reviewer mentioned sound and its effects on killer whales, raising specific concerns about Navy activities and sonar use. One commenter noted that "noise" should be considered in identifying the essential features of critical habitat and another suggested that ESA section 7 consultations should be conducted on military actions, including Navy use of mid-frequency sonar.

Response: The Proposed Conservation Plan for Southern Resident Killer Whales developed under the MMPA includes conservation measures to address potential effects of sound, including military sonar. Section 7(a)(2) of the ESA requires Federal agencies to consult with us to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or to destroy or adversely modify critical habitat. Once this listing becomes effective, Federal agencies must consult on actions that may affect Southern Resident killer whales.

In our proposal to list the Southern Resident DPS, we included information on potential physical and biological features that are essential to conservation and that may require special management considerations. One of the potential essential features was "sound levels that do not exceed thresholds that inhibit communication or foraging activities or result in temporary or permanent hearing loss." We are developing a proposed rule designating critical habitat which will provide additional detail on the essential features.

Comment 4: Several commenters raised whale watching vessels in particular as a threat to Southern Resident killer whales and made suggestions to address their potential effects. Suggestions included requiring distance limits of vessels to whales, reducing the number of vessels, addressing the impacts of vessels sounds, licensing commercial operators, establishing whale watching and protected zones, and increasing enforcement.

Response: We presently have little information about the effects of vessel activity on killer whales. Whales may evade vessels near them, expending energy in the process. Vessel noise may interfere with communication among whales, or with their ability to locate prey. We are uncertain, however, about the extent to which these effects interfere with the survival and recovery of the Southern Residents. The MMPA prohibits "take" of marine mammals, which includes harassment, and existing agency guidelines recommend that vessel operators remain at least 100 yards away from all whales, including Southern Resident killer whales, in order to avoid take. In some cases, operating a vessel in the vicinity of whales may result in a take. The Proposed Conservation Plan for Southern Resident Killer Whales acknowledges the data gaps for vessel effects and recommends monitoring vessel activity around the whales, and evaluating the adequacy of the existing guidelines and regulations. The Plan also announces our intention to consider new regulations regarding vessel operation around whales and/or the creation of protected areas.

Comment 5: Several commenters noted the need for continued research to fill important data gaps to help guide management and conservation actions, particularly research on the Southern Residents' winter range and feeding.

Response: The Northwest Fisheries Science Center is conducting research on these and other high priority questions, and developing a long-term research plan to address the data gaps that exist for Southern Resident killer whales. The Proposed Conservation Plan for Southern Resident Killer Whales summarizes the needed research and monitoring actions. The Plan cross-references specific conservation measures requiring additional research with the appropriate research actions.

Comment 6: The peer reviewer commented that if extirpation of the Southern Residents would leave a significant gap in the range of North Pacific residents for purposes of meeting the "significance" prong of the DPS policy, their range must represent a "significant portion of [the] range" of the unnamed North Pacific resident subspecies. The peer reviewer, therefore, considered the subspecies in danger of extinction "in a significant portion of its range," warranting listing of the entire unnamed subspecies of North Pacific residents.

Response: The reviewer's observation addresses the similarities between the DPS policy's criterion of "significance" and the statutory definition of an "endangered species," which encompasses a species that is "in danger of extinction in all or a significant portion of its range." However, the statutory provision for listing units below the subspecies level (DPSs) gives us the authority and the discretion to list only that portion of a larger taxonomic unit that is actually at risk. Otherwise, whenever we find that a group of organisms constitutes a DPS by virtue of the fact that it is discrete and its extirpation would leave a significant gap in the range of the species or subspecies, we would be required to list the entire species or subspecies. This conclusion would be inapposite to the statutory provision that allows for listing of a DPS.

In its initial status review and resulting report, the BRT considered the extinction risk of the combined populations of Southern, Northern, and Alaska Residents and concluded that the larger group had a zero extinction risk in 300 years under the most reasonable scenario (NMFS, 2002). It is therefore more reasonable to list only that portion of the subspecies that is at risk (i.e., the Southern Resident DPS), rather than the entire subspecies.

Determination of Species under the ESA

To be considered for listing under the ESA, a group of organisms must constitute a "species," which is defined in section 3 of the ESA to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." Guidance on what constitutes a DPS is provided by the joint NMFS-U.S. Fish and Wildlife Service (FWS) interagency policy on vertebrate populations (61 FR 4722; February 7, 1996). To be considered a DPS, a population, or group of populations, must be "discrete" from other populations and "significant" to the taxon (species or subspecies) to which it belongs.

The 2004 BRT concluded that present data do not adequately support recognition of any new species, although multiple species of killer whales may exist and may be confirmed in the future. Accordingly, North Pacific transients and residents should be considered as belonging to a single species. The BRT agreed that the Southern and Northern Residents, as well as the resident killer whales of Southeast Alaska, Prince William Sound, Kodiak Island, the Bering Sea and Russia, likely comprise a subspecies that is distinct from the transients and offshore killer whale ecotypes in the North Pacific. The smallest likely taxon to which the Southern Residents belong would be resident killer whales in the North Pacific, an unnamed subspecies of O. orca. Under the DPS policy, the relevant issues, then, are whether the Southern Residents are discrete from other populations of, and significant to, this subspecies.

Although we have limited genetic data, the available information indicates that Southern Residents are genetically distinct and that there is a high degree of reproductive isolation from other North Pacific resident killer whales (NMFS, 2004). Southern Resident killer whales have a core summer range that is spatially separate from other North Pacific Resident whales, including their closest neighbor, the Northern Residents. In addition, Southern Residents exhibit behaviors unique with respect to other North Pacific Residents. Southern Residents exhibit a distinct "greeting" behavior. They have not been observed using rubbing beaches or taking fish from longline gear, behaviors which appear to be unique to other North Pacific Resident Populations. Based on range, demography and behavior, as well as genetics, the BRT determined that Southern Residents meet the criterion for "discreteness" under the DPS policy.

The BRT also concluded that the Southern Residents are significant with respect to the North Pacific resident taxon based on evaluation of ecological setting, range, genetic differentiation, behavioral and cultural diversity. The Southern Residents are the only North Pacific residents to spend a substantial amount of time in the California Current ecosystem and appear to occupy an ecological setting distinct from other North Pacific resident populations. Loss of the Southern Residents would result in a gap in the range of the North Pacific residents. The Southern Residents differ markedly from other North Pacific Residents populations at both nuclear and mitochondrial genes. In addition, there are differences in cultural traditions, and the Southern Residents may have unique knowledge of the timing and location of salmon runs in

the southern part of the range of North Pacific residents.

The BRT concluded that Southern Residents were discrete and significant, and therefore should be considered a DPS. The Southern Resident DPS of the unnamed subspecies of North Pacific resident killer whales was the unit we evaluated for risk of extinction and proposed for ESA listing in December 2004.

Summary of Factors Affecting the DPS and Viability Assessment

Section 4(a)(1) of the ESA and the listing regulations (50 CFR part 424) set forth considerations for listing species. We must list a species if it is endangered or threatened because of any one or a combination of the following factors: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The 2004 BRT identified the factors that currently pose a risk for Southern Residents and discussed whether they might continue in the future. Concern remains about whether reduced quantity or quality of prey are affecting the Southern Resident population. In addition, levels of organochlorine contaminants are not declining appreciably and those of many "newly emerging" contaminants (e.g., brominated flame retardants) are increasing, so Southern Residents are likely at risk for serious chronic effects similar to those demonstrated for other marine mammal species (e.g., immune and reproductive system dysfunction). Other important risk factors that may continue to impact Southern Residents are sound and disturbance from vessel traffic as well as oil spills. The Proposed Conservation Plan for Southern Resident Killer Whales, developed under the MMPA, provides a more detailed discussion of the potential risk factors (70 FR 57565; October 3, 2005).

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Several factors have modified the Southern Residents' habitat, including contaminants, vessel traffic, and changes in prey availability. Salmon populations have declined due to degradation of aquatic ecosystems resulting from modern land use changes (e.g., agriculture, hydropower, urban development), harvest and hatchery practices. Beginning in the early 1990s, 27 ESUs of salmon and steelhead in Washington, Oregon, Idaho, and California have been listed as threatened or endangered under the ESA. Reductions in prey availability may force the whales to spend more time foraging, and could lead to reduced reproductive rates and higher mortality.

Despite the enactment of modern pollution controls in recent decades, studies have documented high levels of PCBs and DDTs in Southern Resident killer whales (Ross *et al.*, 2000, Ylitalo *et al.*, 2001). These and other chemical compounds have the ability to induce immune suppression, reproductive impairment, and other physiological effects, as observed in studies on other marine mammals. In addition, high levels of "newly emerging" contaminants, such as PBDEs (flame retardants), that may have similar negative effects have been found in killer whales and have an expanding presence in the environment (Rayne *et al.*, 2004).

Commercial shipping, whale watching, ferry operations, and recreational boating traffic have expanded in recent decades. Several studies have linked vessels with short-term behavioral changes in Northern and Southern Resident killer whales (Kruse, 1991; Kriete, 2002; Williams *et al.*, 2002a; 2002b; Foote et al., 2004). Potential impacts from vessels and sound are poorly understood and may affect foraging efficiency, communication, and/or energy expenditure through physical presence or increased underwater sound levels or both. Collisions with vessels are also a potential source of injury.

Overutilization for commercial, recreational, scientific, or educational purposes

The capture of killer whales for public display during the 1970s likely depressed their population size and altered the population characteristics sufficiently to severely affect their reproduction and persistence (Olesiuk et al., 1990). However, there have not been any removals for public display since the 1970s. Whale watching can be considered a form of utilization of Southern Resident killer whales. Under existing prohibitions on take under the MMPA, commercial and recreational whale watching must be conducted without causing harassment of the whales. While NMFS, commercial whale watch operators, and nongovernmental organizations have developed guidelines to educate boaters on how to avoid harassment, there are still concerns regarding compliance with the guidelines and potential violations of the MMPA, increased numbers of vessels engaged in whale watching, and cumulative effects on the whales.

Disease or Predation

While disease has not been implicated in the recent decline of Southern Resident killer whales, high contaminant levels may be affecting immune function in the whales, increasing their susceptibility to disease. The cohesive social structure and presence of all whales in a localized area at one time also has implications should a disease outbreak occur.

Inadequacy of Existing Regulatory Mechanisms

Current levels of contaminants in the environment indicate that previous regulatory mechanisms were not sufficient to protect killer whales. While the use of PCBs and DDT is prohibited under existing regulations, they persist in the environment, possibly for decades, and are also transported via oceans and the atmosphere from areas where their use has not been banned. In addition, there are new emerging contaminants that may have similar negative effects that are not currently regulated.

Other Natural or Human-Made Factors Affecting Continued Existence

Due to its proximity to Alaska's crude oil supply, Puget Sound is one of the leading petroleum refining centers in the U.S. with about 15 billion gallons of crude oil and refined petroleum products transported through it annually (Puget Sound Action Team, 2005). In marine mammals, acute exposure to petroleum products can cause changes in behavior and reduced activity, inflammation of mucous membranes, lung congestion, pneumonia, liver disorders and neurological damage (Geraci and St. Aubin, 1990). The Exxon Valdez oil spill was identified as a potential source of mortality for resident and transient killer whales in Prince William Sound, Alaska (Dahlheim and Matkin, 1994) and has raised concerns about potential implications for Southern Residents, particularly if the entire population is together in the vicinity of a spill. In addition, there may be additional anthropogenic factors that have not yet been identified as threats for Southern Resident killer whales, particularly in their winter range which is not well known.

Viability Analysis

The BRT conducted a population viability analysis (PVA) to synthesize the potential biological consequences of a small population size, a slowly increasing or a declining population trend, and the potential risk factors identified above. The probability of the Southern Resident population becoming extinct was estimated using demographic information from the yearly census through 2003. The most optimistic model (29–year data set) predicted that the probability of Southern Residents becoming extinct (that is, no surviving animals) was less than 0.1 to 3 percent in 100 years and 2 to 42 percent in 300 years. Using the most pessimistic model (the last 10 years of data), the probability of meeting a quasi-extinction threshold (that is, such a small number of animals in the population that they could not reasonably be expected to persist), the probability of meeting the threshold ranged from 39 to 67 percent in 100 years to 76 to 98 percent in 300 years. For both scenarios, the higher percentages in each range were associated with higher probability and magnitude of potential catastrophic mortality events (such as oil spills), as well as with a smaller carrying capacity (that is, assuming the habitat can only support a population of 100 whales).

The BRT modeled combinations of a variety of parameters, some of which are unknown and difficult to estimate or predict (such as carrying capacity and probability of catastrophic mortality, respectively). Accordingly, multiple scenarios were analyzed in order to understand how these parameters would affect the probability that the population would become extinct. For the unknown or uncertain parameters, the BRT used a range of inputs in the model, and this resulted in a range of results. Where the analyses produced high probabilities of extinction, these were associated with the highest levels of potential catastrophic mortality, small carrying capacity, and the use of only a subset of available data. Scenarios incorporating the most optimistic parameters produced probabilities of extinction that were low, but not insignificant. However, there is no indication that the optimistic scenario is the most likely. Therefore, the PVA extinction probabilities, even under the most optimistic conditions, indicate that Southern Resident killer whales are at risk of extinction.

Overall, the BRT was concerned about the viability of the Southern Resident DPS and concluded that it is at risk of extinction because of either small-scale impacts over time (e.g., reduced fecundity or subadult survivorship) or a major catastrophe (e.g., disease outbreak or oil spill). Additionally, the small population size of this killer whale DPS makes it potentially vulnerable to Allee effects (e.g., inbreeding depression) that could cause a further decline. The small number of breeding males, as well as possible reduced fecundity and subadult survivorship in the L-pod, may limit the population's potential for rapid growth in the near future. Although the Southern Resident DPS has demonstrated the ability to recover from lower levels in the past and has shown an increasing trend over the last several years, the factors responsible for the decline are unclear (NMFS, 2002; NMFS, 2004). These factors may still exist and may continue to persist, which could potentially preclude a substantial population increase.

Efforts Being Made to Protect Southern Resident Killer Whales

Section 4(b)(1)(A) of the ESA requires the Secretary to make listing determinations solely on the basis of the best scientific and commercial data available after taking into account efforts being made to protect a species. Therefore, in making ESA listing determinations, we first identify factors that have led to a species or DPS decline and assess the level of extinction risk. We then assess existing efforts being made to protect the species to determine if those measures ameliorate the risks faced by the DPS.

In judging the efficacy of existing protective efforts, we rely on the joint NMFS-FWS "Policy for Evaluation of Conservation Efforts When Making Listing Decisions" ("PECE;" 68 FR 15100; March 28, 2003). PECE provides direction for the consideration of protective efforts identified in conservation agreements, conservation plans, management plans, or similar documents (developed by Federal agencies, state and local governments, Tribal governments, businesses, organizations, and individuals) that have not yet been implemented, or have been implemented but have not yet demonstrated effectiveness. The policy articulates several criteria for evaluating the certainty of implementation and effectiveness of protective efforts to aid in determination of whether a species warrants listing as threatened or endangered.

The Southern Resident killer whale stock was designated as depleted under the MMPA, and a Conservation Plan is under development. A Proposed Conservation Plan for Southern Resident Killer Whales providing conservation measures, research and monitoring tasks intended to restore the population was released for public comment on October 3, 2005 (70 FR 57565). In addition to the conservation planning process, NMFS has responded to requests for immediate conservation actions by implementing and supporting several programs. Working in partnerships with The Seattle Aquarium and The Whale Museum in Friday Harbor, Washington, we have supported education, outreach, and stewardship activities in order to increase public awareness about the conservation status and needs of killer whales. To promote responsible viewing of killer whales, we have also provided support for additional hours of on-water stewardship through the Soundwatch program and enforcement presence through the Washington Department of Fish and Wildlife (WDFW).

On April 3, 2004, the Washington Fish and Wildlife Commission added Washington State's killer whale population to the list of the state's endangered species. The state endangered designation is given to native Washington species that are seriously threatened with extinction throughout all or a significant portion of that range within the state (WAC 232–12–297). The designation directs special management attention and priority to recover the species in Washington. WDFW is working with us on conservation strategies for killer whales.

Southern Resident killer whales are listed as endangered and Northern Residents are listed as threatened under Canada's Species at Risk Act (SARA). Under SARA "endangered species" means a wildlife species that is facing imminent extirpation or extinction and "threatened species" means a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction. Canada's Department of Fisheries and Oceans has convened a Recovery Team, which includes WDFW and NMFS staff members, and has released a Draft Recovery Strategy for Southern and Northern Resident Whales under SARA (DFO, 2005).

In addition to conservation and recovery planning efforts, our Northwest Fisheries Science Center (NWFSC) is engaged in an active research program for Southern Resident killer whales. Research that is currently being conducted is designed to fill identified data gaps and to improve our understanding of the risk factors that may be affecting the decline or recovery of the Southern Resident killer whales. The new information from research will

be used to enhance our understanding of the risk factors affecting recovery, thereby improving our ability to develop and evaluate the effectiveness of management measures.

In addition to protective efforts for Southern Resident killer whales, there are a number of protective efforts underway for West Coast salmonid Evolutionarily Significant Units (ESUs). NMFS recently announced its intent to develop recovery plans for listed Pacific salmon ESUs (70 FR 39231; July 7, 2005). Considerable progress has been made for several watershed areas already, and a draft recovery plan for Puget Sound Chinook was submitted to the agency by Shared Strategy for Puget Sound. The draft plan (written by Shared Strategy, the non-profit group that represents broad salmon recovery interests in the region) is part of what will be a dozen more watershed-level recovery plans that will eventually form the foundation for NMFS's own comprehensive, regional plan for salmon and steelhead in the Northwest.

Informed by the public comments received and based on our review of existing protective efforts, we conclude that collective efforts do not provide sufficient certainty of implementation and effectiveness to substantially ameliorate the level of assessed extinction risk for Southern Resident killer whales. While we acknowledge that many of the ongoing protective efforts are likely to promote the conservation of listed killer whales and their prey, most efforts are relatively recent and thus untested, some are voluntary, and many will require research results to fill important data gaps before we can evaluate their effectiveness. We conclude that existing protective efforts lack the certainty of implementation and effectiveness to preclude listing Southern Resident killer whales, particularly in light of the uncertainties regarding the risk factors. Nonetheless, we will continue to encourage these and other future protective efforts, and we will continue to collaborate with international, tribal, Federal, state, and local entities to promote and improve efforts being made to protect the Southern Resident killer whales and their prey.

Summary of Changes from Proposed Listing Determination

The only change from the proposed listing determination is that we are listing the Southern Resident killer whale DPS as an endangered species, rather than a threatened species.

Final Listing Determination

The ESA defines an endangered species as any species in danger of extinction throughout all or a significant portion of its range, and a threatened species as any species likely to become an endangered species in the foreseeable future throughout all or a portion of its range (16 U.S.C. 1532 (6) and (20)). Section 4(b)(1) of the ESA requires that the listing determination be based solely on the best scientific and commercial data available, after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any state or foreign nation to protect and conserve the species.

We reviewed the petition, the reports of the BRT (NMFS, 2002, 2004), co-manager comments, Cetacean Taxonomy workshop papers and reports, other available published and unpublished information, and comments received in response to the proposed listing determination. We consulted with species experts and other individuals familiar with killer whales. On the basis of the best available scientific and commercial information available, we conclude that the Southern Resident killer whale DPS is in danger of extinction.

In December 2004, we proposed to list the Southern Resident killer whale DPS as "threatened." We identified several risks to the Southern Residents' viability, including "the population decline from 1996–2001, the limited number of reproductive age males, the presence of females of reproductive age that are not having calves, and that the factors for the decline may continue to persist." We also expressed concern about the small population size, which makes the whales susceptible to demographic and stochastic risks (genetic inbreeding or genetic drift, and natural variations in population size or composition). The small population size, combined with their socially cohesive nature, also makes them susceptible to catastrophic risks, such as oil spills or a disease outbreak. We also cited mitigating factors such as the small population increase in the past several years and the presence of males and females that would reach sexual maturity in the coming years. In balancing the risks against the mitigating factors, we concluded the Southern Resident killer whale DPS was not presently "in danger of extinction," but was likely to become so in the foreseeable future.

We have reconsidered the relative weight we gave the risk factors and the mitigating factors in formulating our proposal, in light of information and analysis received during the comment period, and now find the Southern Resident killer whale DPS "in danger of extinction."

As described in the Summary of Factors affecting the DPS and more fully in the "Proposed Conservation Plan for Southern Resident Killer Whales," contaminants such as organochlorines and brominated flame retardants continue to be discharged into the environment, persist for decades, and are known to accumulate in top predators, including killer whales. Southern Residents are likely at risk for serious chronic effects similar to those demonstrated for other marine mammal species, such as immune and reproductive system dysfunction. All current members of the Southern Resident killer whale DPS that have been tested have high levels of toxins in their tissues, and these levels are not likely to significantly decrease over their life spans.

Southern Residents are also at risk because of sound and disturbance from vessel traffic in Puget Sound, a factor that is likely to increase in the future. Trends in salmonid populations and recent cycles of ocean conditions resulting in lowered salmon abundance (the Southern Residents' main prey) are also a likely factor in declines in the Southern Resident killer whale population. The destruction or modification of the whales' habitat (and, to a lesser extent, their overutilization for commercial and recreational purposes) through disturbance from vessels, the persistence of legacy toxins and the addition of new ones into the whales' environment, and the potential limits on prey availability (primarily salmon) given uncertain future ocean conditions, puts them in danger of extinction. The individual and cumulative effects of the threats are more pronounced due to the small size of the population and the fluctuations in its abundance.

Although a number of protective efforts are underway for both Southern Resident killer whales and their prey, we conclude that existing protective efforts lack the certainty of implementation and effectiveness to change our conclusion about the risk to Southern Resident killer whales, particularly in light of the uncertainties regarding the risk factors. Based on the best scientific and commercial data available, the comments received, and after taking into account efforts being made to protect Southern Resident killer whales, we are listing the Southern Resident DPS as endangered. The Southern Resident killer whale DPS will

be listed under the ESA as endangered as of the effective date of this rule. The Southern Resident killer whale DPS does not include killer whales from J, K or L pod placed in captivity prior to listing, nor does it include their captive born progeny.

Prohibitions and Protective Measures

Section 9 of the ESA prohibits certain activities that directly or indirectly affect endangered species. These prohibitions apply to all individuals, organizations and agencies subject to U.S. jurisdiction.

Sections 7(a)(2) of the ESA requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or to adversely modify critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with us.

Examples of Federal actions that may affect Southern Resident killer whales include coastal development, oil and gas development, seismic exploration, point and non-point source discharge of persistent contaminants, contaminated waste disposal, adoption of water quality standards, regulation of newly emerging chemical contaminants, vessel operations and noise level standards and fishery management practices.

Sections 10(a)(1)(A) and (B) of the ESA provide us with authority to grant exceptions to the ESA's section 9 "take" prohibitions. Section 10(a)(1)(A) scientific research and enhancement permits may be issued to entities (Federal and non-Federal) for scientific purposes or to enhance the propagation or survival of a listed species. Activities potentially requiring a section 10(a)(1)(A) research/enhancement permit include scientific research that targets killer whales.

Section 10(a)(1)(B) incidental take permits may be issued to non-Federal entities performing activities that may incidentally take listed species, as long as the taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Activities potentially requiring a section 10(a)(1)(B) incidental take permit include scientific research not targeting killer whales that incidentally takes Southern Resident killer whales.

Our Policies on Endangered and Threatened Wildlife

On July 1, 1994, we and FWS published a series of policies regarding listings under the ESA, including a policy for peer review of scientific data (59 FR 34270) and a policy to identify, to the maximum extent possible, those activities that would or would not constitute a violation of section 9 of the ESA (59 FR 34272).

Identification of Those Activities That Would Constitute a Violation of Section 9 of the ESA

NMFS and FWS published in the **Federal Register** on July 1, 1994 (59 FR 3472), a policy that NMFS shall identify, to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the ESA. The intent of this policy is to increase public awareness of the effect of our ESA listing on proposed and ongoing activities within the species' range. At the time of the final rule, NMFS must identify to the extent known, specific activities that will not be considered likely to result in violation of section 9, as well as activities that will be considered likely to result in violation. We believe that, based on the best available information, the following actions will not result in a violation of section 9:

1. Federally funded or approved projects for which ESA section 7 consultation has been completed, and that are conducted in accordance with any terms and conditions we provide in an incidental take statement accompanying a biological opinion.

2. Takes of killer whales that we authorize pursuant to section 10 of the ESA.

There are many activities that we believe could potentially "take" Southern Resident killer whales. Activities that we believe could result in violation of section 9 prohibitions against "take" of the Southern Resident killer whale DPS include, but are not limited to, the following:

1. Coastal development that adversely affects Southern Resident killer whales (e.g., dredging, land clearing and grading, waste treatment/disposal, pile driving).

2. Discharging or dumping toxic chemicals or other pollutants into areas used by Southern Resident killer whales.

3. Operating vessels in a manner that disrupts foraging, resting or care for young, results in noise levels that disrupt foraging, communication, resting or care for young, or has the potential to cause injury to individuals or groups of whales.

4. Land/water use or fishing practices that result in reduced availability of prey species during periods when Southern Resident killer whales are present.

These lists are not exhaustive. They are intended to provide some examples of the types of activities that we might consider as constituting a take of Southern Resident killer whales under the ESA and its implementing regulations. Questions regarding whether specific activities will constitute a violation of the section 9 take prohibition, and general inquiries regarding prohibitions and permits, should be directed to NMFS (see **ADDRESSES**).

Effective Date of the Final Listing Determination

We recognize that numerous parties may be affected by the listing of the Southern Resident killer whale DPS under the ESA. To permit an orderly implementation of the consultation requirements applicable to endangered species, the final listing will take effect on February 16, 2006 (see **DATES**).

Critical Habitat

Critical habitat is defined in section 3 of the ESA (16 U.S.C. 1532(3)) as: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which listing under the ESA is no longer necessary.

Section 4(a)(3)(a) of the ESA (16 U.S.C. 1533(a)(3)(A)) requires that, to the extent prudent and determinable, critical habitat be designated concurrently with the listing of a species. Designations of critical habitat must be based on the best scientific data available and must take into consideration the economic, national security, and other relevant impacts of specifying any particular area as critical habitat. Once critical habitat is designated, section 7 of the ESA requires Federal agencies to ensure that they do not fund, authorize or carry out any actions that are likely to destroy or adversely modify that habitat. This requirement is in addition to the section 7 requirement that Federal agencies ensure that their actions do not jeopardize the continued existence of listed species.

In our proposal to list the Southern Resident DPS, we included information on potential physical and biological features that are essential to conservation and that may require special management considerations. We requested comments on the appropriateness of considering the suggested features to assist in developing a proposal for critical habitat designation. We have reviewed the comments provided and the best available scientific information on ''essential features'', and will initiate rulemaking to designate critical habitat.

Classification

National Environmental Policy Act (NEPA)

ESA listing decisions are exempt from the requirements to prepare an environmental assessment or environmental impact statement under the NEPA. See NOAA Administrative Order 216–6.03(e)(1) and Pacific Legal Foundation v. Andrus, 675 F. 2d 825 (6th Cir. 1981). Thus, we have determined that the final listing determination for the Southern Resident killer whale DPS described in this notice is exempt from the requirements of the NEPA of 1969.

Executive Order (E.O.) 12866, Regulatory Flexibility Act and Paperwork Reduction Act

As noted in the Conference Report on the 1982 amendments to the ESA, economic impacts cannot be considered when assessing the status of a species. Therefore, the economic analysis requirements of the Regulatory Flexibility Act are not applicable to the listing process. In addition, this rule is exempt from review under E.O. 12866. This proposed rule does not contain a collection-of-information requirement for the purposes of the Paperwork Reduction Act.

E.O. 13084- Consultation and Coordination with Indian Tribal Governments

E.O. 13084 requires that if NMFS issues a regulation that significantly or uniquely affects the communities of Indian tribal governments and imposes substantial direct compliance costs on those communities, NMFS must consult with those governments or the Federal government must provide the funds necessary to pay the direct compliance costs incurred by the tribal governments. This final rule does not impose substantial direct compliance costs on the communities of Indian tribal governments. Accordingly, the requirements of section 3(b) of E.O. 13084 do not apply to this final rule. Nonetheless, we will continue to inform potentially affected tribal governments, solicit their input, and coordinate on future management actions.

E.O. 13132 - Federalism

E.O. 13132 requires agencies to take into account any federalism impacts of regulations under development. It includes specific directives for consultation in situations where a regulation will preempt state law or impose substantial direct compliance costs on state and local governments (unless required by statute). Neither of those circumstances is applicable to this final rule. In keeping with the intent of the Administration and Congress to provide continuing and meaningful dialogue on issues of mutual state and Federal interest, the proposed rule was provided to the relevant state agencies in each state in which the species is believed to occur, and these agencies were invited to comment. We have conferred with the State of Washington in the course of assessing the status of Southern Resident killer whales, and considered, among other things, state and local conservation measures. Washington has listed killer whales under the Washington Administrative Code 232–12–014 and is coordinating with us to develop a Conservation Plan.

References

A list of references cited in this notice is available upon request (see **ADDRESSES**) or via the Internet at *http://www.nwr.noaa.gov*. Additional information, including agency reports and written comments, is also available at this Internet address.

List of Subjects in 50 CFR Part 224

Endangered marine and anadromous species.

Dated: November 10, 2005.

William T. Hogarth,

Assistant Administrator for Fisheries, National Marine Fisheries Service.

■ For the reasons set out in the preamble, 50 CFR part 224 is amended as follows:

PART 224—ENDANGERED MARINE AND ANADROMOUS SPECIES

■ 1. The authority citation for part 224 continues to read as follows:

Authority: 16 U.S.C. 1531–1543 and 16 U.S.C. 1361 *et seq.*

■ 2. In § 224.101, paragraph (b), add the following to the List of Endangered Marine and Anadromous Species, in alphabetical order under MARINE MAMMALS:

§ 224.101 Enumeration of endangered marine and anadromous species.

* * * * *

(b) *Marine mammals.** * * Killer whale (*Orcinus orca*), Southern Resident distinct population segment, which consists of whales from J, K and L pods, wherever they are found in the wild, and not including Southern Resident killer whales placed in captivity prior to listing or their captive born progeny; * * *

* * * * *

[FR Doc. 05–22859 Filed 11–17–05; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 300

[I.D. 110905G]

Fraser River Sockeye Salmon Fisheries; Inseason Orders

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Temporary rule; inseason orders.

SUMMARY: NMFS publishes the Fraser River salmon inseason orders regulating salmon fisheries in U.S. waters. The orders were issued by the Fraser River Panel (Panel) of the Pacific Salmon Commission (Commission) and subsequently approved and issued by NMFS during the 2005 salmon fisheries within the U.S. Fraser River Panel Area. These orders established fishing times and areas for the gear types of U.S. treaty Indian and all-citizen fisheries during the period the Panel exercised jurisdiction over these fisheries.

DATES: Each of the following inseason actions was effective upon announcement on telephone hotline numbers as specified at 50 CFR 300.97(b)(1); those dates and times are listed herein. Comments will be accepted through December 5, 2005.

ADDRESSES: Comments may be mailed to D. Robert Lohn, Regional Administrator, Northwest Region, NMFS, 7600 Sand Point Way N.E., BIN C15700-Bldg. 1, Seattle, WA 98115–0070. Information relevant to this document is available for public review during business hours at the office of the Regional Administrator, Northwest Region, NMFS.

Comments can also be submitted via e-mail at the

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distribution, abundance, demographics, and genetics; (B) habitat conditions including, but not limited to, amount, distribution, and suitability; (C) conservation measures that have been implemented that benefit the species; (D) status and trends of threats; and (E) other new information, data, or corrections including, but not limited to, taxonomic or nomenclatural changes, identification of erroneous information contained in the list, and improved analytical methods.

If you wish to provide information for this 5-year review, you may submit your information and materials to Kyle Baker (see **ADDRESSES** section). Our practice is to make submissions of information, including names and home addresses of respondents, available for public review during regular business hours. Respondents may request that we withhold a respondent's identity, as allowable by law. If you wish us to withhold your name or address, you must state this request prominently at the beginning of your submission. We will not, however, consider anonymous submissions. To the extent consistent with applicable law, we will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety. Information and materials received will be available for public inspection, by appointment, during normal business hours (see **ADDRESSES** section).

Authority: 16 U.S.C. 1531 *et seq.*

Dated: November 22, 2006.

Wanda L. Cain,

Acting Director, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. E6–20249 Filed 11–28–06; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 110706B]

Endangered and Threatened Species; Recovery Plans; Proposed Recovery Plan for Southern Resident Killer Whales

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of availability; request for comments.

SUMMARY: We, the National Marine Fisheries Service (NMFS), announce the availability for public review of the Proposed Recovery Plan (Plan) for Southern Resident Killer Whales (*Orcinus Orca*). NMFS is requesting review and comment on the Plan from the public and all interested parties.

DATES: Written comments and information must be received by February 27, 2007.

ADDRESSES: Copies of the Plan may be reviewed and/or copied at NMFS, Protected Resources Division, 7600 Sand Point Way NE, Seattle, WA 98115. The Plan is available on-line on the NMFS web site *http://www.nwr.noaa.gov*. Comments should be submitted by mail to Chief, Protected Resources Division, 1201 NE Lloyd Blvd., Suite 1100, Portland, OR 97232 or by sending an e-mail message to *orca.plan@noaa.gov*.

FOR FURTHER INFORMATION CONTACT: Lynne Barre, NOAA/NMFS, Northwest Region, (206) 526–4745.

SUPPLEMENTARY INFORMATION: The Endangered Species Act (ESA) of 1973, as amended (15 U.S.C. 1531 *et seq.*) requires that NMFS develop and implement recovery plans for the conservation and survival of threatened and endangered species under its jurisdiction, unless it is determined that such plans would not result in the conservation of the species. NMFS announced the endangered listing of the Southern Resident killer whale distinct population segment (DPS) on November 18, 2005 (70 FR 69903). Prior to the ESA listing, NMFS designated the Southern Resident killer whale population as a depleted stock under the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*) on May 29, 2003 (68 FR 31980). At the time of the designation, we announced our intention to develop a conservation plan.

We held a series of public meetings and technical workshops to gather input from Federal Government agency representatives, state and tribal co-managers, Canadian officials, orca advocacy groups, non-governmental organizations, researchers, whale watch industry, and concerned citizens. We circulated a preliminary draft conservation plan for public review on March 14, 2005. We received comments on the preliminary draft, and made revisions in response to the comments. We subsequently published a Notice of Availability of a Proposed Conservation Plan in the **Federal Register** on October 3, 2005 (70 FR 57565), opening a public comment period. We received comments on the proposed conservation plan and have addressed them in the proposed recovery plan. In addition to addressing the comments, we have incorporated ESA elements into the plan, including discussions of the five ESA listing factors, critical habitat, section 7, and ESA recovery criteria. We also included new research results and references that have become available since the proposed conservation plan was released.

The Plan

The ESA requires that recovery plans incorporate (1) objective, measurable criteria which, when met, would result in a determination that the species is no longer threatened or endangered; (2) site-specific management actions necessary to achieve the plan's goals; and (3) estimates of time required and costs to implement recovery actions. NMFS' goal is to restore the endangered Southern Resident DPS to the point where they are again secure, self-sustaining members of their ecosystems and no longer need the protections of the ESA.

The Plan provides background on the natural history of killer whales, population trends and the potential threats to their viability. The Plan lays out a recovery strategy to address the potential threats based on the best available science and includes recovery goals and criteria. The Plan is not a regulatory action, but presents guidance for use by agencies and interested parties to assist in the recovery of Southern Resident killer whales. The Plan identifies substantive actions needed to achieve recovery by addressing the threats to the species. The program also links management actions to an active research program for filling data gaps, and monitoring activities to assess effectiveness. The Plan incorporates an adaptive management framework by which Plan actions and other elements will evolve and adapt to information gained as a result of research and monitoring. Recovery of Southern Resident killer whales is a long-term effort and will require cooperation and coordination of Federal, state, tribal and local government agencies, and the community.

We request comments on the Proposed Recovery Plan for Southern Resident Killer Whales with this notice. NMFS will consider substantive comments and information provided during the public comment period in the course of finalizing this Plan.

Dated: November 22, 2006.

Angela Somma,

Chief, Endangered Species Division, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 06–9454 Filed 11–28–06; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 111306A]

Marine Mammals; File No. 1053–1825

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of permit.

SUMMARY: Notice is hereby given that David Mann, Ph.D., College of Marine Science, The University of South Florida, College of Marine Science, 140 Seventh Avenue South, St. Petersburg, FL 33701 has been issued a permit to conduct research on certain cetacean species.

ADDRESSES: The permit and related documents are available for review upon written request or by appointment (See **SUPPLEMENTARY INFORMATION**).

FOR FURTHER INFORMATION CONTACT: Amy Sloan or Dr. Tammy Adams, (301)713–2289.

SUPPLEMENTARY INFORMATION: On July 5, 2006, notice was published in the **Federal Register** (70 FR 28909) that a request for a scientific research permit to take certain cetacean species had been submitted by the above-named individual. The requested permit has been issued under the authority of the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq.*), and the regulations governing the taking and importing of marine mammals (50 CFR part 216).

This permit authorizes the permit holder to conduct hearing measurements on stranded cetaceans on beaches, in near-shore waters, and in rehabilitation facilities in the U.S.; and on cetaceans captured under separate research permits.

In compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), a final determination has been made that the activities proposed are categorically excluded from the requirement to prepare an environmental assessment or environmental impact statement.

Dated: November 22, 2006.

P. Michael Payne,

Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. E6–20246 Filed 11–28–06; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Availability of Invention for Licensing; Government-Owned Invention

AGENCY: Department of the Navy, DoD.

ACTION: Notice.

SUMMARY: The invention listed below is assigned to the United States Government as represented by the Secretary of the Navy and is available for licensing by the Department of the Navy. Navy Case No. 83,028: A TECHNIQUE FOR FABRICATING TWO AND THREE TERMINAL DEVICES IN WIDE-BAND GAP SEMICONDUCTORS WITHOUT PLASMA ETCHING and any continuations, continuations-in-part, divisionals or re-issues thereof.

ADDRESSES: Requests for copies of the invention cited should be directed to the Naval Research Laboratory, Code 1004, 4555 Overlook Avenue, SW., Washington, DC 20375–5320, and must include the Navy Case number.

FOR FURTHER INFORMATION CONTACT: Head, Technology Transfer Office, NRL Code 1004, 4555 Overlook Avenue, SW., Washington, DC 20375–5320, telephone 202–767–7230. Due to temporary U.S. Postal Service delays, please fax 202–404–7920, e-mail: *techtran@utopia.nrl.navy.mil* or use courier delivery to expedite response.

(Authority: 35 U.S.C. 207, 37 CFR Part 404)

Dated: November 22, 2006.

M. A. Harvison,

Lieutenant Commander, Judge Advocate General's Corps, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. E6–20203 Filed 11–28–06; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF ENERGY

Notice of Availability of a Special Environmental Analysis; Potomac River Generating Station

AGENCY: Department of Energy (DOE).

ACTION: Notice of Availability.

SUMMARY: DOE has prepared a *Special Environmental Analysis (SEA) for Actions Taken under U.S. Department of Energy Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria, Virginia*, and is announcing its availability. In the SEA, DOE examines environmental impacts from the Secretary of Energy's December 20, 2005 Emergency Order, and the Secretary's September 28, 2006 extension of that Emergency Order; the SEA covers a period of about 24 months beginning in December 2005. The SEA also considers alternatives that include mitigation measures that DOE may take until the Potomac Electric Power Company's (PEPCO) installation of two additional 230 kV electric transmission lines to the Central Washington, DC area (expected in June 2007) that would appear to eliminate the emergency that lead to the issuance of the December 20, 2005 Emergency Order.

DOE prepared the SEA after consulting with the Council on Environmental Quality (CEQ) for alternative arrangements under 40 CFR 1506.11, which applies where emergency circumstances make it necessary to take action without preparing an environmental impact statement (EIS). The U.S. Environmental Protection Agency worked with DOE on this SEA.

Simultaneously with issuance of the SEA, the Secretary is issuing another temporary extension of the Emergency Order until February 1, 2007. DOE is providing the public an opportunity to comment before the Secretary considers whether to allow the Order to expire, extend the Order, or extend the Order with mitigation measures.

DATES: DOE has posted the SEA on two websites: its Web site for this matter at *http://www.oe.energy.gov/permitting/372.htm* and the DOE NEPA Web site at *http://www.eh.doe.gov/nepa/documentspub.html*. Comments on the SEA should be submitted to DOE on or before January 8, 2007.

ADDRESSES: Comments should be addressed to: Anthony J. Como; Permitting, Siting, and Analysis Division; Office of Electricity Delivery and Energy Reliability (OE–20); U.S. Department of Energy; 1000 Independence Avenue, SW., Washington, DC 20585; telephone: 202–586–5935; fax: 202–586–5860; or *anthony.como@hq.doe.gov*. Due to postal security procedures, comments sent through the U.S. Mail may be delayed.

FOR FURTHER INFORMATION CONTACT: For information on the DOE NEPA process, please contact: Carol M. Borgstrom, Director, Office of NEPA Policy and

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A key to quieter seas: half of ship noise comes from 15% of the fleet

Scott Veirs Corresp., [1] , **Val Veirs** [2] , **Rob Williams** [3] , **Michael Jasny** [4] , **Jason Wood** [5]

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Underwater noise pollution from ships is a chronic, global stressor impacting a wide range of marine species. Ambient ocean noise levels nearly doubled each decade from 1963-2007 in low-frequency bands attributed to shipping, inspiring a pledge from the International Maritime Organization to reduce ship noise and a call from the International Whaling Commission for member nations to halve ship noise within a decade. Our analysis of data from 1,582 ships reveals that half of the total power radiated by a modern fleet comes from just 15% of the ships, namely those with source levels above 179 dB re 1 µPa @ 1 m. We present a range of management options for reducing ship noise efficiently, including incentive-based programs, without necessarily regulating the entire fleet.

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A key to quieter seas: half of ship noise comes from 15% of the fleet

Scott Veirs[1], Val Veirs[2], Rob Williams[3], Michael Jasny[4], and Jason Wood[5]

[1]Beam Reach (Social Purpose Corporation)
[2]Colorado College
[3]Pew Fellow in Marine Conservation
[4]Natural Resources Defense Council
[5]SMRU Consulting

February 9, 2018

Abstract

Underwater noise pollution from ships is a chronic, global stressor impacting a wide range of marine species. Ambient ocean noise levels nearly doubled each decade from 1963-2007 in low-frequency bands attributed to shipping, inspiring a pledge from the International Maritime Organization to reduce ship noise and a call from the International Whaling Commission for member nations to halve ship noise within a decade. Our analysis of data from 1,582 ships reveals that half of the total power radiated by a modern fleet comes from just 15% of the ships, namely those with source levels above 179 dB re 1 μPa @ 1 m. We present a range of management options for reducing ship noise efficiently, including incentive-based programs, without necessarily regulating the entire fleet.

Introduction

At its June 2016 meeting, the Scientific Committee of the International Whaling Commission (IWC) agreed that chronic ocean noise is increasing in many regions and adversely affecting populations of whales and other cetaceans (IWC Scientific Committee, 2016). Emerging evidence links chronic ocean noise to negative effects not only on marine mammals (Rolland et al., 2012; Williams et al., 2015) but also fish (Popper and Hawkins, 2016) and invertebrates (Wale et al., 2013). Ships are a major source of chronic ocean noise, responsible for doubling low-frequency levels every decade throughout the second half of the 20th century

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(McDonald et al., 2006; Andrew et al., 2011). In some coastal and other high-traffic areas, ship noise has reached levels that degrade habitat for endangered species of whales and other marine wildlife (Hatch et al., 2012; Erbe et al., 2014).

These developments have inspired a number of recent policy initiatives to reduce noise pollution from ships. Prominently, the International Maritime Organization issued voluntary guidelines in 2014, building on earlier targets (Wright, 2008) and encouraging industry to reduce underwater radiated ship noise in the 10-300 Hz band (Dekeling et al., 2014; IMO/MEPC, 2014). In 2016 the U.S. National Oceanic and Atmospheric Administration launched an agency-wide Ocean Noise Strategy to better integrate risk assessment and mitigation of chronic ambient noise pollution into federal planning actions. European legislation treats ocean noise as a pollutant, and requires member states ultimately to attain "good environmental status" with respect to noise across multiple marine regions (URN, 2014; Audoly et al., 2015; Garrett et al., 2016; Merchant et al., 2016). In some jurisdictions, most recently Canada, governments have committed themselves to regulate shipping noise, but none have yet devised a management system to meet a ship noise reduction target.

In addition to aspirational targets to improve global ocean health, efforts to reduce ship noise also have immediate implications for economic development and endangered species conservation. The southern resident killer whale (SRKW) is an endangered population with critical habitat that spans the international (Canada-U.S.) border and encompasses shipping lanes serving the ports of Vancouver (British Columbia, Canada) and Seattle-Tacoma (WA, U.S.). Both Canada and the U.S. have recognized ocean noise as a threat to SRKW recovery (NMFS, 2008; DFO Canada, 2011). There are a number of large-scale industrial development proposals pending for this region (Gaydos et al., 2015) that could increase ship traffic and raise ocean noise levels. Both countries must consider ocean noise in SRKW critical habitat when assessing environmental impacts of proposed developments, and balance economic growth with conservation of endangered species. All of SRKW summertime critical habitat is ensonified already at levels exceeding one European threshold defining good environmental status (Christine Erbe et al., 2012), so it could be argued that noise reduction has become a necessary precursor to additional industrial development in this region.

What would be required of industry to substantially reduce noise from commercial ships (which originates

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primarily from cavitation at the propeller, but also from shipboard machinery noise transmitted through the hull)? To understand what would be necessary, we considered the quantitative noise reduction target reaffirmed in the summer of 2016 by the IWC's Scientific Committee, namely reducing the contributions of shipping to ocean ambient noise in the 10-300 Hz frequency band by 3 dB (halving the total radiated power) within 10 years, and by 10 dB within 30 years (IWC Scientific Committee, 2016). We explored various mechanisms to attain this -3 dB/decade target, including reducing the number, acoustic source level, or speed of ships.

Methods

We assessed four distinct management options by using an R script (see supplemental information) to analyze 2,800 source level measurements of 1,582 unique, isolated ships recorded as they transited northbound in Haro Strait, a shipping channel within the Salish Sea (Veirs et al., 2016). For ships in the data set with multiple transits we averaged the source spectrum levels (power spectral density) over all available transits.

To assess the relative noise contributions of different ships in our sample of the local fleet (the population of 1,582 ships in 12 ship classes northbound in Haro Strait), we integrated the source spectrum levels for each unique ship to acquire the total power (watts) radiated by each ship in a frequency band relevant to SRKWs (10-40,000 Hz). This band is wider than the 10-300 Hz band stipulated in the noise reduction target endorsed by the IWC. We chose to broaden the band because ship noise at ranges less than ˜3 km extends beyond 300 Hz to frequencies where SRKW hearing is most sensitive (Veirs et al., 2016).

After integration, we sorted the total radiated power levels for all ships, ranking them from lowest to highest. Then we summed the power from all ships, yielding the cumulative total radiated power – a distribution we used to assess quantitatively a range of management options that would accomplish a 3 dB reduction in the total noise radiated by this population of ships. Finally, we converted individual ship source levels from watts to dB re 1 μPa @ 1m. (Note, however, that we abbreviate the resulting broadband (10-40,000 Hz) source levels as "dB" in this paper for brevity.)

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We used an iterative method to understand the first two management options: removal of gross polluters (ships with the highest source levels of the fleet); and reduction of gross polluter source levels to a threshold that achieves the desired halving of power overall. For the first option, we removed the loudest ship from the population and re-calculated the total radiated power of the remaining fleet. If the initial total power was not yet halved, then we repeated the process. For the second option, we also calculated the reduction threshold iteratively. We lowered the source level of the loudest ship to the level of the next-loudest ship in each iteration until the total power radiated by the fleet was halved.

To help managers more deeply understand the practical implications of these two management options, we tabulated the number of ships affected (Table 1). To allow easy extrapolation to the global fleet or other regional subpopulations of it, we also tabulated the number of affected ships as a percentage of both our population and, where applicable, the total number of ships in each class.

The third noise management option was motivated by the observation that for many ships a 1 knot reduction in speed leads to 1 dB reduction in broadband underwater source level (Veirs et al., 2016). We found the speed limit needed to achieve the 3 dB reduction iteratively by: reducing the speed of each loudest ship to the selected speed limit; making a proportional reduction in the source levels (assuming the -1dB/knot relationship applied to all ships); re-integrating the new source level distribution; and checking to see if the reduced total power equaled half of the initial total power.

The fourth management option was requiring a 3 dB reduction of every ship in the fleet. Assessing this option required no new computation.

Results and discussion

The cumulative distribution of source levels (Figure 1) in our dataset ranges from 141-186 dB and has two inflection points, with ˜80% of the population having intermediate source levels of 165-180 dB. The absolute value the calibrated source levels in this distribution may differ in other regions (which may host a different subset of the global fleet) or in other studies of the Haro Strait fleet (e.g. with different assumptions about transmission loss), but the distribution of values will have a similar form.

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From a policy perspective, the most important aspect of the source level distribution is that half the total power is radiated by just 15% of the ships in the fleet (i.e., those with source levels greater than 179.0 dB). More than two-thirds of these gross polluters are cargo and container ships, with each class containing ˜90 such vessels in our population (Table 1, Figure 2). About 43% of container ships are gross polluters, by far the highest proportion of any ship class in our dataset.

Management options could focus on gross polluters by targeting fleet size or operations. In the region where our data originated, for example, managers could halve the total power radiated by this ship population by removing the loudest 15% of the fleet (n=˜240 ships) or by reducing the source levels of the loudest 42.8% of the fleet (n=˜677 ships) to 175.4 dB (Table 1). These results confirm empirically the idea of dramatically reducing acoustic pollution by targeting the noisiest ships for quieting (Leaper et al., 2014). The maximum reduction required by the 175.4 dB threshold, about 10 dB, should be attainable with existing quieting technologies (Southall and Scholik-Schlomer, 2008) and techniques (Audoly et al., 2015), or for many types of new ships with only a 1% increase in design/build costs (Spence and Fischer, 2016).

Because container ships had the highest average source levels (178+/-4 dB) of the 12 ship classes we analyzed (Veirs et al., 2016), they would be most affected by policies that target gross polluters (Table 1). In our population of container ships, 43% would be affected by the removal option, while almost 90% would be affected by the noise reduction option. By contrast, some ship classes would be completely unaffected by any management option that limits source levels. No fishery, pleasure, or military ships in our population had source levels exceeding 175 dB, possibly due to military, fishery, and research classes having already adopted ship-quieting technologies (Southall and Scholik-Schlomer, 2008), including propulsion systems that reduce cavitation, quieter onboard machinery, and shock-absorbing mounts.

Of the management options considered, speed limits appear most likely to reduce noise quickly – by making an operational change, rather than undertaking replacements, retrofits, or maintenance. Because most ships can reduce their broadband source level by ˜1 dB by slowing down by 1 knot (Veirs et al., 2016), in our study area the 3 dB noise reduction target could be met by enforcing a speed limit of 11.8 knots (6.1 m/s) which would affect 83% of the ship population. For comparison, the mean and standard deviation of the

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speed distribution is 14.1 ± 3.9 knots for the ship population and 19 ± 2 knots for the fastest class, container ships (Veirs et al., 2016). While the compliance burden would fall more broadly across the fleet than with the removal or reduction options (Figure 2), faster-moving ships would be required to reduce speed more than other ships, and slow-moving classes would be unaffected. If a uniform speed limit of 11.8 knots conflicts with the "bare steerage" speed required for safe navigation of ships in a particular class, the 3 dB reduction could also be achieved by having all ships in the fleet decrease their speed by 3 knots (Figure 2).

Any noise reduction achieved by decreasing ship speed will increase the time that species are exposed to the lower noise levels. Behavioral response and masking are driven not only by the noise level, but also by a temporal overlap between the noise and the animal. A reduction of 3 dB in the total radiated power of ships does not address this temporal overlap, but in our study area, it would likely increase the functional acoustic space of SRKWs substantially and lower the maximum ship noise exposures that could cause behavioral responses or masking in the species (Holt, 2008; Williams et al., 2013, 2014, 2016). Such benefits should be weighed against the increase in temporal overlap that may result from speed reduction. At the same time, other environmental effects of a speed limit should be considered, including altered fuel efficiency (air pollution) and risk of collisions (oil spills and ships striking baleen whales).

Proven technologies and techniques (Southall and Scholik-Schlomer, 2008; Audoly et al., 2015) exist for reducing ship noise. Combinations of them, without necessarily altering speed, could be used to reduce source levels by 3 dB in each ship across the entire fleet, or just in gross-polluting ships. To date, however, minimal mitigation has been undertaken by the commercial shipping industry, either due to lack of regulation or incentives to adopt them. Management vehicles include, at least: regulated vessel speed limits in biologically important habitat, like those mandated off the U.S. East Coast to reduce ship strike mortality in North Atlantic right whales; tax incentives or subsidies to retrofit or replace noisy ships with quieter ones, for which designs already exist (Leaper et al., 2014); regulated noise emission standards for all or some ships entering into a state's internal waters; or port-based incentives and other measures. As examples of the latter, the Port of Vancouver, one of the largest ports in SRKW critical habitat, is reducing berthing fees through its EcoAction program to reward ships that are accredited as quiet by ship-classification societies, and in 2017 piloted a voluntary slow-down in Haro Strait with a speed limit of 11 knots (speed through water) in which compliant ships could receive a $500 stipend.

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Studies of the distribution of acoustic polluters, along with what determines the maximum and minimum source levels in each ship class, will help guide the creation of regional or port-devised incentives or regulatory requirements to reduce underwater noise pollution. Although our sample is drawn from one site in the northeastern Pacific Ocean, it represents one of the largest archives of calibrated source characteristics for ships anywhere in the world. If the distribution of source levels in our data set is statistically representative of the noise output from the global fleet, or other regional subsets of it, then our results may be used to assess options for managing oceanic noise beyond our study area.

Conclusions

The distribution of source levels in our ship population indicates an opportunity to halve radiated noise levels by managing as little as 15% of the fleet. If removal of the gross polluters is not feasible, reducing the source levels of the top 42.8% to an achievable threshold or setting a speed limit of 11.8 knots (affecting 83% of the fleet) could also yield major environmental improvements. Despite projections of ship noise rising through 2030 (Frisk, 2012), optimal management of the global fleet could begin to reduce the current detrimental levels of noise without necessarily regulating the entire fleet.

Acknowledgements

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169 # Figures and tables

170 **Figure 1**

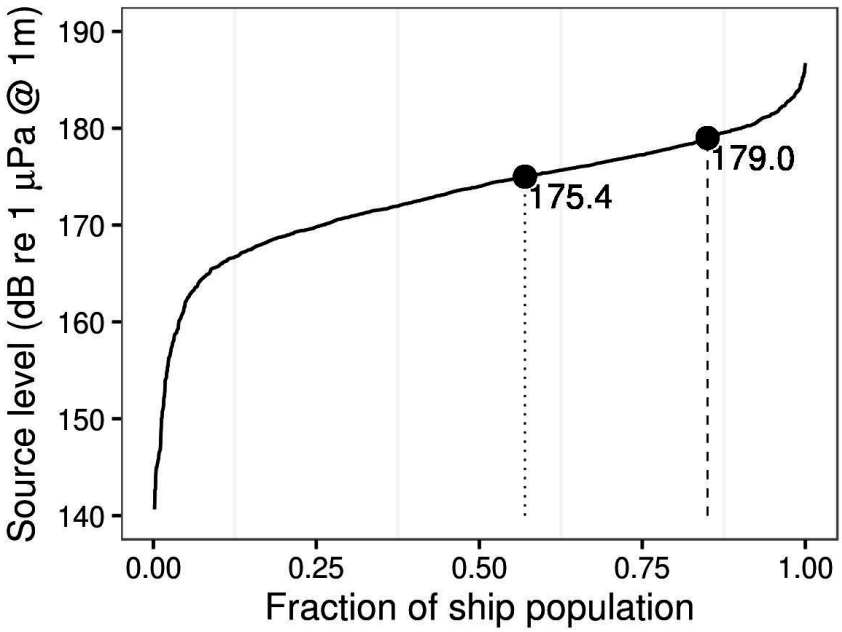


Figure 1: **Cumulative distribution of source levels with two management options** Cumulative distribution of source levels for the ship population (solid curve). Two management options for halving of the total power radiated by the fleet are depicted by vertical lines: removing the 15% of ships with source levels $>$ 179.0 dB (dashed line); and reducing source levels of 42.8% of the ships to 175.4 dB (dotted line).

171 **Figure 2**

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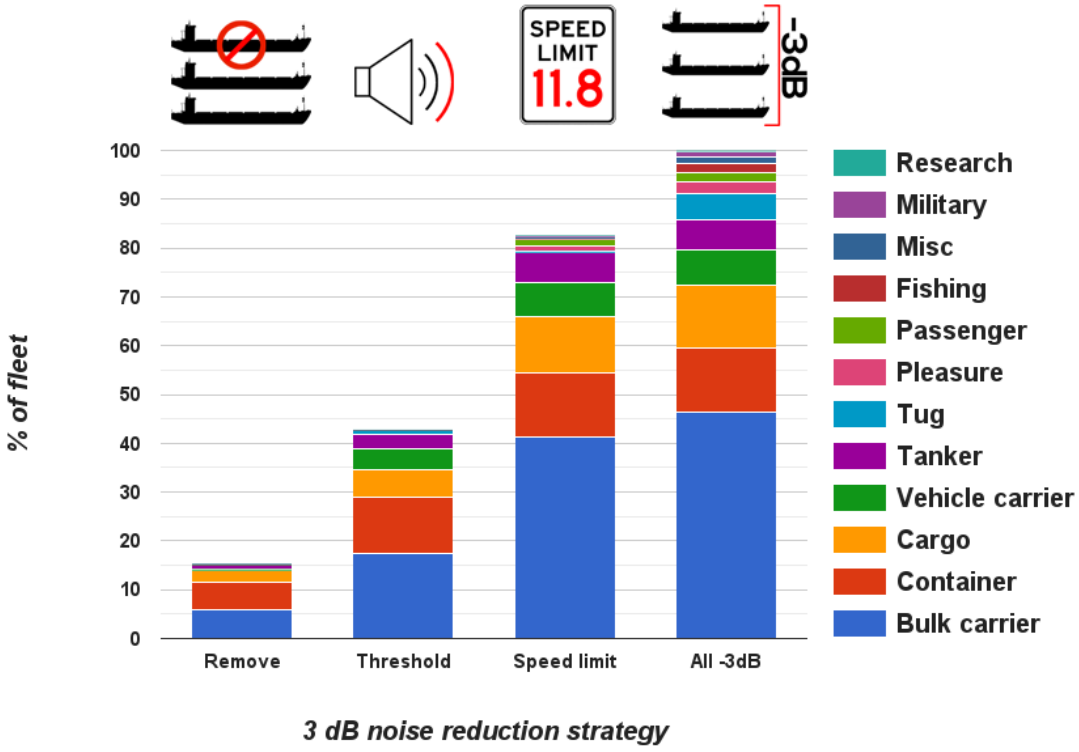


Figure 2: **Proportion of fleet affected by four noise reduction strategies** The height of each stacked bar represents the percentage of the fleet (population of 1,582 ships) that would be affected by four different strategies for halving the total radiated power. Removal of gross polluters affects 15%; limiting them to a noise threshold of 175.4 dB affects 42.8%; enforcing a speed limit of 11.8 knots affects 83%; and having all ships reduce their source level by 3 dB affects 100%. Colors indicate the classes of affected ships and the thickness of any colored bar section depicts the portion of the fleet that has affected ships in the class associated with the color.

172 **Table 1**

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	Management option:	Remove gross polluters (above 179 dB)			Quiet gross polluters (to 175.4 dB)		
Ship class	Total # of ships	# of ships	% of fleet	% of class	# of ships	% of fleet	% of class
All classes	1,582	240	15.2	N/A	677	42.8	N/A

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Management option:		Remove gross polluters (above 179 dB)			Quiet gross polluters (to 175.4 dB)		
Ship class	Total # of ships	# of ships	% of fleet	% of class	# of ships	% of fleet	% of class
Bulk carrier	734	94	5.9	13	276	17.4	37.6
Container	207	90	5.6	43	184	11.6	88.9
Cargo	206	36	2.3	17	89	5.6	43.2
Vehicle carrier	111	5	0.3	5	66	4.2	59.5
Tanker	101	12	0.8	12	46	2.9	45.5
Tug	85	2	0.1	2	12	0.8	14.1
Pleasure	35	0			0		
Passenger	31	0			3	0.2	9.7
Fishing	28	0			0		
Miscellaneous	21	1	0.1	5	0		
Military	19	0			0		
Research	4	0			1	0.1	25.0

Table 1. Proportions of fleet and classes affected by two management options aimed at gross polluters

One option removes gross polluters (ships with source levels greater than 179 dB) while the other requires them to use quieting technologies or techniques to reduce their source levels below a threshold of 175.4 dB. The 2nd column lists the total number of ships in the fleet ("All classes") and in each class. Then for each option and ship class we tabulate the number of ships affected, along with that number expressed as a percentage of the whole fleet (1,582 ships) and as a percentage of the ship class (where applicable or non-zero).

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Exhibit 19

10 Years of Research & Conservation

Southern Resident Killer Whales



NOAA FISHERIES

OUR PARTNERS

PARTNERS AND COLLABORATIONS

Front cover photo: Southern Resident killer whales with the NOAA ship Bell M. Shimada on the outer coast. Opposite page: Southern Resident killer whales in front of Seattle skyline. NWFSC/NOAA Fisheries.

This document summarizes 10 years of work made possible through funds appropriated by the U.S. Congress to NOAA Fisheries. This work would not be possible without the hard work and expertise of our many partners. Every project, scientific discovery, and management action listed in this document is the result of successful collaborations with multiple entities. In some cases NOAA provided funding to groups to conduct an action or research project; in others partners provided critical expertise, advice, or consultations. Due to space constraints and to aid readability, we cannot list every partner on each accomplishment. Our major partners are listed here. We are indebted to our regional partners and look forward to building upon our past success and together recovering Southern Resident killer whales.

Institutions

- American Cetacean Society
- Beam Reach (BR)
- Biowaves
- Cascadia Research Collective (CRC)
- Center for Whale Research (CWR)
- Concurrent Technologies Corporation (CTC)
- Department of Fisheries and Oceans, Canada (DFO)
- Global Research and Rescue
- Industrial Economics
- Killer Whale Tales (KWT)
- Orca Network
- OrcaSound (OS)
- Pacific Salmon Commission
- Pacific Whale Watch Association
- Peak Internet
- Puget Sound Partnership
- Resolve
- San Juan County Sheriff's Office
- Soundwatch Boater Education Program
- TerraMar
- The Bridge Group
- The Mediation Institute
- The Port Townsend Marine Science Center
- The Seattle Aquarium
- The Whale Museum (TWM)
- The Whale Trail
- University of California at Davis, SeaDoc Society
- University of Washington (UW)
- Washington Department of Fish and Wildlife (WDFW)

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- David Bain (UW)
- Robin Baird (CRC)
- Ken Balcomb (CWR)
- Susan Berta (Orca Network)
- John Candy (DFO)
- Paul Cotterell (DFO)
- Jeff Dismukes (Sysstat, Inc)
- John Ford (DFO)
- Jeff Foster (CRC)
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INTRODUCTION

"Over the last decade, we have come a long way…[but] our research has inspired new important questions."

The endangered Southern Resident killer whale *(Orcinus orca)* is an icon of the Pacific Northwest and inspires widespread public interest, curiosity, and awe around the globe. These striking black and white mammals are recognized for their cultural and spiritual importance to coastal tribes and communities, their value as a keystone species in the marine ecosystem, and their starring role in our region's ecotourism industry. But the Southern Residents are also among the most contaminated marine mammals in the world. Noise and overcrowding from boat traffic, as well as a scarce supply of their preferred food—salmon—pose serious threats to this endangered population.

Over the last decade, we have come a long way in our understanding and ability to protect this unique population. Through the work of our scientists and regional partners, we have made significant progress on many of the key questions that were asked a decade ago when the whales were first considered for listing under the U.S. Endangered Species Act (ESA). For example, we know a lot more about:

- Where the whales spend their time during the winter months;
- What species and stocks of fish they eat, and how this changes throughout the year;
- How the population reacts to changes in abundance of their prey;
- Which chemical contaminants are most affecting the whales; and
- How they react to the presence of boat traffic and noise.

NOAA Fisheries has used these new findings to increase protections for the whales. These include developing new rules for boat operations in the vicinity of the whales, evaluating how fishing and habitat loss affects whales through changes in prey abundance, and developing proactive plans to protect whales in the event of a major oil spill.

Although many key questions have been answered, the population continues to struggle to recover. Consequently, our research has inspired new questions, such as whether competition with other marine mammals might be limiting the population's recovery. Our research has also shown that some of the most important factors affecting the population, such as lack of adequate prey, cannot be addressed through simple actions, but instead will require a long-term commitment to rebuilding and enhancing depleted salmon stocks. In this document you will find a summary of research and conservation accomplishments made possible by 10 years of Congressional funding (FY 2003 to FY 2012) and our plans for future actions to protect the Southern Resident killer whales.

KILLER WHALES

Killer whales are found in every ocean. In the Northeast Pacific Ocean, there are three main groups, or "ecotypes," of killer whales whose ranges overlap, but that differ in their ecology, behavior, diet, and genetics.

- **Residents**, which include the Northern and Southern Resident killer whale populations along with additional populations around the Pacific Rim, occur in large social groups called pods. Residents eat fish, particularly salmon.

- **Transients**, sometimes called Biggs killer whales, are also found throughout the Pacific Rim, often in long-term stable social units of less than 10 whales – smaller than the social groups of residents. Transients feed almost exclusively on marine mammals like seals, sea lions, whales, dolphins, and porpoises.

- **Offshores** are believed to feed primarily on fish, squid, and sharks. These whales often occur offshore but also enter coastal and protected inshore waters. Offshores congregate in groups of 25 to 75 animals and sometimes have been sighted in larger groups of up to 200 whales. Offshores are the least studied of the three ecotypes.

2001

Center for Biological Diversity and others petition agency to list Southern Residents under the ESA.

2002

Determined Southern Residents ineligible for protection under the ESA.

Completed Southern Resident Status Review.

2003

Formed scientific team to study Southern Resident risk factors and data gaps.

The Southern Resident killer whale population is comprised of three pods, designated J, K, and L. Whales from the same pod tend to spend the majority of their time together, and consist of multiple matrilines – female whales and their descendants.

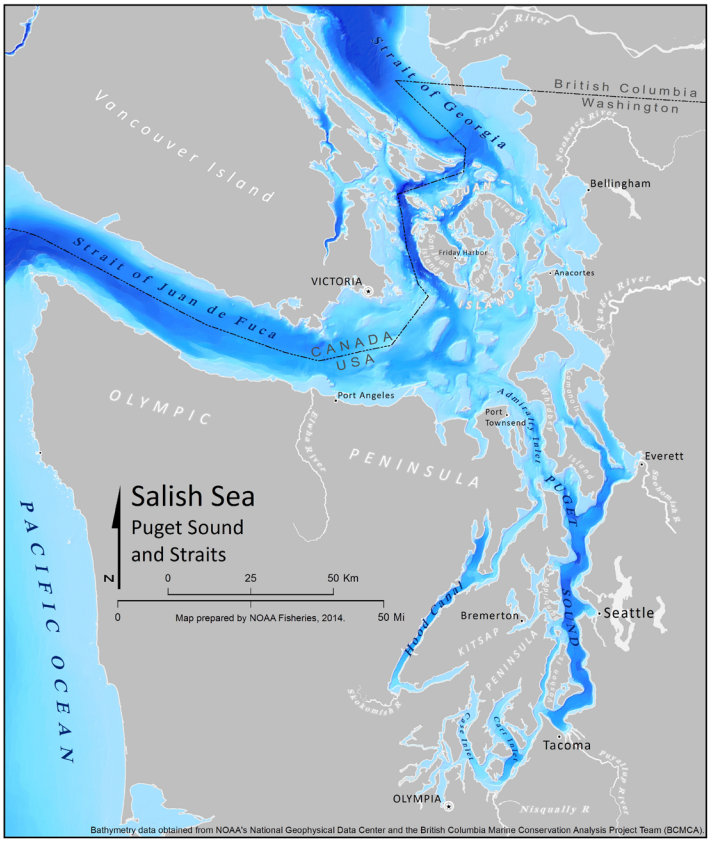
During the spring, summer, and fall months, the Southern Resident population can be found in the Salish Sea, which includes the inland waters of Puget Sound, the Northwest Straits, and southern Georgia Strait. Until recently, little was known about where whales go in the winter months, although Southern Residents had been sighted as far south as Monterey Bay, CA and as far north as Chatham Strait in southeast Alaska. As we describe later, thanks to federal funding and collaboration with regional partners, we now have a much more detailed, if still incomplete, picture of their coastal distribution.

STATUS AND TRENDS

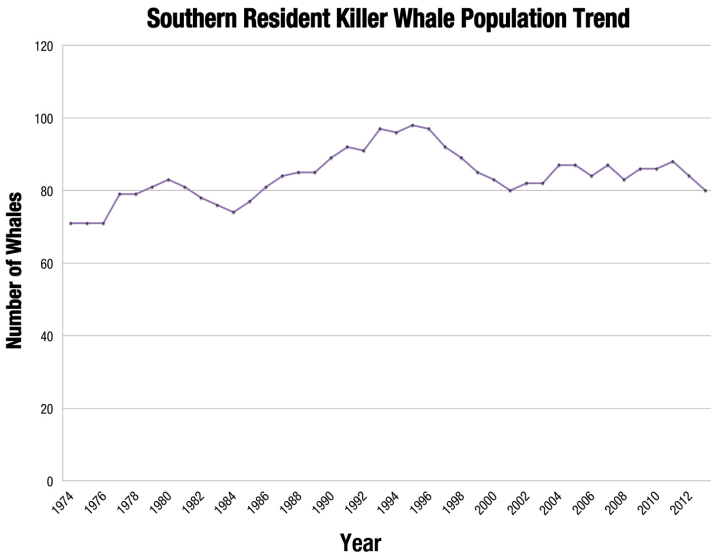
Scientists estimate the minimum historical population size of Southern Residents was about 140 animals. Beginning in the late 1960s, a live-capture fishery removed nearly 50 whales for display at marine parks and resulted in an immediate steep decline in the population. The decline was steepest among the juveniles in the population, because smaller animals were targeted for capture. By 1974, the population consisted of 71 whales.

Live captures of this population ended in the early 1970s, and since that time the population has gone through several periods of growth and decline. In the mid 1980s, Southern Residents entered an 11-year growth period peaking at 98 animals in 1995. From 1996 to 2001, the population experienced a renewed decline of almost 20% and was reduced to 80 whales in 2001 before increasing somewhat to 88 whales in 2005 (including an orphaned whale, L98, who later died from a collision with a tugboat).

As a result of the steep decline in abundance, in 2005 the population was listed as an endangered distinct population segment (DPS) under the ESA. The major threats to the population's survival identified at the time were prey availability, pollution and contaminants, and effects from vessels and sound. In addition, small population size and vulnerability to oil spills and disease were identified as significant concerns. The population has declined since 2005 and consisted of 82 whales in the summer of 2013.



Map by: Damon Holzer. NWFSC/NOAA Fisheries.



Hosted first science workshops to identify research needs on prey relationships and vessel interactions.

Court orders NOAA to reconsider eligibility of Southern Residents for ESA listing.

Southern Residents are declared "depleted" under the Marine Mammal Protection Act.

RECOVERY PLANNING

"While we have made progress toward meeting the recovery goals, there is still more work to do."

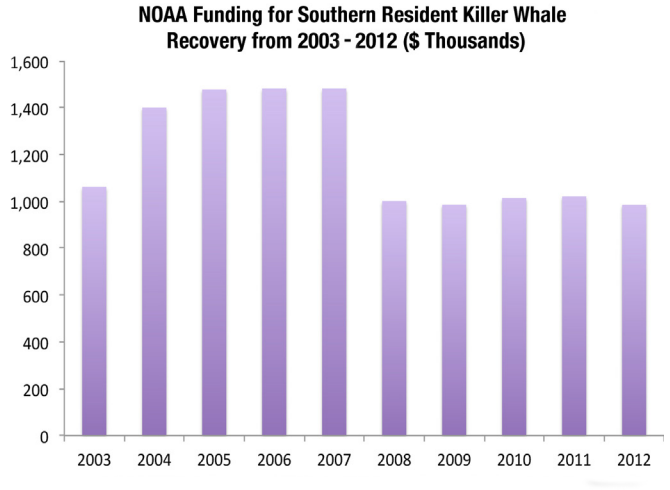
With extensive input from the public, NOAA Fisheries completed a recovery plan for Southern Residents in January 2008. Based on the best available information, it was clear that the population faced multiple potential threats and that we had many gaps in our understanding, but it was not clear which threats were most responsible for limiting the population's recovery. The plan, therefore, identified the specific aspects of the potential threats to address based on the best available science. The plan also identified important data gaps to fill.

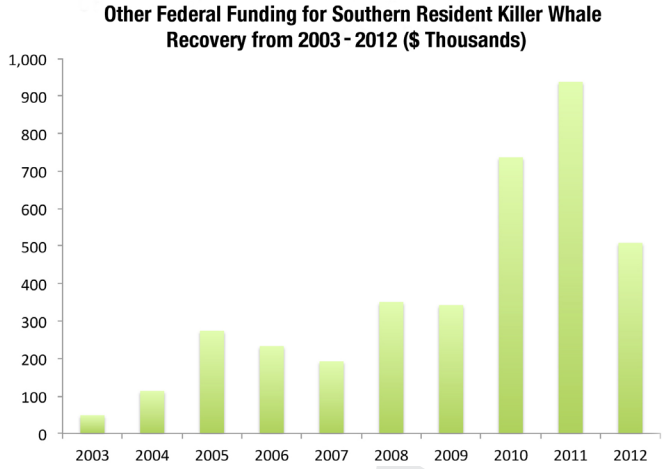
Even before the recovery plan was finalized, many efforts were underway by local and regional partners, and state and federal groups to conserve and protect Southern Resident killer whales. In 2003, the U.S. Congress allocated specific funding for killer whale research and management. From 2003 to 2012, NOAA spent $15.7 million dollars on research and conservation projects focused on or supporting recovery of Southern Resident killer whales.

Coastal communities in the Pacific Northwest have shown a commitment to recovery of the Southern Resident killer whales by implementing a number of actions in the recovery plan. Recovery is a long-term effort and will require cooperation, coordination, and dedication of resources in the years to come. The Southern Residents have long lifespans, low reproductive rates, and a small number of reproductive individuals, so a recovery strategy should ensure that the whales' population growth is on a positive trend over a long period of time. Therefore, our recovery criteria require a high degree of confidence that the population has been growing for at least several decades.

While we have made progress toward meeting the recovery goals, there is still more work to do. Over the past decade, scientists have advanced our knowledge about the biology of the whales, the threats they face, and other information guiding conservation of this endangered species. But Southern Residents still face an uncertain future. Research and conservation activities remain important to learn more about the whales and inform actions to protect them.

A key to the continued success of research and conservation programs is leveraging resources and maximizing impact through partnerships. For example, the whales spend significant time in Canadian waters and are listed as endangered under the Canadian Species At Risk Act, so transboundary coordination has, and will continue to be, important to recovery.





From 2003 to 2012, $15.7M in federal funding has been provided to support Southern Resident killer whale recovery activities. NOAA Funds are those directed by Congress to be used for this purpose. Other federal funds represent additional funds contributed by NOAA and other federal agencies for specific projects.

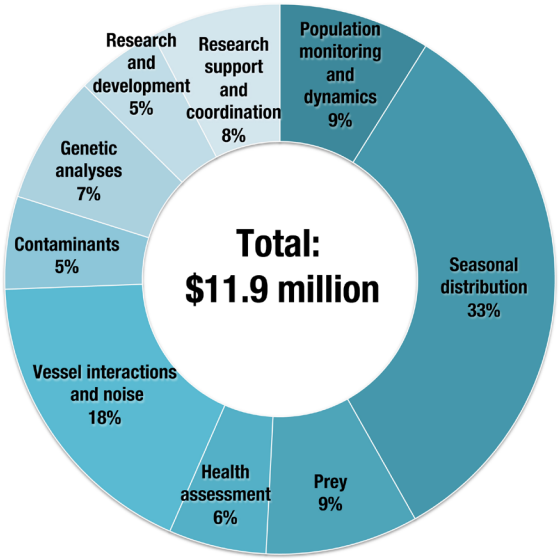
2004

Washington Department of Fish and Wildlife completes Washington State Status Report for Southern Residents.

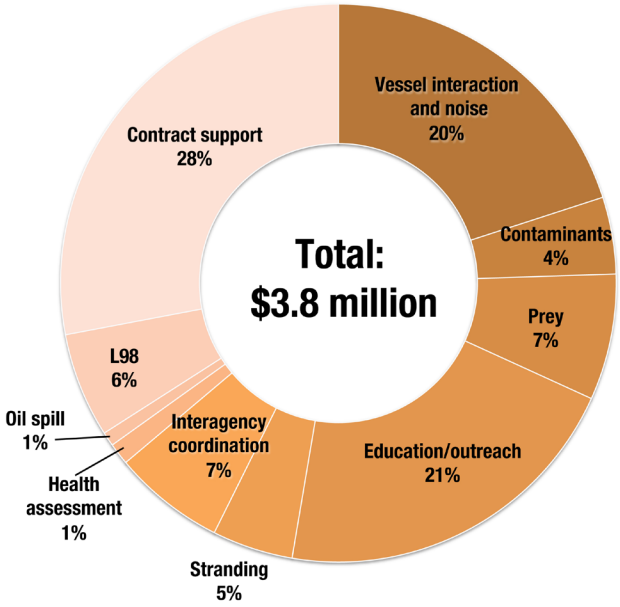
Completed first Southern Resident winter distribution survey cruise (PODS) and confirmed coastal habitat use by L pod.

Hosted additional science workshops about behavioral data collection and identification of Southern Resident subspecies.

Total Funding for Science and Research 2003-2012 by Category



Total Funding for Management and Conservation Actions 2003-2012 by Category



The pie charts include all expenses associated with each category, including supplies, equipment, travel, and federal and contractor labor and overhead costs. Federal labor costs were not tracked to the project level, but are applied proportionally across all categories.



NOAA Fisheries

Learning from Springer and Luna

NOAA has worked with Canada and many partners to respond to two lone killer whales that were separated from their families.

A73, (also known as Springer and pictured above), a Northern Resident calf found alone in Puget Sound, was returned to her family group in 2002 and has successfully reintegrated there. She had her first calf in 2013.

L98 (also known as Luna), a lone Southern Resident juvenile in Canadian waters, was killed by a vessel in 2006 before he could be returned to his family group.

These unique situations provided new insight into the challenges these whales face in their environment. Working with Springer taught us successful reintroduction strategies for young orcas with an absent mother, and gave us useful health insights through disease and blood screenings. The experience with Luna highlighted risks of interacting with boats and humans. The diverse transboundary partnerships formed as a result of these efforts continue to benefit recovery efforts for Northern and Southern Resident killer whale populations. Springer's rescue was supported by emergency funds through the John H. Prescott Marine Mammal Rescue Assistance Grant Program.

Washington State designates killer whales in Washington State as endangered.

Completed an updated Southern Resident status review.

Collected first fecal sample from a Southern Resident to identify diet.

What Does It Mean for Southern Resident Killer Whales to Be Endangered?

Look for the different icons throughout the report to see how research supports implementation of the protections under the Endangered Species Act.

Protections under the Endangered Species Act (ESA)		Date Completed	Icon
ESA Listing	When a species is listed, "take" is prohibited without a permit. Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct.	November 2005	
ESA Section 7 – Reviewing federal activities	Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify critical habitat. NOAA Fisheries consults on federal actions under section 7 to reduce or mitigate impacts and ensure the survival and recovery of Southern Resident killer whales.	Ongoing	
ESA Section 10 permits – Reviewing scientific research activities	Permits can be issued for scientific research or to enhance the survival of a species; permits can also be issued for takes that are incidental to an otherwise lawful activity (such as construction projects with pile driving). Issuing a section 10 permit is a federal action so we also conduct section 7 consultations to ensure issuing permits will not reduce survival or recovery.	Ongoing	
ESA Critical Habitat	For listed species, NOAA Fisheries must designate critical habitat — specific areas within their occupied range that contain the physical and biological features essential for conservation and that may require special management considerations or protection. Critical habitat is protected from destruction or adverse modification by federal actions (see section 7 above).	November 2006 (Summer range only)	
ESA Recovery Plan	NOAA Fisheries is required to develop and implement recovery plans, which include site-specific management actions, objective, measurable recovery criteria, and estimates of time and cost to carry out recovery actions.	January 2008	
ESA 5-year Review	NOAA Fisheries must conduct a review of all listed species at least once every 5 years to determine if the listing status should be changed.	January 2011	
ESA Protective Regulations	NOAA Fisheries shall issue regulations as deemed necessary and advisable for the conservation of listed species.	April 2011 (Vessel regulations)	

2005

Southern Resident killer whale distinct population segment listed as endangered under ESA.

First paper from Southern Resident killer whale program characterizing diving behavior of Southern Residents in the summer range.

2006

Co-hosted a symposium with the Department of Fisheries and Oceans Canada to share new research results.

Reducing Threats to Southern Resident Killer Whales

Federal agencies must insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify critical habitat. NOAA Fisheries consults on federal actions under section 7 of the Endangered Species Act to reduce or mitigate impacts and ensure the survival and recovery of Southern Resident killer whales. Section 7 consultations are an important and effective management tool to reduce impacts on Southern Residents.

	Types of Actions	Mitigation/Conservation Measures
Actions that affect the salmon prey of Southern Residents	• Harvest management, such as fisheries regulations or fishery management plans • Hydropower operations • Hatchery production and management • Freshwater and estuary habitat projects	• Risk analysis to assess salmon abundance levels and relationships to killer whale survival and recovery. • Identify workgroups and research projects to address data gaps. • Minimize occurrence of derelict gear. • Protective measures for salmon habitat, populations, and hatchery operations.
Actions that affect contaminant levels	• Wastewater treatment plants • Sewer outfalls • Dredge disposal of contaminated sediments • Creosote piling removal	• Monitor input levels of harmful contaminants. • Identify workgroups and research projects to address data gaps. • Implement adequate mixing zones to limit accumulation in local prey. • Required threshold levels for at sea disposal. • Spill prevention and emergency clean-up plans.
Actions that may produce sound and/or cause disturbance	• In-water construction, pile driving • Docks, marinas, terminals that increase vessels traffic • Tidal and wave energy projects • Navy and Coast Guard operations • Research on Southern Resident killer whales	• Protective monitoring zones to avoid exposure to high levels of sound. • Responsible slow, safe vessel operation to reduce risk of strikes. • Adaptive management approaches for new technology, including required monitoring and feedback to evaluate protections. • Terms and conditions to minimize impacts of research activities (such as limits on repeated approaches or restricted age/sex for sampled individuals). • Track individual project effects to assess cumulative impacts.

Collected first contemporary biopsy sample from a Southern Resident to quantify contaminant loads, infer diet preferences, and collect DNA for pedigree analysis.

Completed Southern Resident killer whale Research Plan.

Proposed potential areas for Southern Resident critical habitat.

MAJOR THREATS TO RECOVERY

PREY AVAILABILITY

Recovery Goal: Rebuild depleted populations of salmon and other prey to ensure an adequate food base for recovery of the Southern Residents.

Southern Residents are fish-eating whales that rely on echolocation to detect their prey, primarily Pacific salmon. One species, Chinook salmon, make up a majority of their summer diet. In the fall and spring the whales eat a wider variety of salmon species, including coho, chum, and steelhead. Their winter diet remains relatively unknown, but recent investigations by NOAA Fisheries and collaborating scientists suggest it also consists largely of Chinook salmon. In the Pacific Northwest, many Chinook salmon populations have declined substantially from historical levels of abundance and are listed as threatened or endangered under the ESA. Ensuring that salmon populations are healthy and sustainable is an important part of achieving recovery for the whales.

Science and Research

Research prior to 2003 suggested that the whales prefer Chinook salmon, but these studies were largely focused on Northern Resident whales. The diet of Southern Residents may be different because the two killer whale communities occupy different ranges. To better understand the Southern Resident whales' diet, NOAA researchers have collaborated with experts over the past 9 years, collecting fecal material and prey remains from the whales to determine what they eat. With partners, we modeled the daily food requirements of the whales, investigated relationships between population sizes of salmon and whales, and examined the relationship between the whales' movement patterns and prey availability.

Major Findings and Milestones:

Food Preferences

- We confirmed that Chinook salmon are the whales' preferred prey, particularly in the summer. To a lesser extent, the whales also consume other salmon species and groundfish, such as halibut and lingcod. In Puget Sound, chum salmon appear to be a particularly important prey item during the late fall.
- Fraser River Chinook salmon make up the bulk of the whales' summer diet while they are in the Salish Sea. From our sampling in coastal waters we learned that they also consume Chinook from the Columbia, Sacramento, Klamath, and other coastal river systems.
- Research we funded showed that the backscatter patterns of fish air bladders are unique for each salmon species, and these unique patterns likely allow the whales to distinguish Chinook salmon from other species using echolocation.

Feeding Behavior

- We estimated the daily energy requirements of the whales, and based on these numbers, calculated that whales consume hundreds of thousands of adult salmon each year.
- Several methods have shown that the west side of San Juan Island is a foraging "hot spot" for Southern Residents during the summer.
- Studies showed that the whales travelled over a greater area and their movement patterns were more complex in the late 1990s, when prey availability was low.

Impacts on Population

- We found that survival and birth rates in the Southern Resident killer whale population are correlated with coastwide abundance of salmon.
- An analysis of hormones in the feces of Southern Residents showed that reduced prey availability has a greater effect on these whales than vessel traffic, though during years of very poor food availability the presence of vessels likely contributes to stress.

2006

Designated final Southern Resident critical habitat in inland Washington waters.

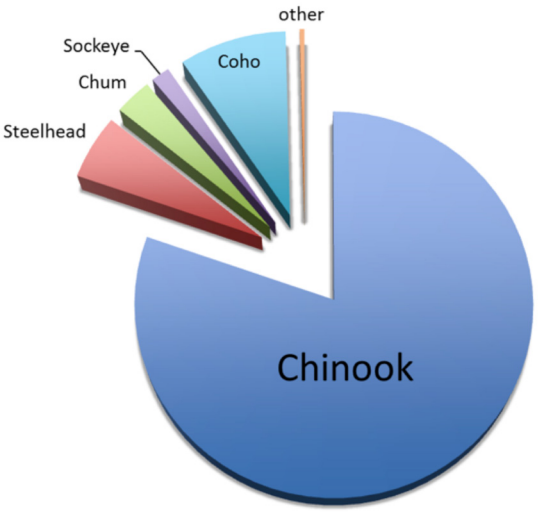
2007

Requested public input on potential vessel regulations.

Published paper showing high levels of toxics in Southern Residents, raising concerns about health, especially for juveniles with highest levels of PBDEs.

- We funded a study that estimated killer whale body size from photographs taken above whales using a helicopter. This novel method has promise for helping us understand how food availability impacts whale body condition and growth.

Composition of the Southern Residents' Summer Diet



Scientists collected individual prey samples in the Southern Residents' summer range, including the Western Juan de Fuca Strait and San Juan Island, from May to September 2004-2008. More than 75% of the whales' summer diet is Chinook salmon. Data from Hanson et al. 2010.

Management Activities

Biological Opinions

Under section 7 of the ESA, NOAA reviews all federal actions to ensure that endangered species, as well as their primary food source, are not put in jeopardy. Since listing in 2005, we have evaluated federal actions that directly affect the Southern Residents. We have also evaluated the effects of actions on their prey – namely salmon – and their habitats. For example, we know that the whales eat Columbia River and Sacramento River salmon, so we have included the Southern Residents in our assessment of the Federal Columbia River Power System (FCRPS) and the state and federal water projects in California, which affect multiple species of ESA-listed salmon and steelhead. Actions in these opinions benefit the salmon, and therefore the whales, including habitat, hatchery, predation management, and harvest actions to mitigate for the adverse effects of hydrosystems. The opinions also include numerous research, monitoring, and evaluation actions to support and inform adaptive management decisions.

Salmon Fisheries

The management of commercial and recreational salmon fisheries can affect the amount of food available to sustain the endangered Southern Resident killer whale population. It is essential to understand what the whales eat, how much they need, and where they are feeding in order to ensure we have a healthy and sufficient source of food to support the recovery of the whales.

As part of an ongoing evaluation of salmon fisheries, NOAA and the Department of Fisheries and Oceans Canada appointed an independent science panel to review salmon harvest actions and to inform recovery of Southern Residents in the U.S. and Canada. The panel held three workshops in 2011 to 2012 to rigorously explore the evidence available to answer the following key question:

> *To what extent are salmon fisheries affecting recovery of Southern Resident killer whales by reducing the abundance of their available prey, and what are the consequences to their survival and recovery?*

The science panel reviewed all available information, including new research called for by the outcomes of the first two workshops, and provided a final report in November 2012. The panel concluded that at a broad scale, salmon abundance will likely influence the recovery of the whales, but that there was a great deal of uncertainty about whether current fisheries remove enough salmon to have a meaningful influence on the whales' status.

The report also provided valuable recommendations on future analysis and research that could be done to fill data gaps and reduce uncertainty. The report will continue to be used to inform the management of salmon fisheries and assess impacts of actions that may alter the abundance of salmon available to the whales as part of the recovery programs for Southern Residents in the U.S. and Canada. Background information on the science panel process, workshop materials, and the final report are available at: http://www.westcoast.fisheries.noaa.gov/

Completed first stock identification of Southern Resident killer whale prey, shedding light on importance of salmon in whale diet.

Completed final Southern Resident killer whale Recovery Plan.

2008

First fecal samples collected from Southern resident killer whales to identify stress hormones, genetic identify, and diet.

MAJOR THREATS TO RECOVERY (cont.)

POLLUTION AND CONTAMINANTS

Recovery Goal: Minimize pollution and chemical contamination in Southern Resident habitats.

Southern Resident killer whales are long-lived, top predators in the marine ecosystem, which make them vulnerable to pollutants that can accumulate up the food chain and negatively affect their health. This endangered population is exposed to contaminants from urban areas such as Puget Sound, where they and their prey spend much of their time.

Chemical pollutants of concern for killer whales include the pesticide DDT and chemicals found in industrial coolants and lubricants (known as PCBs), as well as flame-retardants (PBDEs). A large body of evidence links pollutant exposure to disease and reproduction problems in marine mammals. For example, chemicals in flame-retardants can potentially affect thyroid hormone levels, mimic or offset reproductive processes, and alter immune disease response in many species.

High levels of pollutants may be keeping the whale population from increasing at the rate required for recovery of the population. It is hard to study how these pollutants affect wild whales, so we often rely on information from other species and lab experiments. Working to reduce chemical contamination in the whales' habitat and food, however, will help slow the accumulation of these chemicals in the whales over their long lives, which may help their long-term prospects of survival.

Science and Research

U.S. and Canadian researchers first measured chemical pollution in the whales in the early 1990s. They found that the whales had high levels of PCBs but did not measure some other important contaminants such as DDT and flame-retardants. Over the past decade, NOAA Fisheries' researchers have collected many more biopsy samples from the whales in order to measure current levels of a number of pollutants.

Major findings and milestones:

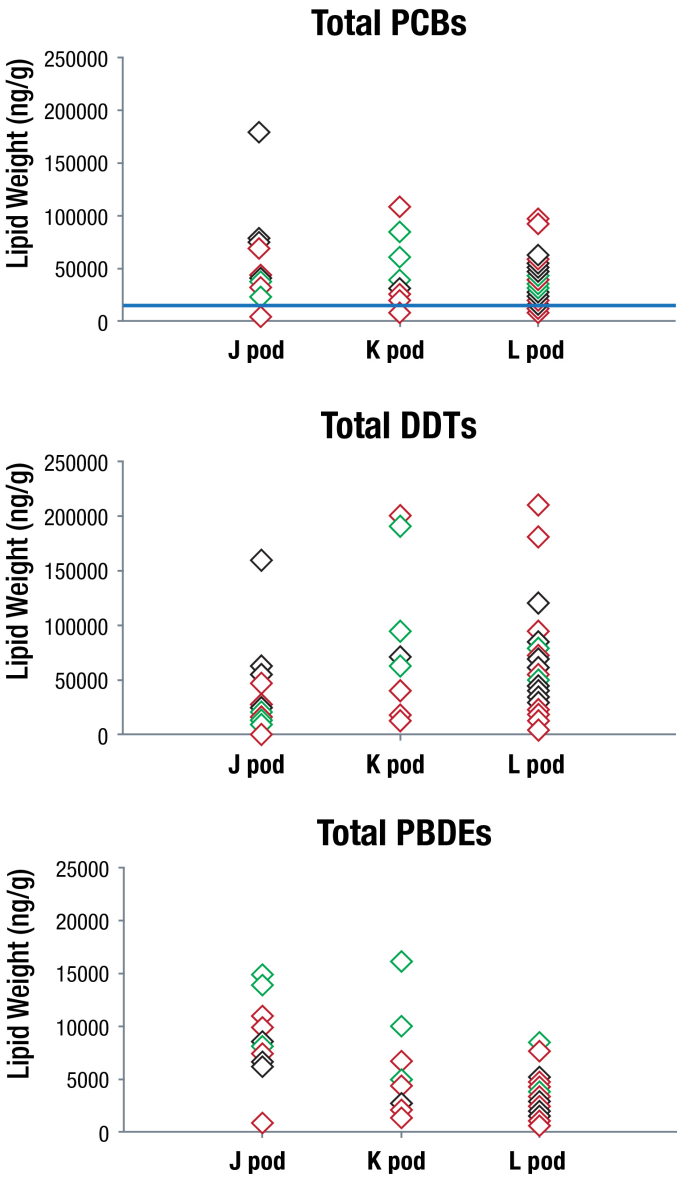
- We discovered that young whales have particularly high levels of certain pollutants.
- All of the whales in the population, including young whales, have high levels of pollutants that were banned long ago, like PCBs (legacy pollutants). The levels of PCBs found in their blubber exceed those we know to affect the health effects of other marine mammals. Section 7
- The population's three pods differ greatly in the types of pollutants found in their blubber. L and K pod have higher levels of pollutants, such as DDT found mostly near the California coast, suggesting that the whales eat prey from that area.
- Computer models showed that banned pollutants like PCB will slowly decline in the environment. However, because of high contaminant levels in currently reproducing females, young whales will continue to be exposed to these pollutants for several generations. Section 7
- These same computer models also predicted that the newer pollutants, like those found in flame retardants, will increase rapidly in the environment. This means that even though accumulation of banned contaminants will slowly decline in the whales, newer contaminants will increase, possibly resulting in continued health risks for the whales. Section 7

2009

Co-hosted Southern Resident killer whale Naturalist Workshop with The Whale Museum for whale-watch operators and naturalists to learn about U.S. and Canadian management efforts and research results.

Published trio of papers on how Southern Residents modify their behavior in presence of vessels.

Proposed new vessel regulations to protect killer whales.



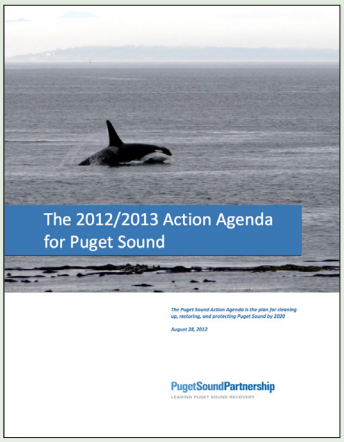
The concentrations of PCBs, DDTs, and PBDEs found in the whales' blubber vary by pod, sex, age, and pollutant, but all of the whales in the population, including young whales, have high levels of pollutants that were banned long ago (known as legacy pollutants), like PCBs. The levels of PCBs found in their blubber exceed the levels we know to cause poor health effects in other marine mammals. Figure generated using data from Krahn et al. 2007, Krahn et al. 2009 and NWFSC unpublished data.

Legend:
Black- Maturing and adult males 13 years and older
Red – Adult females 12 years and older
Green – Juvenile and sub-adult whales
Blue line – the level we know generates negative health effects in other marine mammals

Management Activities

Partnering with Puget Sound Partnership

Contaminants are a threat to healthy marine ecosystems, not just Southern Resident killer whales. In order to address the threat of pollution and contamination in critical habitat for the whales, we work with the Puget Sound Partnership; the state agency leading the cleanup of Puget Sound. We collaborate with them in their efforts to clean up, restore, and protect Puget Sound by 2020. For more information on efforts to address pollution and contaminants, please visit http://www.psp.wa.gov/.



Convened PBDE Working Groups

We have focused our recent management efforts on one emerging contaminant, flame-retardants, also known as PBDEs, in Puget Sound. With the discovery of relatively high levels of these chemicals in Southern Resident killer whales, the recovery plan identifies actions to monitor and mitigate effects from these newly emerging contaminants. Discharge of treated wastewater is one of the primary sources of PBDEs in Puget Sound. We worked with the U.S. Environmental Protection Agency to establish working groups composed of state and local managers and the research community to evaluate data gaps and make recommendations on the following topics:

- PBDE removal efficiency in wastewater treatment plants
- PBDE modeling in Puget Sound (fate, transport, and bioaccumulation or food web modeling)
- Toxicological thresholds for PBDEs in killer whales
- Effects of mixtures of persistent pollutants

The working groups have completed a report of recommendations to help inform policy makers, conservation groups, agencies that issue permits and regulate contaminants, and the Puget Sound Ecosystem Monitoring Program. Background information on the working groups, and the report are available at: www.westcoast.fisheries.noaa.gov.

2010

Added killer whale response plan to the Northwest Area Contingency Plan for oil spill response.

Published two papers, one on the identification of species and stocks of prey consumed and one on prey consumption requirements by Southern Residents, providing much needed information on Southern Resident predator/prey relationships.

2011

Completed 5-year Status Review; no change to status needed.

VESSELS AND NOISE

Recovery Goal: Minimize disturbance of Southern Resident killer whales from vessels.

The inland waters of Washington state and British Columbia are highly urbanized areas with significant vessel traffic from container ships, ferries, tugboats, recreational boats, and fishing vessels, and are also where the whales spend much of their time in the summer and fall. Southern Resident killer whales are also the focus of considerable recreational and commercial whale watching. The cumulative impacts from vessels may interfere with the whales' ability to communicate and find food, affecting their health and survival. Quantifying the amount and types of marine traffic, as well as the whales' responses to vessels, has helped us understand the effect of vessels on killer whale behavior and determine the best ways to protect whales and allow for human uses of the marine environment.

Science and Research

Working with our partners, we have completed studies providing insights into the trends in vessel activity and how the whales react to vessels. The results helped the agency create new regulations for vessel activities in areas frequented by Southern Resident killer whales.

Major findings and milestones:

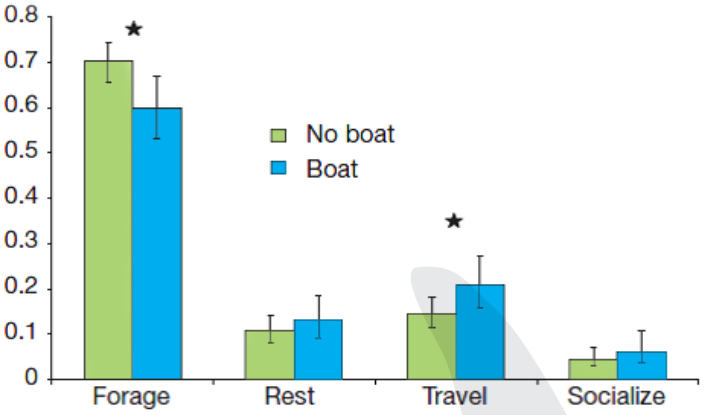
Vessel activity and ongoing monitoring PR

- With our partners, we monitored the vessels in the vicinity of the whales annually and observed compliance with the whale watch guidelines and regulations. Recreational boaters are the most common vessel type observed out of compliance.
- In collaboration with our partners, we documented summer vessel traffic in the San Juan Islands, including the western shore of San Juan Island, a high-use area for Southern Residents. We detected a higher vessel presence on weekends and holidays and a small increase in overall vessel traffic in 2010 compared to a similar 2006 study.
- We completed a detailed survey of the whale watching industry to evaluate how future regulations might affect employment and participation in this important tourist activity.

Noise and impacts on communication PR

- A study we funded quantified the level of noise produced by a variety of vessel sizes, propulsion systems, and operational speeds in Haro Strait.
- Average noise levels in Haro Strait are strongly influenced by large vessels such as commercial ships, according to a NOAA-funded study.
- NOAA-funded scientists constructed and validated models that predicted received levels of sound from large vessels that killer whales experience in the main shipping lanes of Haro Strait.
- We determined that noise from motoring vessels at distances of up to 400 meters has the potential to affect echolocation abilities of foraging whales.
- We confirmed that ambient noise levels increase as the number of vessels increase.
- Our studies documented particularly high noise levels experienced by whales in close proximity to certain types of vessels such as small recreation and commercial whale watch boats.

Southern Resident Behavior Changes With Boat Presence



This figure shows the amount of time Southern Residents from J, K, and L pod spent foraging, resting, traveling, and socializing with and without the presence of boats in two areas near San Juan Island. When vessels were present, the whales foraged significantly less and travelled more. Data from Lusseau et al. 2009.

2011

Published scientific paper showing reproductive success appears to increase with male age and size and that Southern Residents do not breed outside of their small population.

Announced new vessel regulations to protect killer whales.

First of three NOAA-DFO Bilateral Scientific Workshops to Evaluate Effects of Salmon Fisheries on Southern Residents.

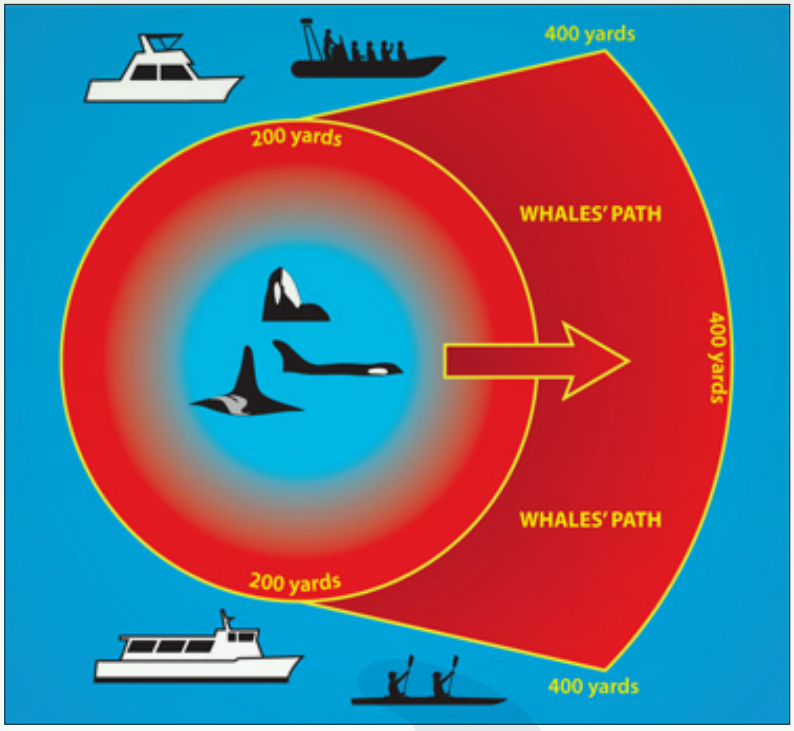
Management Activities

NOAA Fisheries announced new regulations to protect killer whales in Washington State from vessel impacts in April 2011. The rule prohibits vessels from approaching any killer whale closer than 200 yards, and prohibits vessels from intercepting or parking in the path of the whales.

These regulations were developed and informed by public input, scientific results from research we conducted or funded, and data from the Soundwatch Boater Education Program that monitors boat activity around the whales. We also considered the potential costs of the regulations to various stakeholder groups, including the whale watching industry and fishing communities.

The regulations strike a balance by providing protection for endangered Southern Resident killer whales while still allowing for educational and economically viable whale watching. The new 200-yard approach rule was a change from a previous 100-yard guideline. Our final assessment concluded that the new regulations would provide a net benefit to whales by reducing risk of vessel strikes and behavioral and acoustic disturbance, but would have no significant impacts to socioeconomics or recreational opportunities. The new regulations called for additional education, enforcement, and monitoring activities, which are currently underway. In 2013, the Washington Department of Fish and Wildlife received a NOAA endangered species grant to support enforcement.

For more information on the regulations and the "Be Whale Wise" guidelines, please visit: http://www.bewhalewise.org/.



WCR/NOAA Fisheries

Impacts on behavior PR

- Research we funded demonstrates that killer whales spend a greater proportion of time traveling and less time foraging in the presence of vessels, including kayaks.
- Results from our research as well as research we funded show that Southern Residents modify their behavior by increasing surface activity (breaches, tail slaps, and pectoral fin slaps) and swimming in more erratic paths when vessels are close.
- We found that Southern Resident killer whales increase the amplitude (loudness) of their calls when noise levels in their environment are high.
- We estimated the potential energetic impact of increased surface activity and louder calls in wild killer whales by quantifying the energetic cost of the same activities in trained bottlenose dolphins.

Deployed first satellite tag on a Southern Resident (adult male J26) to determine winter distribution.

Longest Southern Resident satellite tag deployment to date (>3 months) provided information on winter habitat use and allowed researchers to collect the most offshore prey samples in one research cruise.

2012

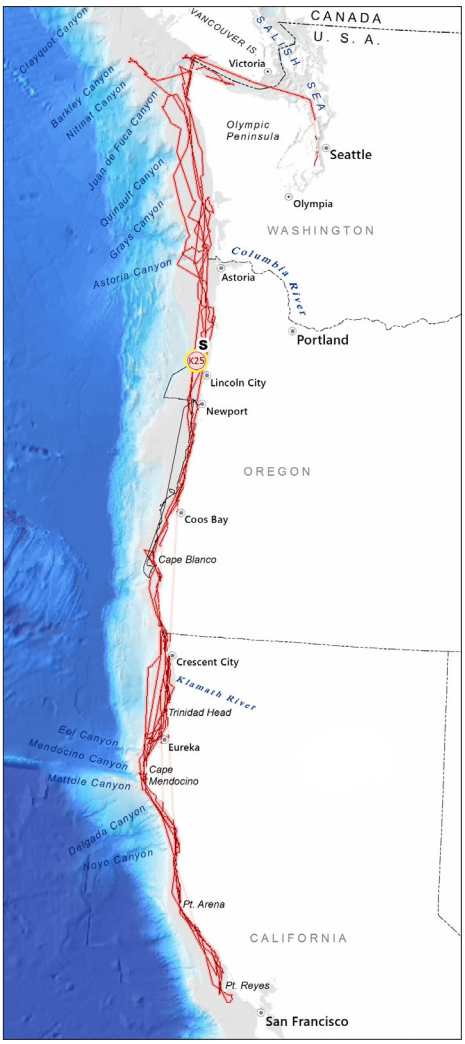
2013

Second and third NOAA-DFO Bilateral Scientific Workshops to Evaluate Effects of Salmon Fisheries on Southern Residents.

FILLING CRITICAL INFORMATION GAPS

WINTER DISTRIBUTION

In 2003 we knew very little about the whales' winter habitat and their distribution along the West Coast. This was a large information gap, since the whales spend well over 50% of their time on the outer coast where they are difficult to observe. Understanding more about the whales' coastal habitat has helped us learn what they are eating, what threats they face in this part of their habitat, and how to protect this important part of their range.



Movements of satellite-tagged Southern Resident killer whale K25 from 29 December 2012 to 3 April 2013. NWFSC/NOAA Fisheries.

Science and Research

Prior to 2003, data on the whales' winter distribution and movement patterns were limited to a handful of sightings off the West Coast over several decades. A series of workshops identified winter distribution as a primary data gap. To determine where the whales spend their time outside of the inland waters of Washington and British Columbia, we used a variety of technologies, including passive acoustic monitoring, a land-based sighting network, coastal research cruises, and most recently satellite-linked tags.

Major findings and milestones:

- We located and recorded the location of Southern Residents off the Washington and Oregon coasts on 6 of 7 NOAA cruises to study the whales since 2004.
- With partners we expanded the sighting network in inland Washington waters and along the West Coast.
- We greatly expanded the use of passive acoustic monitoring to study the whales' coastal habitat use. Acoustic recorders deployed at 7 sites off the West Coast detected dozens of Southern Resident calls, providing an improved understanding of where the whales go along the coast.
- We implemented a satellite-linked tagging program to directly determine whale movements. We collected 93 days of winter location information for K pod in 2013 and a month of locations for J pod in 2014.
- In 2013, researchers used satellite tagging information to follow the whales along the coast for 8 days, allowing nearly continuous investigations of behavior and habitat use. Scientists also collected numerous prey and fecal samples to learn more about winter diet, and oceanographic data helped them understand features of their environment on the outer coast of Oregon.
- Prey and fecal samples collected during coastal cruises suggest that Southern Residents consume Chinook, steelhead, chum, lingcod, and halibut during winter and spring months.



Southern Resident killer whale male, K25, with satellite tag attached. NWFSC/NOAA Fisheries.

Management Activities

NOAA Fisheries designated critical habitat for Southern Resident killer whales in 2006. Three specific areas were designated which together comprise approximately 2,560 square miles (6,630 square kilometers) of marine habitat in inland waters of Washington:

1. the Summer Core Area in Haro Strait and waters around the San Juan Islands;
2. Puget Sound; and
3. the Strait of Juan de Fuca.

At the time, we did not include any areas off the coast because of the limited information regarding the whales' distribution along the coast, as well as the uncertainty regarding the important habitat features in the coastal areas. In January 2014, the Center for Biological Diversity submitted a petition to NOAA Fisheries requesting an expansion of the critical habitat to include offshore waters of the Pacific Ocean. New information from the current research activities will inform future consideration of critical habitat along the coast.

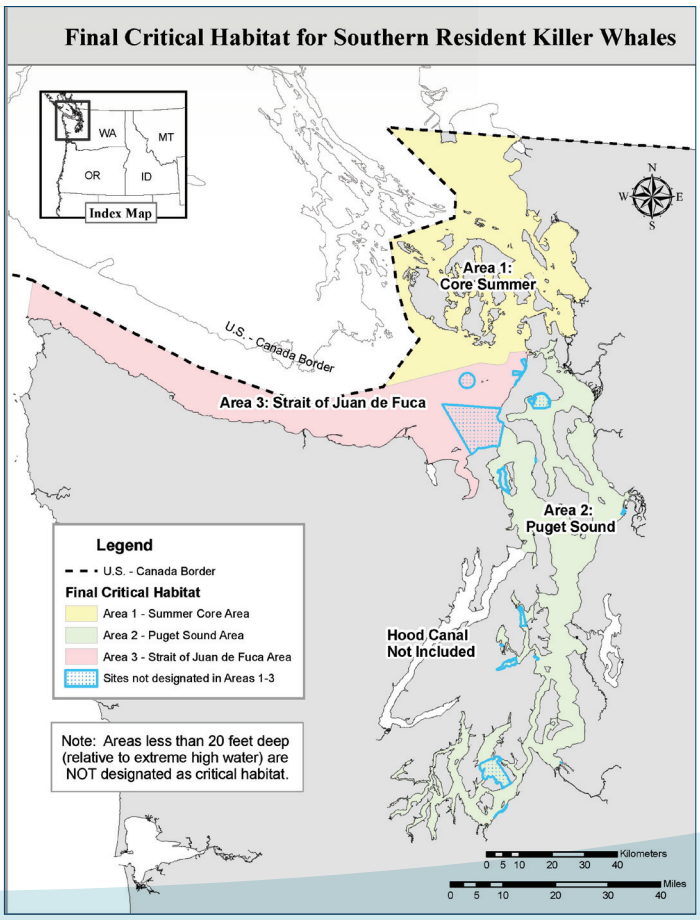
MATING PATTERNS AND RELATIONSHIP TO OTHER KILLER WHALE POPULATIONS

In its listing of the Southern Resident killer whales under the ESA, NOAA Fisheries determined that the whales are a distinct population within a sub-species of killer whales consisting of fish-eating resident killer whales of the North Pacific Ocean. The taxonomy of killer whales remains uncertain, however. To help reduce this uncertainty, NOAA Fisheries has funded and conducted research on the genetic relationships of different groups of killer whales in the Pacific and worldwide. We have also used genetic information to evaluate patterns of mating and inbreeding within the Southern Resident whale population. This information is useful for evaluating whether the population is suffering adverse effects from inbreeding.

Science and Research

Major findings and milestones:

- Genetic analysis of historical samples from museum collections revealed that the historical range of Southern Residents is similar to what it is today.
- Genetic data show that the resident and transient killer whale ecotypes in the North Pacific diverged from each other at least 20,000 years ago, and possibly much earlier, with almost no interbreeding between the ecotypes.
- Paternity analysis revealed that the oldest and largest males are the most successful breeders in the population.
- This paternity analysis also showed that sometimes Southern Residents mate with whales in their own pod, a behavior not seen in other killer whale populations. Despite this mating within pods, the overall level of inbreeding within the population appears to be low.



Management Activities

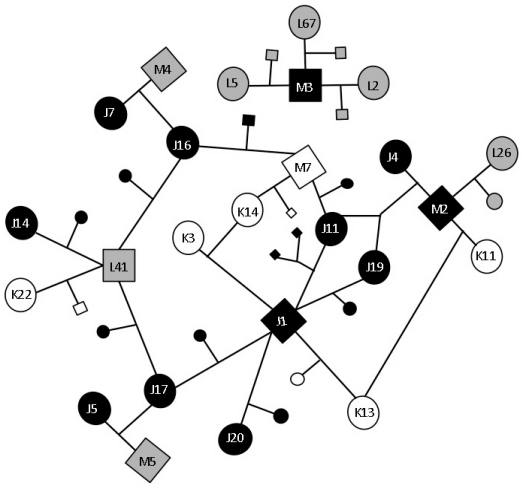
In 2012 NOAA received a petition asking us to remove the Southern Resident killer whales from the list of endangered species. Based on the best available information, including new genetic information released since the ESA listing in 2005, we reaffirmed that the North Pacific Residents are likely a sub-species and that the Southern Residents are a distinct population segment of that sub-species. In 2013 we found that delisting was not warranted and the Southern Residents maintained their endangered status under the ESA.

NOAA FISHERIES

FILLING CRITICAL INFORMATION GAPS (cont.)

DEMOGRAPHICS

One of the most important methods for assessing the status of this endangered population is the annual census, which has been conducted every year since 1976. NOAA Fisheries has funded the Center for Whale Research to complete the annual survey each year from 2003 to 2013. The data collected provide managers with current information on Southern Resident population status and trends, updates to photo-identification guides, relationships among individual whales, and valuable data for advancing scientific research that help predict population-level responses to environmental change.



A partial family tree of the Southern Resident killer whale community, based on observed mother-offspring pairs and a genetic paternity analysis. Males are represented by squares, females by circles, and a line connecting a male and a female indicates they are parents of an offspring. Researchers found that only a few older males, such as J1 and L41, are the fathers of many of the offspring in the population. They also found that unlike what has been seen in other killer whale populations, some males mated with females in their own pod, potentially leading to future inbreeding problems. Individuals labeled "M" are fathers that were not sampled, most likely because they died prior to the study. Source: Ford et al. 2011.

Science and Research

Major findings and milestones from studies using the census data:

- The ongoing census provides accurate demographic information, including births, deaths, and the numbers of whales by age and sex.
- Despite an overlapping range and a similar diet, annual survival and birth rates of Southern Residents are depressed compared to Northern Residents. For example, over her full reproductive lifetime, a Northern Resident female produces on average one more calf than a Southern Resident female. Over time this results in a major difference in the populations' growth rates.
- The census data also showed that survival rates for calves born to older mothers were 10% higher than other calves, possibly because older mothers may be more experienced.
- Census studies showed that the small size of the population makes it difficult to forecast how alterations in Chinook salmon fishing might impact the population.
- Data from the annual census helped us confirm that individual whales prefer to spend most of their time with their own pods and close relatives, although the amount of time varies annually.
- The whales spend less time in large social groups during times of population decline and potentially low prey abundance. This suggests that their environment influences their social structure, and such changes in social groups can affect other behaviors such as patterns of mating, group foraging, and social care of calves.

Southern Resident killer whales with young calf. NWFSC/NOAA Fisheries.



MANAGING FOR RECOVERY

In addition to addressing the three primary threats to the Southern Resident killer whales and prioritizing additional research studies to fill critical information gaps, we have taken additional conservation actions to protect the whales and raise awareness. We are working to reduce future impacts and increase their chances of recovery through contingency response planning for impacts from possible oil spills, coordinating stranding responses for injured or dead whales, and supporting education and outreach about the science and management of these animals.

OIL SPILL PREPAREDNESS

All of the Southern Residents are periodically in the same location at the same time (known as a "super pod"), making the whales very vulnerable to a catastrophic event like an oil spill during such times. Many efforts are underway to prevent oil spills, but in the event they do occur, we are working on plans to reduce their impacts.

NOAA Fisheries worked closely with partners to develop a killer whale-specific oil spill response plan. Together with the University of California at Davis, we hosted a workshop with researchers, oil spill responders, and oil industry representatives and developed a draft oil spill response plan for killer whales. Working with the Washington Department of Fish and Wildlife, the Region 10 Regional Response Team and the Northwest Area Committee, we completed the plan, and it was adopted in 2010 as part of the Northwest Area Contingency Plan.

STRANDING RESPONSE

We can protect the whales by rescuing sick or injured whales and by learning about what may be causing death in the animals that wash up on our shores. Responding to stranded killer whales is an important data source for learning about the threats to the whales.

As part of NOAA Fisheries' role in coordinating the West Coast Marine Mammal Stranding Network, we work with network members to prepare for and respond to stranded killer whales. We developed an initial stranding protocol for killer whales, and our partners developed a detailed Killer Whale Necropsy and Disease Testing Protocol. In partnership with University of California at Davis and the Northwest Marine Mammal Stranding Network, we provided funding support to ensure prompt and thorough examinations of every stranded killer whale carcass. Stranding response along the West Coast is also supported through the John H. Prescott Marine Mammal Rescue Assistance Grant Program.



Necropsy of stranded killer whale neonate calf. WCR/NOAA Fisheries.

EDUCATION AND OUTREACH

Education and outreach about recovery of Southern Resident killer whales raises public awareness and knowledge about the whales, the threats they face, and actions people can take to support recovery.

We work closely with museums and aquariums, non-profit groups, researchers, and schools to raise awareness and show how individuals and organizations can contribute to conservation. A few examples of our partnerships and education and outreach programs include:

- The Seattle Aquarium created an Orca Family Center and killer whale trading cards to inspire conservation of our marine environment.
- The Whale Museum on San Juan Island helped to establish the Salish Sea Hydrophone Network and features conservation messages in its educational programs, exhibits, and the Soundwatch Boater Education Program.
- Killer Whale Tales inspires students to take an active role in conservation of the whales and their habitat.
- Orca Network connects whales and people in the Pacific Northwest and collects sighting information.
- The Whale Trail inspires appreciation and stewardship of whales and our marine environment by establishing a network of land-based viewing sites.
- NOAA Fisheries' high school curricula on killer whale recovery aligns with state learning requirements and is available for use in Washington State public schools.
- The Port Townsend Marine Science Center inspires conservation of the Salish Sea with their Orca Project and as part of the Salish Sea Hydrophone Network.

NOAA FISHERIES

THE NEXT 10 YEARS

The many accomplishments described in this document were made possible through federal funding provided by Congress from FY 2003 to FY 2012. NOAA Fisheries and its partners have used this funding to conduct the innovative research needed to understand what factors are most affecting the whales and to implement targeted actions addressing those factors.

As a result of reductions in federal funding in FY 2012 and FY 2013, NOAA Fisheries was forced to temporarily eliminate or scale back important parts of the Southern Resident recovery program, such as aspects of the annual population census, visual monitoring of the whale health, satellite tag research and deployment, and coastal sighting network along the West Coast. Funding levels also prevented us from starting new studies assessing their health using breath analysis and reduced support for education and outreach. The graphic on the right highlights the critical research and management actions we plan to accomplish in the next ten years and beyond as resources allow.

We remain committed to increasing cooperation and coordination, both within NOAA and with our partners. Together we will continue to apply cutting-edge science techniques to explore killer whale biology and interactions with humans and the environment, and use the best available science to guide our management and recovery efforts for Southern Resident killer whales.

	Prey Availability	Pollution & Contaminants	Vessels & Noise
Science & Research	• Study competition between other salmon predators including seals and seal lions, Northern Resident killer whales, and fisheries. • Continue research on whale health related to diet. • Continue to study what whales eat in the winter. • Investigate inter-year variability in killer whale diet.	• Monitor levels of new and emerging contaminants in the whales. • Test and refine models to predict future contaminant loads. • Investigate whether high contaminant loads have direct impacts on health and reproduction.	• Investigate whether noise and vessels prevent whales from foraging efficiently. • Measure the impacts of behavior change due to vessel presence and noise. • Conduct field studies to evaluate effectiveness of new vessel regulations. • Quantify sources of human-generated noise throughout the Southern Resident killer whales' range and assess their impacts.
Conservation & Management	• Continue to evaluate relationships between salmon abundance and whale health and minimize effects of actions that reduce salmon abundance.	• Evaluate and minimize effects of actions that increase contaminants in the whales and their prey. • Support oil spill prevention. • Continued readiness in the event of a potentially catastrophic oil spill.	**Enforcement** • Continue to enforce vessel regulations.



THE NEXT 10 YEARS

Genetics & Population Structure

- Continue to collect and analyze data to inform killer whale taxonomy and breeding patterns.
- Collect data needed to estimate historical abundance.

- Use taxonomic and genetic information to assess the status of population and recovery criteria during reviews of listing status and in response to petitions.

Demographics

- Continue to monitor population size and response to changes in salmon abundance.
- Improve our estimates of the carrying capacity of the environment for the whales.
- Study how the population responds to seasonal changes in prey abundance and competition with other salmon predators.

- Conduct periodic reviews under the ESA to assess progress toward recovery goals.

Winter Distribution

- Address many questions about their life during the winter (diet, behavior, threats) to assess which risk factors may be impacting the whales in this portion of their range.

- Evaluate expanding critical habitat areas to include waters along the west coast where they range.

Health Assessment

- Combine health information for individuals from data collected to date (biopsies, feces, imagery, etc.).
- Conduct new nutritional studies and breath analyses to understand conditions that may contribute to killer whale mortality.
- Investigate stranded animals and other samples to understand the risk disease poses to these animals.

- Use health assessment and stranding investigation results to help prioritize recovery actions.

Science & Research

Conservation & Management

Opposite page: Southern Resident killer whale near a ferry in Puget Sound. This page: Southern Resident killer whale with salmon. NWFSC/NOAA Fisheries.



NOAA FISHERIES

LOOKING AHEAD

With 10 years of funding, collaboration, and ingenuity we have made substantial and important steps to aid Southern Resident killer whale recovery. Research projects have illuminated new aspects of killer whale biology, behavior, and ecology and helped us better understand the challenges this population faces. Targeted management actions, informed by research, have been taken to secure protections for the whales and their habitat. We have much better information to guide our decisions than we did 10 years ago, and this research continues.

While we can celebrate important successes, the key threats remain challenging to understand and manage. In particular, the past decade of research has shown that some of the most important threats facing the whales, such as prey limitation and high contaminant levels, cannot be addressed without a long-term commitment. Recovery of threatened salmon, for example, is a monumental task in itself and is expected to take many years. The threat of contaminants is also challenging, particularly considering that the whales remain contaminated by chemicals that were banned decades ago.

There are also mysteries that persist. For example, will increases in salmon abundance benefit the Southern Resident whales, or will any increases be consumed by other populations such as the Northern Resident killer whales? Are there health issues, like disease, which we have not yet uncovered? We also must consider new threats and actions as we look to a future with climate change, new alternative ocean energy projects, and continuing development along our coasts and in our ports.

In the next 5 to 10 years, there are several high priority projects planned to help answer these remaining questions and inform management actions to advance their recovery. Understanding the factors that affect the whales' health will help us identify the most important threats, how they interact, and what we can do to reduce their impacts. New technologies are being developed to better understand disease threats, assess individual body condition and health of individuals for example, via collection of breath samples, and gain a better understanding of the health effects of carrying large contaminant burdens.

We also plan to explore additional management actions outlined in the recovery plan. New information on coastal distribution and habitat use will inform designation of additional critical habitat for the whales. Seasonal health assessments, habitat use, and potential times and places with prey limitations or vessel impacts that affect health or feeding will be taken into consideration when determining the need for additional conservation actions, such as a protected area.

Recovery of the Southern Residents and their preferred salmon prey, as well as protection of their broad and diverse habitat, is a long-term process that requires support over a large geographic area, from California to Southeast Alaska. Our recovery criteria are built around a timeframe of 14 to 28 years based on the biology of these long-lived animals. It will take at least that long for us to evaluate the effectiveness of the protective measures put in place in the last several years. The last 10 years of federal funding and effort have secured a strong foundation of research and conservation, which we can build on to secure recovery of this iconic species for future generations.

Boater watching Southern Resident killer whales near San Juan Island, WA. NWFSC/NOAA Fisheries.



PUBLICATIONS

Included in this section are scientific articles resulting from work funded by federal Southern Resident killer whale funds. Most, if not all, of these articles are the result of successful collaborations with our regional, national, and international partners.

Genetics

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NOAA FISHERIES

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Exhibit 20

Southern Resident Killer Whales
(Orcinus orca)

5-Year Review:
Summary and Evaluation



Photo: Northwest Fisheries Science Center

National Marine Fisheries Service
West Coast Region
Seattle, WA

December 2016

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5-YEAR REVIEW
Southern Resident killer whales/*Orcinus orca*

EXECUTIVE SUMMARY

The Southern Resident killer whale Distinct Population Segment (DPS) was listed as endangered under the Endangered Species Act (ESA) in 2005. In the listing, the National Marine Fisheries Service (NMFS) identified three main threats to their survival: 1) scarcity of prey, 2) high levels of contaminants from pollution, and 3) disturbance from vessels and sound. As of 1 July 2016 after the summer census, there were only 83 individuals left in the population (CWR 2016). Their small population size and social structure also puts them at risk for a catastrophic event, such as an oil spill, that could impact the entire population. Updates regarding research and management actions for the primary threats (prey, pollution and vessels) are included below and in discussions of whether the recovery criteria related to each of the threats have been met. This review fulfills our requirement under section 4(c)(2) of the ESA to conduct, at least once every five years, a review of listed species to ensure that the listing of these species remains accurate.

Although the population of these whales, also known as orcas, has been studied for more than 40 years, we are not certain which threat is the most important to address in order to ensure recovery. The Recovery Plan therefore addresses each of the threats based on the best available science. NMFS has linked the management actions in the Recovery Plan to research and monitoring actions to gather information to inform prioritization, refine recovery actions, and identify new actions as needed.

To inform recovery, there is an active research program underway to gather more information about the biology of the whales, habitat use and distribution, how the different threats are impacting the whales, and to monitor the population status. The Northwest Fisheries Science Center (NWFSC) developed a research plan (NMFS 2006) that informed the monitoring and research actions in the Recovery Plan. The NWFSC conducts research on the whales, partners with a variety of academic and non-profit research groups, coordinates with Canadian researchers, and provides information on research to the public. All of these efforts implement actions in the Recovery Plan.

A variety of partners have been engaged in implementing research and conservation efforts for Southern Resident killer whales for over a decade. In 2014, NMFS compiled a 10-year review of the research and conservation efforts to support recovery of the Sothern Resident killer whales. The report summarizes major research findings, management activities, and remaining knowledge gaps, and discusses the threats currently faced by Southern Residents as well as actions to be taken to address them. This 5-year review identifies a number of the actions presented in the 10-year review as well as new steps that have been implemented since that review was completed. The 10-year report can be found at www.westcoastfisheries.noaa.gov.

In 2016, NMFS launched a Species in the Spotlight program, identifying eight species that are among the most at risk of extinction and initiating an agency-wide effort to spotlight and save

these highly at-risk species. Southern Residents are one of the Species in the Spotlight and we have developed an action plan to highlight a subset of actions from the recovery plan for action over the next 5 years. The Species in the Spotlight focus has helped us support existing partnerships and foster new collaborations to further recovery. High priority actions for 2016-2020 are outlined in the 2016 Species in the Spotlight 5-Year Action Plan discussed in Section 1.3.5 of this review.

Despite the implementation efforts over the long term and in the last 5 years, the population has not grown. This review provides an update on the status of the Southern Residents and our progress toward meeting the recovery criteria identified in the recovery plan. While some of the biological downlisting and delisting criteria have been met, the overall status of the population is not consistent with a healthy, recovered population. Considering the status and continuing threats, the Southern Resident killer whales remain in danger of extinction. Therefore, the recommended classification in this 5-year review is for Southern Resident killer whales to remain the same: Endangered.

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional or Headquarters Office: West Coast Regional Office–Chris Yates, Assistant Regional Administrator for Protected Resources, (562) 980-4007

Cooperating Science Center(s): Northwest Fisheries Science Center–Mike Ford**,** Director of the Conservation Biology Program, (206) 860-5612

1.2 Methodology used to complete the review:

The West Coast Regional Office led the 5-year review and requested review by the Northwest Fisheries Science Center and Office of Protected Resources. Reports, publications, and information available from ongoing studies and reviews that have become available since *The Recovery Plan for the Southern Resident Killer Whales (Orcinus orca)* was completed in January 2008 and the first 5-year review was completed in 2011 are the primary sources of information and data in this review.

1.3 Background:

1.3.1 Federal Register Notice citation announcing initiation of this review:

81 Fed. Reg. 4264, January 26, 2016- Endangered and Threatened Species; Initiation of 5-year Review for Southern Resident Killer Whales

Upon publishing the notice of the initiation of the Review in the Federal Register, NMFS solicited comments from the public, scientific community, tribes, governmental agencies, environmental organizations, industry, and any other interested parties regarding information relevant to the recovery of endangered Southern Residents. The categories of information sought included: (1) species biology; (2) habitat conditions and information; (3) status and trends of threats; (4) actions taken to benefit the species; (5) need for additional measures; (6) assessment of the recovery criteria; and (7) any other information that has become available since the species was listed in 2005 or since the last 5-year review. The comment period closed on April 25, 2016, with 54 comments submitted. Among the commenters were residents of the Puget Sound region, science educators, and five representatives of environmental organizations, namely the NRDC, Oceana, The Whale Museum, The Center for Biological Diversity, and The Orca Salmon Alliance. Fifty-three of the comments expressed support for the continuation of the species' Endangered listing. Several substantive comments were submitted by environmental organizations. They included not only evidence previously considered in the original listing of Southern Residents as well as the previous 5-year review, but also new information regarding the health and viability of the species under current natural and anthropogenic pressures. Many commenters urged the agency to support the removal of the lower Snake River dams to assist in endangered Chinook salmon recovery. A number of commenters also supported the critical habitat designation amended to include coastal areas of the species' range (see 1.3.3 Associated rulemaking below).

1.3.2 Listing history

Original Listing

Federal Register notice: 70 Fed. Reg. 69903, November 18, 2005 - Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales

Date listed: Effective February 16, 2006

Entity listed: DPS

Classification: Endangered

1.3.3 Associated rulemaking:

Critical Habitat Designation: 71 Fed. Reg. 69054, November 29, 2006 - Endangered and Threatened Species; Designation of Critical Habitat for Southern Resident Killer Whales

Protective Regulations: 76 Fed. Reg. 20870, April 14, 2011, Protective Regulations for Killer Whales in the Northwest Region under the Endangered Species Act and Marine Mammal Protection Act

Critical Habitat Revision: 80 Fed. Reg. 9682, February 24, 2015, 12-Month Finding on a Petition to Revise the Critical Habitat Designation for the Southern Resident Killer Whale Distinct Population Segment

1.3.4 Review History:

This is the second, formal 5-year Review for Southern Resident killer whales. The first 5-year review was completed in 2011 (NMFS 2011).

1.3.5 Species' Recovery Priority Number at start of 5-year review:

Southern Resident killer whales have a recovery Priority Number of One, based on criteria in the Recovery Priority Guidelines (55 Fed. Reg. 24296, June 15, 1990) that describes a high magnitude of threats, high recovery potential, and the potential for economic conflicts while implementing recovery actions. The Priority Number of One for Southern Resident killer whales is based on a high magnitude of threat because of rapid population decline, habitat destruction and continuing threats to recovery. This priority is given to species whose limiting factors and threats are well understood and the needed management actions are known (e.g., a recovery plan is in place) and have a high probability of success, but are also in conflict with economic activities. Implementing regulatory actions for the recovery of the Southern Resident DPS could involve restrictions on commercial fishing, contaminant discharge, and vessel activities. In 2016, NMFS launched the Species in the Spotlight program to highlight conservation actions to aid in the recovery of eight Priority One species. As a part of this program, 5-year action plans have been built off of the existing recovery plans for each species to help guide federal action agencies and provide a more detailed, near-term plan to engage partners to work toward recovery. Southern Resident killer whales were included in this program, and the 5-year action plan can be found at http://www.nmfs.noaa.gov/stories/2015/06/spotlight_srkw.html.

1.3.6 Recovery Plan or Outline

Name of plan or outline: Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*)
Date issued: January 2008
Dates of previous revisions, if applicable: N/A

2.0 RECOVERY IMPLEMENTATION

Even before there was a recovery plan in place for the endangered Southern Resident killer whales, local, state, Federal, and other regional groups were implementing many actions to conserve killer whales and restore a range of habitats, species, and ecosystem processes in the region. In implementing the recovery program over the last decade, NMFS has prioritized actions to address the threats with the highest potential for mitigation- salmon recovery, oil spill response, and reducing vessel effects. Efforts to address additional threats, such as contaminants have also been implemented. Table 2.1 is from the Recovery Plan (NMFS 2008a) and includes a full list of potential threats, their associated listing factors, and the potential severity, likelihood, and feasibility of mitigation of the threat.

Table 2.1. Factors considered in listing and potentially affecting recovery of Southern Resident killer whales.

Threat	Listing Factors	Severity	Likelihood	Feasibility of Mitigation
Prey availability	Habitat	High	High	High, many salmon recovery efforts underway
Contaminants	Habitat, Inadequacy of Existing Regulations	High	High	Medium, Puget Sound clean-up efforts underway
Vessel effects (commercial, recreational whale watch)	Habitat, Overutilization, Inadequacy of Existing Regulations	High	High	High, whale watching guidelines and outreach underway, NMFS evaluating regulations and/or protected areas
Vessel effects (other vessel traffic not targeting whales)	Habitat, Inadequacy of Existing Regulations	Medium	High	Medium, safety and security considerations may limit ability to alter shipping lanes, MMPA and ESA mechanisms in place
Sound	Habitat, Inadequacy of Existing Regulations	Medium-High	High	Medium, MMPA and ESA mechanisms in place

Oil spills (pipelines, container and oil tankers)	Other Natural or Human-made Factors	High	Low	High, regulations in place for prevention, response plan for killer whales in development
Oil spills (small chronic sources)	Other Natural or Human-made Factors	Medium	High	Medium, permits and program in place to regulate point and non-point sources
Disease	Disease and Predation	High	Low	Low, opportunistic monitoring in place
Small population size	Other Natural or Human-made Factors	Medium-High	Medium	Low, population monitoring in place
Live-captures for aquaria	Overutilization	Low	Low	Live-captures discontinued, but potential population structure effects remain

Source: Final Recovery Plan for Southern Resident Killer Whales, NMFS 2008a

Examples of efforts to address the primary threats include actions to restore salmon populations on the West Coast that will increase the availability of salmon for killer whales and restore the degraded nearshore habitats they share. A collaborative and comprehensive effort in Washington State- the Puget Sound Partnership- is also working to restore the area's ecological health. NMFS put vessel regulations in place in 2011 to reduce the impacts of vessels. A 10-year report released in 2014 summarizes much of the research and recovery actions that have taken place since the species was listed. These efforts have resulted from strong internal partnerships between the West Coast Region and the science centers and collaborations between NMFS and a variety of outside organizations, including Fisheries and Ocean Canada, the Center for Whale Research, the Whale Museum, and the Washington Department of Fish and Wildlife, among others. A broad summary of agency actions, collaborative efforts, and new knowledge gained over the last five years is provided in this section. Actions and progress are discussed in more detail with regard to specific threats criteria in Section 3.

2.1 Cost

In the Recovery Plan, NMFS identified the many actions already underway, the responsible parties undertaking the actions, and the costs. The implementation table in the Recovery Plan incorporated the actions that had been implemented with funding available in Fiscal Year (FY)2003-FY2007 and costs through FY2010 were provided in the 2011 5-year review. An updated implementation plan is included as Appendix A. We have updated the cost information for management, monitoring, and research actions implemented in FY2011-FY2016 for this review. Some cost information for specific high priority actions for 2016-2020 are listed in the Species in the Spotlight Action Plan. NMFS' funding represents the majority of the costs included in the implementation plan for FY2003-FY2016 and salary costs for NMFS staff working on killer whales are not included. We have included a small amount of cost information for other groups and organizations where available. The Recovery Action Mapping Tool (RAMT) has also

been created to help managers visualize recovery actions and aid in recovery coordination. RAMT is an application used to track recovery implementation for endangered and threatened species in the West Coast Region. Included in RAMT are all of the actions and projects associated with Southern Resident killer whale recovery, including NMFS funding for individual projects from FY2003- FY2016. RAMT can be accessed at https://www.webapps.nwfsc.noaa.gov/wcr/#.

In 2015, the National Fish and Wildlife Foundation (NFWF) created a new grant program to support Southern Resident recovery efforts. In its first year, the Killer Whale Research and Conservation Program granted $590,000 in funding to projects supporting three key recovery strategies: increasing prey availability, improving habitat quality, and strengthening management through research. These funds were matched by grantee contributions to generate a total of greater than $1.4 million in conservation research. More information about this program can be found at http://www.nfwf.org/killerwhales/Pages/home.aspx.

We are also actively seeking additional information on the efforts and expenditures of other organizations to implement actions in the Recovery Plan and have created an online form where partners can provide this type of information (http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/planning_implementation.html).

2.2 Biological Opinions

As mandated by section 7 of the Endangered Species Act, NMFS reviews federal actions to ensure that they do not jeopardize the continued existence of threatened or endangered species or adversely modify or destroy their critical habitat. Since Southern Residents were listed in 2005, NMFS has evaluated federal activities that directly affect the whales. NMFS also conducts consultations on the whales' primary prey— namely salmon—when those species are also listed as threatened or endangered. Notable actions that have been evaluated include the operation and continued presence of the Federal Columbia River Power System, which impacts spawning habitat for Chinook salmon, as well as urban development projects in the Puget Sound region and Navy sonar activities, among others.

2.3 Addressing Key Threats

Prey
The West Coast community has been engaged in salmon recovery for many years and recently local groups, in coordination with NMFS, have completed recovery plans for listed salmon populations. For specific information on salmon recovery, please visit: www.salmonrecovery.gov and http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/salmon_and_steelhead.html. The Pacific Coastal Salmon Recovery Fund (PCSRF) was established by Congress in FY2000 to protect, restore, and conserve Pacific salmon and steelhead populations and their habitats. Under the PCSRF, NMFS manages a program to provide funding to states and tribes of the Pacific Coast region – Washington, Oregon, California,

Nevada, Idaho, and Alaska. The thousands of PCSRF projects that have been implemented throughout the region have made important contributions to improve the status of ESA-listed species, prevent extinctions, and protect currently healthy populations. These accomplishments are summarized in independent reviews and annual Reports to Congress which can be found on our web page at: http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/pacific_coastal_salmon_recovery_fund.html. To monitor progress on salmon recovery, NMFS completed 5-year reviews for 27 listed Evolutionarily Significant Units and DPSs of Pacific salmon and steelhead (81 Fed. Reg. 33468, May 26, 2016). For more information on the 5-year reviews for salmon and steelhead, please visit: http://www.westcoast.fisheries.noaa.gov/publications/status_reviews/salmon_steelhead/2016_status_review.html.

In 2011 and 2012, NMFS and Department of Fisheries and Oceans Canada (DFO) appointed an independent science panel to review the effects of salmon harvest on Southern Resident killer whales. The panel held three workshops in that time to determine to what extent salmon fisheries are affecting the whales and what the consequences of those effects are to their survival and recovery. The science panel reviewed all available information, including new research called for by the outcomes of the first two workshops, and provided a final report in November 2012. The panel concluded that at a broad scale, salmon abundance will likely influence the recovery of the whales, but that there was a great deal of uncertainty about whether current fisheries remove enough salmon to have a meaningful influence on the whales' status.

The report also provided valuable recommendations on future analysis and research that could be done to fill data gaps and reduce uncertainty. The report will continue to be used to inform the management of salmon fisheries and assess impacts of actions that may alter the abundance of salmon available to the whales as part of the recovery programs for Southern Residents in the U.S. and Canada. Background information on the science panel process, workshop materials, and the final report are available at: http://www.westcoast.fisheries.noaa.gov/.

Contaminants

To address the threat of pollution and contamination, NMFS has worked with The Puget Sound Partnership (PSP), a Washington State agency working to restore and protect Puget Sound. The PSP in particular is leading the cleanup of Puget Sound. NMFS participated in the development of the PSP's strategy for cleaning up, restoring, and protecting Puget Sound by 2020. In 2016 the PSP released the updated 2016 Action Agenda with a list of Near Term Actions that integrate scientific assessment with community priorities, and establish a unified set of actions that are needed to protect and restore Puget Sound (PSP 2016). The Southern Resident killer whales are listed as indicators of Puget Sound's health in the Action Agenda. Killer whale recovery falls under the six recovery goals for all of Puget Sound. One of the actions identified in the Action Agenda to be completed by 2020 is to "achieve an end-of-year census of 95 individual Southern Resident killer whales, which would represent a 1 percent annual

average growth rate from 2010 to 2020." The PSP works with various partners including NGOs, state and federal agencies, and tribes to accomplish these goals, and each year they publish their *State of the Sound* to inform the public and decision makers of the progress that has been made. For more information on the PSP's efforts to address pollution and contaminants, please visit http://www.psp.wa.gov/.

The most recent pollution and contamination management efforts have been focused on an emerging contaminant— flame-retardants— known as PBDEs. Southern Resident killer whales have been found to have the highest levels of these chemicals than any other marine organism (Alonso *et al.* 2014). One of the primary vectors of contamination of PBDEs in Puget Sound is through the discharge of treated wastewater. NMFS worked with the U.S. Environmental Protection Agency to establish working groups of researchers and state and local managers to evaluate data gaps and make recommendations for the mitigation of PBDE contamination, including: 1) the removal of PBDEs from wastewater in treatment plants, 2) modeling PBDE contamination in Puget Sound, 3) determining toxicological thresholds for PBDEs in killer whales, and 4) determining the effects of mixing persistent pollutants. These working groups published a report in 2013 summarizing their conclusions, which can be found at: https://www.eopugetsound.org/sites/default/files/features/resources/PBDEs_Puget_Sound_Report.pdf.

Health

Understanding how environmental and human-caused factors influence the health of Southern Resident killer whales is crucial to not only identifying the threats faced by the species but also the actions that can be taken to aid in their recovery. In April 2015 and again in March 2016, NMFS worked with partners to host two Southern Resident Killer Whale Health Workshops to discuss potential strategies to better understand and address the decreased reproduction and increased mortality trends observed in the population. Representatives from NMFS, environmental NGOs, academic institutions, and the aquarium industry participated. Workshop attendees identified study needs, data gaps, and strategic approaches to creating a better understanding of Southern Resident health. As a result, the attendees came up with a list of actions to be initiated within 18 months, 3 years, 5 years, and greater than 5 years. High priority actions support three main goals: building an effective toolbox for research and assessment, tracking animals of interest and continuing studies related to prey and body condition, and identifying risks to reproduction and survival. Many of the actions prescribed have already been initiated, and significant collaborations with partner agencies and organizations are underway. Most notably, the DFO, the Vancouver Aquarium, the Northwest and Southwest Fisheries Science Centers, the Center for Whale Research, and University of California (UC) Davis have emerged as important partners in fulfilling the goals laid out in the priority actions. The list of priority actions developed at the 2015 workshop can be found at: http://www.westcoast.fisheries.noaa.gov/.

As a part of their Killer Whale Research and Conservation Program, the National Fish and Wildlife Foundation awarded $590,000 (over $1.4 million including matching funds) in grants to research partners in 2015. Over half of that funding awarded was consistent

with projects identified as priority actions from the 2015 Health Workshop. In particular, UC Davis was awarded funds for the development of a standardized health assessment protocol and health index as well as the creation of a comprehensive database for killer whale health records. These tools will be used to identify spatial and temporal trends in whale health, assess group and individual fitness, guide research activities, and aid in the creation of guidelines for intervention. NMFS will be working closely with the UC Davis to accomplish these goals. Additional information on the program is available at: http://www.nfwf.org/killerwhales/Pages/home.aspx.

Vessel Effects

NMFS has coordinated with the U.S. Coast Guard, Washington Department of Fish and Wildlife (WDFW), and DFO to evaluate the need for regulations or areas with vessel restrictions as described in the Recovery Plan. In April of 2011, NMFS published final vessel regulations in the Federal Register. They then came into effect as of May 16, 2011 (76 Fed. Reg. 20870, April 14, 2011). The final rule includes two elements: 1) a prohibition on approaching killer whales within 200 yards, and 2) a prohibition on parking in the path of the whales. WDFW also enacted state regulations with similar requirements. Additional information on the regulations is available at: www.bewhalewise.org. The new regulations were developed using the best available science and consideration of public input in order to strike a balance between providing adequate protection for the whales and allowing for an educational and economically viable whale watching industry. These regulations also call for additional education, enforcement, and monitoring activities. In 2013 and 2016, WDFW received NMFS endangered species grants to support enforcement efforts. The regulations are currently being evaluated for their effectiveness in advancing the recovery of the Southern Residents and results of the review are expected in 2017. In November 2016, NMFS received a petition from several NGOs requesting we establish a whale protection zone to support recovery of the Southern Residents. That petition is currently under review.

Many studies provided evidence for the vessel regulations and new studies continue to improve our understanding. Previously, researchers found that whales spend more time traveling and less time foraging when vessels are nearby, indicating that they should maintain a greater distance from the whales in inland waters, which serve as important foraging areas (Lusseau et al. 2009). Results from more recent behavioral studies can help vessel operators understand potential risks and contribute to mitigation of vessel impacts (Noren and Hauser 2016). In addition to proximity to the vessels, a NWFSC study using suction cup digital acoustic tags (DTAGs) study found that speed of nearby vessels is an important indicator of the level of noise received by the whales at a given distance (Houghton et al. 2015). Although the regulations codified in 2011 do not include a restriction on speed, the Be Whale Wise guidelines recommend a slow zone up to 400 meters away from the whales at all times. Other recent studies have identified that noise from large ships extends into frequencies used by Southern Residents for echolocation. This means vessels not targeting the whale can still cause disturbance and impair the whales' ability to find food, should they continue foraging when vessels are present (Veirs et al. 2015). The NWFSC is continuing DTAG data analysis funded by NFWF to

better understand how vessel-generated noise influences the subsurface behavior of Southern Residents, especially foraging behaviors (NFWF 2015).

NMFS has joined a new partnership lead by the Port of Vancouver called the Enhancing Cetacean Habitat and Observation (ECHO) Program. The ECHO Program supports projects aimed at understanding the impacts of vessel activity on Northwest whales, including Southern Residents. These impacts include acoustic and physical disturbance, environmental contamination, and prey availability. The goal of the program is to develop management regimes to better address the threats that vessels pose to at-risk whale species. More information about the ECHO Program can be found at http://www.portvancouver.com/environment/water-land-wildlife/marine-mammals/.

Oil Spill Threat

NMFS worked closely with partners to address the threat of an oil spill in the killer whales' habitat by developing a killer whale-specific oil spill response plan. NMFS and UC Davis hosted a workshop with researchers, oil spill responders, and oil industry representatives and developed a draft oil spill response plan for killer whales. Working with WDFW, the Region 10 Regional Response Team and the Northwest Area Committee, we completed the plan, and it was adopted in the Northwest Wildlife Response Plan as part of the Northwest Area Contingency Plan, which can be found at http://rrt10nwac.com/NWACP/Default.aspx. WDFW and other partners have participated in drills to practice implementation of the response plans, including an on-the-water drill in March 2013 to practice the use of deterrents methods. In addition, NMFS has continued to work with partners to gather more information on the available deterrents methods, such as recording the sounds from helicopters and banging pipes, to evaluate the most effective distances and deployments.

2.4 Outreach Partners

NMFS works closely with museums and aquariums, non-profit groups, researchers, and schools to raise awareness and educate the public about recovery of the Southern Residents and how individuals and organizations can contribute to conservation. A few examples of our partnerships and education and outreach programs include:

- The Seattle Aquarium created an Orca Family Center to inspire conservation of our marine environment (www.seattleaquarium.org).
- The Whale Museum features conservation messages in its educational programs, exhibits, and the Soundwatch Boater Education Program (www.whalemuseum.org).
- Killer Whale Tales promotes classroom understanding and stewardship (www.killerwhaletales.org).
- Orca Network connects whales and people in the Pacific Northwest and collects sighting information (www.orcanetwork.org).
- The Whale Trail inspires appreciation and stewardship of whales and our marine environment by establishing a network of land-based viewing sites (www.thewhaletrail.org).

- The Port Townsend Marine Science Center inspires conservation of the Salish Sea with their Orca Project and as part of the Salish Sea Hydrophone Network (http://www.ptmsc.org/).
- NMFS developed a high school level curricula on killer whale recovery aligned with state learning requirements (www.nwr.noaa.gov/upload/HS-orca.pdf).

2.5 Strandings

Stranded killer whales provide valuable opportunities for us to learn about the status and threats to the population. As part of NMFS' role in coordinating the West Coast Marine Mammal Stranding Network, we work with network members to prepare for and respond to stranded killer whales. We also coordinate with other regions to assist with stranding response. We developed an initial stranding protocol for killer whales for the network, and partners from the U.S. and Canada have developed a detailed Killer Whale Necropsy and Disease Testing Protocol, which has been recently updated (Raverty et al. 2014). In partnership with UC Davis, NMFS has provided funding to ensure prompt and thorough examinations are conducted on any stranded killer whale carcass. Stranding response along the West Coast is also supported through the John H. Prescott Marine Mammal Rescue Assistance Grant Program. Gaydos and Raverty (2010) have compiled available information on stranded killer whales and causes of death, when known, since the Southern Residents were listed and analysis of killer whale strandings along the West Coast are ongoing.

Data collected from three Southern Resident killer whale strandings in the last five years have contributed to our knowledge of the health of the population and the impact of the threats to which they are exposed. Transboundary partnerships have supported thorough necropsies of L112 in 2012, J32 in 2014, and L95 in 2016, which included testing for contaminant load, disease and pathogens, organ condition, and diet composition. Reports for those necropsies are available at: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/rpi_strandings.html. A final necropsy report for J34, who was found dead near Sechelt, British Columbia on December 20, 2016 is still pending, but the initial findings can be found at: http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/mammals-mammiferes/srkw-eprs-j34-eng.html. Necropsy results from several stranded calves over the last five years and reviews of other killer whale strandings along the coast are still pending.

2.6 Recovery Coordination

NMFS continues to coordinate with Federal, state, and international agencies regarding killer whale recovery programs. The U.S. Coast Guard, WDFW, and DFO were cooperating agencies on the Environmental Assessment for the vessel regulations described above. In addition, NMFS and DFO participate in each other's meetings regarding killer whale recovery to share information, provide updates on recovery actions, and ensure consistency on both sides of the border whenever possible. DFO released an Action Plan in 2016 for Southern and Northern Resident killer whales under

their Species at Risk Act. In alignment with the NMFS Recovery Plan, the DFO Action Plan focuses on the primary threats to survival: prey availability, human disturbance such as vessel impacts, and contaminants. It also establishes protections for critical habitat (Fisheries and Oceans Canada 2016). The Action Plan can be found at the DFO website (http://www.registrelep-sararegistry.gc.ca/document/default_e.cfm?documentID=2944).

3.0 REVIEW ANALYSIS

3.1 Application of the 1996 Distinct Population Segment (DPS) policy

3.1.1 Is the species under review a vertebrate?

__X_ **Yes,** go to section 3.1.2.
_____**No,** go to section 3.2.

3.1.2 Is the species under review listed as a DPS?

_X__ ***Yes****, go to section 3.1.3.*
____ ***No****, go to section 3.1.4*

3.1.3 Was the DPS listed prior to 1996?

____ ***Yes****, give date and go to section 3.1.3.1.*
_X__ ***No****, go to section 3.1.4.*

3.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

____ ***Yes,*** *provide citation and go to section 3.1.4.*
____ ***No****, go to section 3.1.3.2.*

3.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

____ ***Yes****, discuss how it meets the DPS policy, and go to section 3.1.4.*
____ ***No****, discuss how it is not consistent with the DPS policy and consider the 5-year review completed. Go to section 3.5.2, Synthesis.*

3.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

____ ***Yes****, provide citation(s) and a brief summary of the new information; explain how this new information affects our understanding of the species and/or the need to list as DPSs. This may be reflected in section 4.0, Recommendations for Future Actions. If the DPS listing remains valid, go to section 3.2, Recovery*

Criteria. If the new information indicates the DPS listing is no longer valid, consider the 5-year review completed, and go to section 3.5.2, Synthesis.

__X__ ***No****, go to section 3.2., Recovery Criteria.*

3.2 Recovery Criteria

3.2.1 Does the species have a final, approved recovery plan[1] containing objective, measurable criteria?

_X__ ***Yes****, continue to section 3.2.2.*

____ ***No****, consider recommending development of a recovery plan or recovery criteria in section IV, Recommendations for Future Actions, and go to section 3.4.1, Updated Information and Current Species Status.*

3.2.2 Adequacy of recovery criteria.

3.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

_X__ **Yes,** go to section 3.2.2.2.
____ ***No****, go to section 3.2.3, and note why these criteria do not reflect the best available information. Consider developing recommendations for revising recovery criteria in section 4.0.*

In January 2016, NMFS released the announcement of this impending review in the Federal Register and solicited comments, including input on the adequacy of the recovery criteria (81 Fed. Reg. 4264, January 26, 2016). The comment period closed on April 25, 2016 and 54 comments were received, none of which pertained to the recovery criteria. However, NMFS will continue to evaluate the criteria moving forward and seek input prior to making any revisions.

One set of suggestions regarding recovery criteria was provided in 2012 in the report released by the Independent Science Panel (Hilborn et al. 2012), which comments on the utility of different types of recovery criteria. Although there are benefits and drawbacks associated with any metric used for assessing recovery of an endangered species, Hilborn et al. (2012) outline five main requirements of any recovery criteria. These include:

1) The establishment or choice of measurable population characteristics such as abundance and growth rate by which to determine population status

[1] Although the guidance generally directs the reviewer to consider criteria from final approved recovery plans, criteria in published draft recovery plans may be considered at the reviewer's discretion.

2) Thresholds for these characteristics that define the status of the population
3) The probability that these thresholds will be met
4) The amount of time over which the chosen characteristics should be measured
5) A clearly defined method for measuring those characteristics

The recovery criteria included in the Recovery Plan currently meet four of the five requirements outlined by the Panel. The fifth requirement—the selection of a metric for measuring population growth rate— requires further review and consultation before any updates to the recovery criteria are made.

3.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)? *(Note: If it can be clearly articulated how recovery criteria address all current threats to the species, evaluating whether recovery and/or downlisting criteria have been met in section 3.2.3 may be sufficient to evaluate the species listing classification and no further analysis may be necessary.)*

_X__ ***Yes****, go to section 3.2.3.*
____ ***No****, go to section 3.2.3, and note which factors do not have corresponding criteria. Consider developing recommendations for revising recovery criteria in section 4.0.*

3.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. *(for threats-related recovery criteria, please note which of the 5 listing factors are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here):*

If you answered *yes* to both 3.2.2.1. and 3.2.2.2., evaluating whether recovery and/or downlisting criteria have been met in section 2.2.3 may be sufficient to evaluate the species listing classification and no further analysis may be necessary; *go to section 3.5.2, Synthesis.*

3.3 Delisting Criteria

Biological criteria
1. The Southern Resident DPS has exhibited an increasing population trend at an average growth rate of 2.3 percent per year for 28 years (two full cycles).

2**.** Available information on social structure, calf recruitment, survival, population age structure, and gender ratios of the Southern Resident DPS are consistent with the trend observed under Criterion 1 above and are indicative of an increasing or stable population.

Quantitative measures for population parameters include:

- Representation from at least three pods,
- More than two reproductive age males in each pod or information that fewer males are sufficient,
- A ratio of juveniles, adults, post-reproductive, male and female individuals similar to the Northern Resident population model [i.e., 47 percent juveniles, 24 percent reproductive females, 11 percent post-reproductive females, and 18 percent adult males] (Olesiuk et al. 2005),
- Adequate inter-birth intervals to allow for population growth,
- No significant increase in mortality rate for any sex or age class.

Have the Biological Criteria for Delisting been met?

No, not all of the biological delisting criteria have been met. Over the last 28 years the population size has fluctuated, and there has not been an average increase per year for the population. In 1982 there were 85 whales and in 2016 there were 83 whales counted in the summer census, with 78 surviving at the time of this report. Following the census four additional missing whales have been confirmed dead by the Center for Whale Research and one whale was found stranded in December 2016.

There is representation in all three pods, J (24 whales), K (19 whales), and L (35 whales). There are currently 4 reproductively mature males in J, 8 in K, and 10 in L pod between the ages of 10 and 42 years old. Of the 78 individuals in the population, 22 of them are reproductive age males and 27 are reproductive age females. However, based on an updated pedigree from new genetic data, most of the offspring in recent years were sired by two fathers, meaning that less than 30 individuals make up the effective reproducing portion of the population. Because a small number of males were identified as the fathers of many offspring, a smaller number may be sufficient to support population growth than was previously thought (Ford et al. 2011, NWFSC unpublished data). In addition many offspring were the result of matings within the same pod raising questions and concerns about inbreeding effects. Research into the relationship between genetic diversity, effective breeding population size, and health is currently underway to determine how this metric can inform us about extinction risk and inform recovery (NWFSC unpublished data).

The age and sex class distribution is similar for both Northern Resident and Southern Resident populations (Tables 3.1 and 3.2). If we assume the Northern Resident population is a model of an increasing or stable resident killer whale population we can also compare other population parameters to evaluate the delisting criteria. The previously reported average inter-birth interval for reproductive Southern Resident females is 6.1 years, which will allow for population growth, but likely at a slower rate than observed for Northern Residents, which have a shorter inter-birth interval (Olesiuk et al. 2005). There is uncertainty in the inter-birth interval because not all births are observed. Because the Southern Resident population is so small, age and sex composition are more influenced by individual births and deaths. More recent reproductive and demographic data can be used to re-evaluate the targets described in Olesiuk et al. (2005). This analysis assumes a range of reproductive maturity between 10 and 42 years old for both males and females (Table 3.2).

Table 3.1 Northern Resident population model described in Olesiuk et al. (2005).

Juveniles	47 %
Reproductive females	24 %
Post-reproductive females	11 %
Reproductive males	18 %

Table 3.2 Southern Resident and Northern Resident population demographics in 1979 versus most recent levels.

	SRKW 1979 (%)	SRKW 2016 (%)	NRKW 1979 (%)	NRKW 2010 (%)
Juveniles (< 10)	37	31	33	38
Adult males (10+)	18	29	31	22
Adult females (10-42)	27	33	32	34
Post-reproductive females (42+)	19	7	4	7

The NWFSC continues to evaluate changes in fecundity and mortality rates, and has updated the work on population viability analyses conducted for the 2004 Status Review for Southern Resident Killer Whales and the science panel review (Krahn et al. 2004; Hilborn et al. 2012; Ward et al. 2103). Following from that work, including data from the last 5 years, 2011 through 2016, now suggests a downward trend in population growth projected over the next 50 years, in part due to the changing age and sex structure of the population, but also related to the relatively low fecundity rate observed over the period from 2011 to 2016 (Figure 3.1). The population trend projection is most pessimistic if future fecundity rates are assumed to be similar to those in 2016, and less steep but still declining if an average fecundity rate over the last five years is used for the projections (Figure 3.1). The projection using 2011 through 2016 fecundity data shows some stability and even a slight increase over the next decade. As the model projects out over a longer time frame (50 years) there is increased uncertainty around the estimates, however, if all of the parameters in the model remain the same the overall trend shows a decline in later years. Using more variable survival and fecundity rates may be more representative than relying on the single poor year of 2016, but this single year scenario provides information on what could happen if poor reproduction continues. Deviations from the assumptions underlying these projections may lead to more pessimistic or optimistic trajectories. For example, these growth trends assume the ratio of female to male births is 50:50; however, over the last five years new births have been skewed slightly toward male, and over the entire time series the proportion of births that are female is closer to 43 to 44 percent. A second factor is the potential effects of inbreeding (generally a risk for any small population). The NWFSC is continuing to investigate relationships between inbreeding coefficients and demographic rates; if inbreeding has a negative effect on survival or fecundity and inbreeding is occurring in the population, the population trajectory may be more negative. Birth of even a small number of female calves in the next several years could improve the outlook for the age and sex structure of the population. In addition, there are a number of actions underway to target recovery of critical prey, reduce vessel impacts and better understand how several health related factors influence reproduction. As actions are implemented and we can improve our ability to evaluate and mitigate risks, we hope to see improvements in the vital rates of the population.

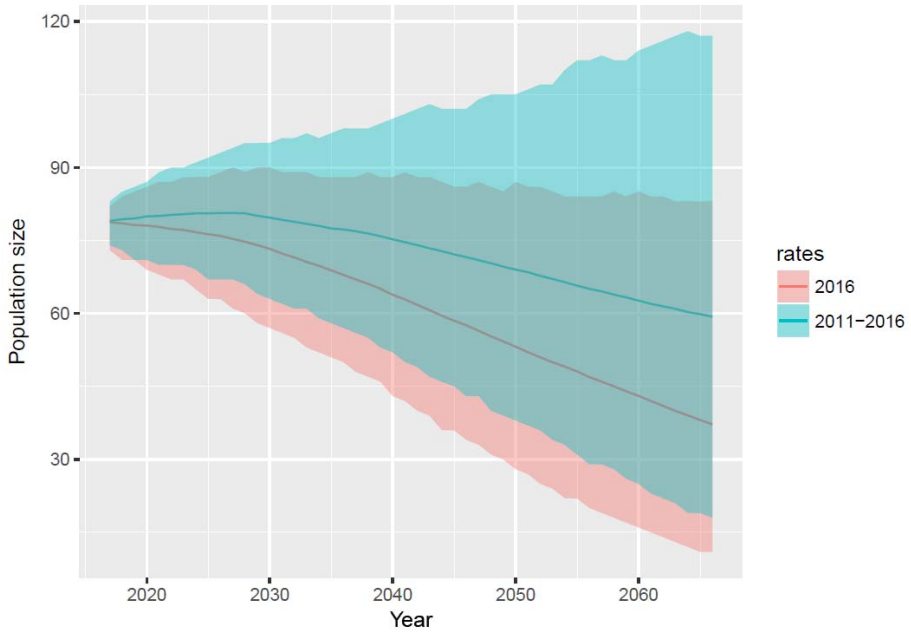


Figure 3.1 Southern Resident killer whale population size projections from 2016 to 2066 using 2 scenarios: (1) projections using demographic rates held at 2016 levels, and (2) projections using demographic rates from 2011 to 2016. The pink line represents the projection assuming future rates are similar to those in 2016, whereas the blue represents the scenario with future rates being similar to 2011 to 2016.

These analyses provide insight into the current status of the population and how different factors may affect future population growth, although uncertainty increases the farther out you make predictions. Because the population is so small, slight changes in births and the sex of calves can have a big influence on modeled future population growth. Vital rates, and in particular fecundity, has varied over time and it is essential to continue closely tracking the population through the annual census and other studies to update the models and projections and understand the status, extinction risk, effectiveness of recovery actions, and recovery potential for the population.

3.3.1 Threats Criteria

The threats criteria are designed to evaluate the ESA section 4(a)(1) listing factors as they relate to the Southern Resident DPS. The same statutory factors must be considered in delisting as in listing, with objectives related to each factor included as part of the recovery criteria.

Factor A: The present or threatened destruction, modification, or curtailment of a species' habitat or range.

Objective: Ensure adequate habitat to support a recovered population of Southern Resident killer whales. Habitat needs include sufficient quantity, quality, and accessibility of prey species.

Criteria:

A1. Observations indicating that lack of prey is not a source of mortality or a factor limiting recovery of Southern Residents. Consistent observations or measurements of good body condition in a significant number of individuals, and no or limited observations of reduced feeding behavior or recovery of emaciated stranded animals.

A2. Sufficient knowledge of the foraging ecology of Southern Residents to determine that established fishery management regimes are not likely to limit the recovery of the whales.

a. Fisheries management programs that adequately account for predation by marine mammal populations when determining harvest limits, hatchery practices, and other parameters.
b. Fisheries management programs that are consistent with recovery of salmon stocks and that support sustainable salmon populations.

A3. Contaminant levels in killer whales, prey species or surrogate marine mammal populations in the greater Puget Sound area that indicate a reduction or slowing of accumulation of legacy contaminants, such as PCBs and DDT, and information on current baseline levels of emerging contaminants. This could include data showing that overall contaminant levels in the population are decreasing or accumulation is slowing, or information that younger animals have a proportionally reduced contaminant load. A decrease in the number of contaminated sites in Puget Sound would also indicate a reduction in contaminants in a portion of the habitat of Southern Resident killer whales.

A4. Management actions in place to reduce vessel disturbance, auditory masking and risk of ship strikes. Voluntary guidelines, education programs, and prohibitions under the Marine Mammal Protection Act (MMPA) currently in place should have remained in place. Regulations and/or protected areas should have been considered and put in place if it is determined that they will provide additional reduction in vessel effects.

Have the Threats Criteria for Factor A been met?

No, the threats criteria for Factor A have not been met. While there has been significant progress in assessing the habitat needs of the whales, more research is needed to help us evaluate if the needs of the whales are being met, identify which factors are degrading habitat, and determine where and when the whales may be prey limited.

A1. There is ongoing research and analysis underway to assess the health of the whales and evaluate if prey is a limiting factor for recovery of Southern Resident killer whales. Both United States and Canadian researchers have conducted statistical studies revealing relationships between overall coastwide Chinook salmon abundance indices and Southern Resident killer whale survival, social cohesion, growth rate, and fecundity (Fearnbach et al. 2011; Ford et al. 2010; Ward et al. 2009; Ward et al. 2013). New studies utilizing aerial photogrammetry to study body condition methods are useful in the study of individual and

population-wide health. Aerial photogrammetry allows researchers to take measurements of the whales' length and width to assess individual body condition. Fearnbach et al. (2011) found indications of decreased body size in young adults as a result of nutritional stress during early growth. These data are important for the study of population-wide response to environmental stress (Fearnbach et al. 2011; Durban et al. 2009). Additional information on the health status and body condition of the whales and distribution of their prey would clarify where and when the whales may be food limited, and what other factors may contribute to the observations by Fearnbach et al. (2011) and Durban et al. (2009).

Although nutritional stress is a possible cause of poor body condition and reduced body size, disease, organ malfunction, vessel disturbance, and prey contamination could also be behind the conditions observed for individual whales in aerial photogrammetry studies (Hilborn et al. 2012). More research into these confounding factors and the effects that they have on the whales is needed to fully understand how external influences affect Southern Resident killer whale health. One of the projects funded by the NFWF Killer Whale Research and Conservation Program in 2015 aims to fill this data gap. The Vancouver Aquarium Marine Science Centre received the funding to conduct an ongoing, multi-year study of the impacts of prey availability and contaminant load on killer whale body condition. This study uses aerial photogrammetry to rate body condition as well as biopsies from the corresponding whales to help quantify the effects of contamination and poor nutrition (NFWF 2015).

In another new study, University of Washington researchers are using fecal samples to evaluate the health of Southern Residents. Specifically, these researchers are using hormone measures of stress (glucocorticoids, or GCs) and nutrition (triiodothyronine, or T3) in feces to determine the physiological impacts of nutritional and psychological stress, presumably caused by vessel disturbance and lack of prey (Ayers et al. 2012). This study has shown reduced T3 values in Southern Residents during late spring and summer, which indicates nutritional stress during the period spent in the Salish Sea. Elevated T3 values in the early spring when the whales first arrive in the area, however, indicate that the whales are foraging on prey with high nutritional value before they get there, suggesting the importance of coastal early spring run salmon (Ayers et al. 2012). However, a lack of data from winter months and understanding of variability in the data limits the utility of this information and makes it difficult to assess the overall nutritional status of the whales based on these values alone (Hilborn et al. 2012).

Reduced feeding behavior has been reported when vessels are present and it is estimated that the presence of vessels could result in an 18 percent decrease in energy intake, a consequence that could have a significant negative effect on an already prey-limited species. (Lusseau et al. 2009; Williams et al. 2006); however, we do not have sufficient information to quantify this reduction in feeding for individual whales or evaluate the cumulative effects of all vessel traffic that may be changing the whales' behavior. Actions to address the impact of vessels are discussed in more detail below under A4 and under Factor B, criteria B1.

Since the last 5-year review, there have been two deceased killer whales that exhibited some signs of nutritional stress at the time of necropsy. The first, J32, was deemed to be in "fair body condition", with some generalized, moderate emaciation and prominent vertebrae (Ford

2013). The second, L95, was found to be in "moderate to fair body condition" at the time of necropsy. Photos taken a month before death showed rib outlines, possibly indicating nutritional stress (Raverty 2016). It is unclear to what extent nutritional stress may have contributed to the deaths of these two individuals, however lack of prey cannot be ruled out as a significant contributor.

A2. A number of studies and evaluations of management actions have contributed to our knowledge of foraging ecology and potential effects from fisheries on the whales. One recent study conducted by the NWFSC and partner organizations used fecal DNA analysis to confirm the results of previous studies conducted using other prey identification methods (Ford et al. 2016). Their findings confirmed previous studies using the remains of prey left behind during foraging events to determine the diet of the whales (Hanson et al. 2010). They found that salmonids make up greater than 98 percent of Southern Resident killer whale diet with Chinook salmon comprising 79.5 percent of the overall diet. However, while previous studies did not detect a significant amount of coho salmon in the diet, Ford et al. (2016) discovered that coho were responsible for at least 15 percent of the diet, and that they were an important prey species during times of decreasing seasonal Chinook salmon abundance. This indicates that the whales shift to other prey items in the absence of Chinook salmon (Ford et al. 2016; Hilborn et al. 2012).

Several studies have also used genetic identification methods and energy content analysis to estimate the river of origin of salmon consumed by the whales and to explain their preferences for certain stocks. Most Chinook salmon prey samples (80 to 90 percent) from summer feeding events in the Salish Sea originated from the Fraser River and stock identification also showed a high likelihood that the whales consume hatchery fish, indicating that hatcheries could be making important contributions to Southern Resident recovery (Hanson et al. 2010). Fraser River Chinook salmon were found to have the highest total energy content of all of the Chinook runs from the region found in the whales' range and diet, while Puget Sound Chinook salmon were found to have significantly lower total energy (O'Neill et al. 2014). These studies and others conducted to implement the research actions in the Recovery Plan inform fishery management programs that determine harvest limits and hatchery practices.

Salmon harvest actions are evaluated under the ESA to ensure that the harvest management regimes will not jeopardize the continued existence of ESA-listed salmon or killer whales or adversely modify their designated critical habitat. In recent years, NMFS has completed section 7 consultations on several fisheries including the Pacific Salmon Treaty (NMFS 2008b), Pacific Coast Salmon Fisheries (2008c), and the Puget Sound Salmon Fisheries (NMFS 2016). These consultations contain the most up-to-date information on foraging ecology of the whales and we considered published papers from all sources and unpublished data from the NWFSC. Our analyses also include many assumptions and we have identified gaps in our knowledge, such as a lack of information about the foraging efficiency of the whales. In each of these consultations we examined the percent reductions in the killer whales' prey base from harvest. We also analyzed the number of Chinook salmon or kilocalories from Chinook salmon food energy remaining after the fisheries as compared to our estimates of the Chinook salmon needs of the whales.

Our analyses for the fisheries consultations characterize the short-term and long-term effects on Southern Residents from prey reduction caused by harvest. Effects anticipated on an annual level are considered short-term (i.e., harvested Chinook salmon in a given year). Our estimates of short-term prey reductions from fisheries have been small relative to remaining prey available to the whales to meet their prey needs. Long-term effects consider the potential for the action to affect viability of prey at the salmon stock or Evolutionarily Significant Unit, (ESU)-level over a longer time frame. In the long term, the harvest actions we have analyzed have met the conservation objectives of harvested stocks, were not likely to appreciably reduce the survival or recovery of listed Chinook salmon, and were therefore not likely to jeopardize their continued existence.

We considered both the short- and long-term components of the analysis to inform our conclusions for Southern Residents. The harvest consultations referenced above concluded that the harvest actions cause small prey reductions, but were not likely to jeopardize the continued existence of ESA-listed Chinook salmon or Southern Residents, or adversely modify their critical habitats.

An independent science panel convened in 2011 and 2012 to analyze the effects of salmon fisheries on both Chinook salmon abundance and Southern Resident recovery (see Table 3.3). Their final report, published in 2012, concludes that there is little evidence that a reduction in salmon catch would have long-term benefits for Southern Resident killer whales (Hilborn et al. 2012). Not enough information is known regarding other sources of salmon mortality and the dynamic ocean food web that determines the amount of Chinook salmon available to Southern Residents to identify harvest management measures that would benefit the whales. Furthermore, salmon fisheries target Chinook salmon from several different runs, not just those that are important to Southern Residents, making it difficult to understand how reducing fishing effort on Chinook salmon would impact prey availability for the whales. The panel concluded that the 2.3 percent growth rate necessary for delisting the species is unlikely to be achieved by simply reducing Chinook salmon fisheries, but that efforts to restore important Chinook salmon habitat may increase the carrying capacity of Southern Resident prey species. The report noted that these actions, unlike a reduction in salmon fishery harvest, would likely have greater long-term benefits for the whales (Hilborn et al. 2012).

Table 3.3. Summary of panel's research recommendations (page numbers in Hilborn et al. 2012 in parentheses)

Recommendation	In Recovery Plan?	Status of Research in Progress
Collect information on the Southern Resident coastal diet and distribution (v, xii, 18, 20, 21, 23, 38)	Yes	Ongoing sample collection during coastal cruises
Collect more information on stock-specific Chinook salmon distribution during winter (35, 38)	Yes	Sample analysis conducted on coastal samples, manuscript in development
Better quantify Chinook salmon consumption by other predators, particularly seals and sea lions, including updated abundance estimates of these predators (ix, 38, B-4)	No	Pacific Salmon Commission funded food web modeling project 2015-2016 (Chasco et al. in press), additional modeling underway
Gain more realistic understanding of Southern Resident dynamics as a function of both prey abundance and abundance of other predators; better quantify abundance of Chinook salmon that would be made available to Southern Resident through fishery reductions fishery removals (competing risk of death models) (ix, 33, 35, 38, 51, 52)	No	Competing risk of death model considered in Pacific Salmon Commission project (Chasco et al. in press)
Collect information on seasonal differences in Southern Resident metabolism, condition, and prey consumption. (21, 22, 24, vi)	Yes	Seasonal photogrammetry project funded through NFWF for 2016-2017
Evaluate relationship between salmon abundance and whale condition (vi, xii, 24)	No	Continuing evaluation of relationships as part of risk assessment development
Better quantify the effects of alternative fishing scenarios on long-term abundance of Chinook salmon (36)	No	NFWF funded project studying the effects of hatchery practices on prey availability for Southern Residents for 2016-2017 (NFWF 2015), Thesis assessing the effects of fisheries and hatchery production on prey availability (Strange 2016)
Research to characterize potential catastrophic risks faced by Southern Resident (52)	Yes	Ongoing risk assessment work considers a survival threshold regarding catastrophic risk
Better estimates of the carrying capacity of Southern Resident and whether they are currently experience density dependent growth	No	NWFSC population viability analysis performed annually

A. Models used for salmon harvest management, such as the Fishery Regulation Assessment Model (FRAM) (described in NMFS 2008b), account for natural mortality, but natural mortality is not calculated based on estimates of what marine mammals are consuming. Natural mortality is essentially determined by calculating the difference between counts of smolts exiting rivers and counts of adults returning to the rivers, and considering the number of fish harvested.

B. For each of the fishery actions identified above, NMFS conducted section 7 consultations to ensure that the fisheries do not jeopardize the continued existence of ESA-listed salmon. For example, the consultation for the Puget Sound salmon fisheries described above for killer whales also includes an analysis of effects on listed salmon (NMFS 2016). For additional information on salmon fishery consultations including a description of the approach for harvest decisions for ESA-listed salmon and steelhead please visit our web page at http://www.westcoast.fisheries.noaa.gov/fisheries/salmon_steelhead/salmon_and_steelhead_fisheries.html.

A3. Since research on the effects of environmental contaminants on Southern Residents began in the early 1990s, it has been widely known that persistent organic pollutants (POPs) or "legacy contaminants" are of particular concern to the whales. PCB levels have been detected in blubber samples at concentrations that far exceed the threshold known to have detrimental health effects on harbor seals in Puget Sound. High concentrations of PCBs have been linked to changes in gene expression in killer whales, particularly in those genes related to endocrine and immune function as well as important metabolic processes (Buckman et al. 2011). However, despite their persistence in the marine environment, recent analysis indicates that PCB levels may be declining in Puget Sound harbor seals, a promising result for the whales (Ross et al. 2013). High levels of DDTs have also been found in the whales, especially in K and L pods, which spend more time in California in the winter where DDTs still persist in the marine ecosystem (Sericano 2014). In the last five years, however, the focus on POPs has shifted toward one emerging contaminant in particular—PBDEs.

PBDEs have been used in many common household and industrial products as flame retardants since the 1970s. They are not chemically bound to the products that contain them, which makes them particularly prone to leaching out into the environment (Gockel and Mongillo 2013). In the United States and Canada, the three forms in which PBDEs exist as flame retardants were banned from production and importation in 2004 and 2013. However, they remain in many consumer products made before that time, so their release is ongoing and their concentrations in the marine environment may continue to increase in the coming years (Lundin et al. 2015; Gockel and Mongillo 2013; Ross et al. 2013; Mongillo et al. 2012). The largest pathway of contamination in Puget Sound is atmospheric deposition, which accounts for about 44 to56 percent. PBDEs become detached from indoor products and then bind to dust particles and are delivered into waterways via wastewater (Gockel and Mongillo 2013). Although direct evidence of the effects of PBDEs on killer whale health is lacking, studies in proxy species such as sea lions and harbor seals suggest similar effects to PCBs, including immune and endocrine disruption, cancer, decreased reproduction, and

increased calf mortality (Mongillo et al. 2012; Gockel and Mongillo 2013; Lundin et al. 2015). In response to this emerging threat, NMFS and the U.S. EPA convened several working groups and a policy forum to make recommendations on how to monitor and address PBDE contamination in Puget Sound. The results of these meetings can be found at https://www.eopugetsound.org/sites/default/files/features/resources/PBDEs_Puget_Sound_Report.pdf.

One major obstacle to setting specific recovery goals for reducing the contaminant load in Puget Sound is a lack of data supporting an effects threshold for killer whales. Several studies have been conducted on other species of marine mammals to determine the level at which specific contaminants have detrimental health effects, but these studies are more difficult to conduct on cetaceans. Furthermore, the time lag between prey consumption, contaminant storage in blubber, and physiological response makes it difficult to say with any certainty that contaminants are responsible for those responses (Gockel and Mongillo 2013). However, some studies in the last five years have focused on improving methods for studying the effects of contaminants on killer whales. The results from these studies indicate that researchers may be getting closer to being able to establish effects thresholds that will be able to guide recovery implementation. For example, methods for analyzing scat are allowing researchers to determine contaminant loads while simultaneously testing for stress hormones. Correlating physiological evidence of stress with contaminant load may provide evidence for the health effects of PCBs and PBDEs on Southern Residents (Ayers et al. 2012; Gockel and Mongillo 2013; Lundin et al. 2015). Still, many of the contaminant studies of killer whales rely on small sample sizes and additional work is needed to track trends in individual animals over time and to link physiological effects with different levels of various contaminants. The health database described in Section 2.3 will help organize this data and allow researchers to develop models to better understand the health effects of certain thresholds of contamination in killer whales.

NMFS recently released a technical memorandum reviewing existing information about the threats that contaminants pose to Southern Residents. The authors make several recommendations to fill the data gaps that are currently hindering efforts to reduce these threats. These include developing new biomarkers for toxicity, utilizing non-invasive methods to measure contaminant load, and correlating contaminant load with health and reproduction. By closing these data gaps, management actions can be put in place to reduce exposure, monitor long-term contaminant levels, and determine the risks posed by persistent organic pollutant in Southern Residents (Mongillo et al. 2016).

A4. NMFS has taken several management actions to reduce vessel disturbance, the most significant of which has been implementing mandatory regulations in May of 2011 (76 Fed. Reg. 20870, April 14, 2011). The final rule includes two elements: 1) a prohibition on approaching killer whales within 200 yards, and 2) a prohibition on parking in the path of the whales. These regulations apply to all killer whales, not just Southern Residents, since it can be difficult to identify the ecotype of any given whale.

NMFS has continued to work with partners to enforce the new regulations and advance education campaigns to raise boater awareness. In 2013 and again in 2016, WDFW received

3-year ESA Section 6 grants to assist enforcement efforts. They spend several days a week from May to October on the water giving out warnings and citations to vessel operators who violate the regulations, as well as passing out information regarding state and federal boating laws. The Soundwatch Boater Education Program out of the Whale Museum also spends at least 4 days on the water every week during the summer to record violations and educate boaters on the regulations (Seely 2015). NMFS has also continued to promote the voluntary Be Whale Wise guidelines through Soundwatch, WDFW, the Seattle Aquarium, the Orca Network, and other partners.

NMFS also considered including a no-go zone prohibiting vessels from entering a 6 square mile area along the west side of San Juan Island from May 1 to September 30 in proposed vessel regulations, but did not include it in the final rule after receiving a large number of public comments opposing the action. However, a no-go zone in this important foraging area is still being considered and in 2016 NMFS received a petition requesting establishment of a whale protection zone. The petition is currently under consideration.

Factor B: Overutilization for commercial, recreational, or educational purposes
Objective: Ensure commercial, recreational or educational activities are not affecting the recovery of Southern Residents, including vessel effects from whale watching.

Criteria:

B1. Reduction in impacts from commercial and recreational whale watching, or evidence that this activity does not cause population level effects. Reductions may be measured through fewer incidents reported in the vicinity of whales, increased audiences for education programs and establishment of regulations or protected areas if needed (see Criterion A4).

B2. No permanent removals of individual Southern Residents from their habitat, including live capture for public display, and any incidental takes associated with fisheries or other commercial or recreational activities have been addressed through regulatory mechanisms to insure against recurrence.

Have the Threats Criteria for Factor B been met?
Some of the criteria for Factor B have been met. There are no requests or authorizations for removals of Southern Residents. NMFS has also made progress in addressing overutilization of Southern Residents by developing regulations to reduce vessel disturbance.

B.1 Actions to reduce vessel disturbance are described above under A4. NMFS' regulations are intended to reduce the number of potentially harmful incidents when vessels are not following the responsible viewing guidelines. Although the regulations have only been in place for a short time, the final rule includes detailed information on what long-term benefits NMFS expects for the regulations. A seasonal no-go zone on the west side of San Juan Island is still under consideration, although the measure was not included in the final vessel regulations in 2011. NMFS will continue to work with the Soundwatch Boater Education Program and WDFW to monitor the vessel activity around the whales, track outreach to a variety of audiences, and evaluate trends in the number of incidents of vessels not following

guidelines and regulations. A review of the current regulations is currently underway and NMFS has also received a petition requesting establishment of a whale protection zone.

B.2 The public display industry has not requested authorization to remove Southern Resident killer whales from the wild and NMFS has not authorized any live captures. Incidental take in fisheries is not currently a threat to Southern Resident killer whales (Caretta et al. 2010). However, potentially harmful interactions with fishing gear do sometimes occur. In 2015, a member of the J-pod— J39— was photographed with a salmon fishing flasher dangling out of his mouth. Five days later, J39 was photographed again by the Center for Whale Research without the flasher. There were no signs of any damage to the tissue around his mouth (Balcomb 2015). Continued monitoring has shown no negative consequences of this fishery interaction. However, NMFS will continue to rely on reports of any incidental take in fisheries from the fishing community and from observers to monitor any increase in takes.

In 2016, the death of L95 may have been connected to research activities. A necropsy revealed that a limpet-style satellite tag may have provided a vector for a fungal infection that ultimately contributed to the death of the animal. An expert panel concluded that several factors seem to have predisposed L95 to this fungal infection, including poor body condition, tag placement and malfunction, contamination of the tag from sea water, and even immunosuppression. Although mortality due to complications from satellite tagging is rare (and in this population, unprecedented), the panel made several recommendations for improving the tagging protocol and further decreasing the risk to the whales. For the time being, NMFS has suspended the tagging program for further review. The report from the expert panel can be found at http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/l95_expert_panel.pdf.

Factor C: Disease or predation
Objective: Ensure that diseases and their effects on reproduction and survival are not a threat to the sustainability of the Southern Resident DPS.

Criteria:
C1. Sufficient knowledge to determine that disease is not limiting the recovery of Southern Resident killer whales.

Have the Threats Criteria for Factor C been met?
No, the threats criteria for Factor C have not been met. Additional information is needed to ensure that diseases are not affecting reproduction and survival of Southern Residents.

C1. Gaydos et al. (2004) reviewed potential infectious disease threats for Southern Resident killer whales. While the social structure and small size of the population put them at risk of infectious disease, we have not identified infectious disease as a limiting factor for the Southern Resident killer whale population. We do not, however, have sufficient information to ensure that disease is not affecting the population, nor do we understand how other threats such as contaminants and prey availability may impact the susceptibility of Southern Residents to disease. It is hypothesized that certain contaminants may have negative

consequences for the immune system, however no direct observations or measurements have been made to support this theory. More research is required to determine how the threats addressed under Factor A may affect the population's ability to withstand disease. Several priorities from the health workshop address data gaps regarding disease.

Factor D: The inadequacy of existing regulatory mechanisms
Objective: Ensure that regulatory mechanisms other than the ESA are adequate to ensure that threats to the sustainability of the DPS do not recur.

Criteria:
D1. Baseline conditions of emerging contaminants, such as PBDEs, in Southern Residents, prey species, and surrogate marine mammal populations in the greater Puget Sound area have been determined, and trends and other information indicate that contaminant inputs into the Southern Residents' habitat are not limiting recovery and sustainability of Southern Residents.

D2. Regulations are in place to limit the introduction of harmful contaminants, and there is evidence of decreasing levels of contaminants detected in Southern Residents, prey species, or surrogate marine mammal populations, or evidence that the current level of contaminants causes no harm to the whales.

D3. There is a reduction in impacts from commercial and recreational whale watching, or evidence that this activity does not cause population level effects. Reductions may be measured through fewer incidents reported in the vicinity of whales, increased audiences for education programs, and establishing regulations/protected areas if needed (see Criterion A4).

Have the Threats Criteria for Factor D been met?
No, the threats criteria for Factor D have not been met. Additional information is necessary to evaluate the adequacy of existing regulatory mechanisms, particularly to address pollution and contaminants. NMFS has made progress in addressing impacts from vessels by developing regulations to reduce disturbance.

D1. We do not currently have sufficient baseline or trend information to evaluate if contaminant loads and accompanying physiological impacts are limiting recovery and sustainability of Southern Residents. As described above under A3, there is some information on trends and levels of emerging contaminants in killer whales and other marine mammals; however, many of the contaminant studies of killer whales rely on small sample sizes and additional work is needed to track trends in individual animals over time and to link physiological effects with different levels of various contaminants.

D2. To address the threat of pollution and contamination, NMFS participated in efforts of the Puget Sound Partnership to develop a strategy for cleaning up, restoring, and protecting Puget Sound by 2020. In 2016, the Partnership released an updated Action Agenda which integrates scientific assessment with community priorities, and establishes a unified set of actions that are needed to protect and restore Puget Sound (Puget Sound Partnership 2016).

NMFS also collaborated with the U.S. EPA to conduct a series of workshops to assess the presence and impact of PBDEs on the Puget Sound ecosystem and Southern Resident killer whales. The working groups formulated a set of recommendations to address the issue of PBDE contamination in Puget Sound. Although high levels of persistent organic pollutants remain in the marine environment, one recent study suggests that PCB levels may be declining in some marine mammals (Ross et al. 2013). See A3 above for information on our efforts to assess contaminant trends and our need for additional information on potential harm from different levels of various contaminants.

D3. See A4 and B1 above for information on actions to reduce disturbance by vessels, including commercial and recreational whale watching.

Factor E: Other natural or manmade factors affecting its continued existence.
Objective: Maintain protection from oil spills and improve oil spill response techniques for killer whales. Continue monitoring the population and identify any new natural or manmade factors affecting the recovery of Southern Residents.

Criteria:
E1. Effective oil spill response plan is in place for killer whales as part of the wildlife branch section of the NWACP.

E2. Effective oil spill prevention plans are in place that are no less protective than those in place at time of listing.

E3. An annual census is in place which has and will continue to assess the population status of Southern Residents.

E4. Knowledge of distribution, habitat use and potential risks to the population in the coastal portion of the range of Southern Residents has been increased and determined not to affect the sustainability of the population.

Have the Threats Criteria for Factor E been met?
No, not all of the threats criteria for Factor E have been met. Additional information is necessary to evaluate the distribution, habitat use, and potential risks to the Southern Residents in the coastal portion of their range. NMFS, along with partners, has made significant progress on other criteria by developing an oil spill response plan and supporting the annual census.

E1. NMFS is working closely with partners to address the threat of an oil spill in the killer whales' habitat by developing a killer whale-specific oil spill response plan. In 2007, NMFS and UC Davis hosted a workshop with researchers, oil spill responders, and oil industry representatives and developed a draft oil spill response plan for killer whales. Working with WDFW, the Region 10 Regional Response Team, and the Northwest Area Committee, we completed the plan, and it was adopted as part of the Northwest Area Contingency Plan. NMFS is continuing to work with WDFW to develop specific implementation strategies for the hazing techniques identified in the plan.

E2. NMFS is not aware of any reduction in oil spill prevention practices. In 2009, Washington Department of Ecology (Ecology) released the 2007-2008 Spill Prevention, Preparedness, and Response Program Report (Ecology 2009). The report includes information on partnerships, new initiatives, incidents, and performance. While the volume of oil released has been decreasing, the number of spills has remained steady for the last 20 years. The report identifies future actions to address chronic pollution sources. For additional information and links to reports on capacity to respond to oil spills in Washington, and oil spill prevention, preparedness and response, please visit http://www.ecy.wa.gov/programs/spills/spills.html and http://www.psp.wa.gov/oilspills.php.

E3. The annual census conducted by the Center of Whale Research (www.whaleresearch.com) remains in place to assess the status of the Southern Resident killer whale population. NMFS has identified the census as a priority, provides support for the census, and expects these efforts to continue. NMFS' support for the Center for Whale Research annual census implements action A.1, Continue the annual census, from the Recovery Plan, and cost information for this action is included in Appendix A.

E4. The Southern Resident killer whales spend more than half of their time in coastal offshore waters, primarily in winter months, and learning more about how they are using this habitat has been a top priority since the listing when only a handful of sightings existed. In 2014 NMFS received a petition requesting an expansion of critical habitat to include offshore waters of the Pacific Ocean. We accepted the petition and identified the next steps for modifying the critical habitat in our 12-month finding (80 Fed. Reg. 9682, February 24, 2015). New information from ongoing research through passive acoustic monitoring, land-based sightings, coastal research cruises, and satellite-linked tagging conducted over the last 5 years will inform the critical habitat revision. Critical habitat identifies physical and biological features that are essential to the conservation of listed species. Revising critical habitat to include coastal portions of the whales' habitat will ensure that federal actions won't adversely modify, destroy, or otherwise reduce the conservation value of this habitat. Descriptions of critical habitat are also a powerful educational tool, illustrating important habitat features and specific areas where those features are found. Studies on coastal habitat use are also critical to our understanding of the key prey for the whales during the winter months, have provided information on reproduction, and help us understand potential threats in offshore waters.

Research projects have increased our knowledge of distribution, habitat use, and potential risks to the population in the coastal portion of the range of Southern Residents. The NWFSC, along with many partners, have used several methods to gather new information about the whales along the coast. Sighting networks, such as Orca Network (http://www.orcanetwork.org/), encourage people to report sightings of the whales. Hydrophone networks, such as the SeaSound Project (http://www.orcasound.net/), and passive acoustic recorders deployed by scientists, collect vocalizations of the whales (Hanson et al. 2009b). The NWFSC has also conducted dedicated ocean class shipboard visual and acoustic surveys to locate and track killer whales. On eight of the past nine cruises, NWFSC scientists have located the Southern Residents along the Washington and Oregon coasts. Between 2012 and 2016 the NWFSC deployed eight satellite tags on individual Southern

Residents to track their movement during the winter months when they leave Puget Sound. Analysis of the satellite tag data is currently underway and will inform designation of coastal critical habitat for the whales. More information on the satellite tag program is available at https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/marinemammal/satellite_tagging/.

3.4 Downlisting Criteria

1. The Southern Resident DPS has exhibited an increasing population trend at an average growth rate of 2.3 percent per year for 14 years (one cycle).

2. Available information on social structure and population structure are consistent with the trend observed under Criterion 1 above, and they are indicative of an increasing or stable population.

Quantitative measures for some population parameters:
- Representation from at least three pods, and
- At least two reproductive age males in each pod.

Have the Biological Downlisting Criteria been met?
No, not all of the biological downlisting criteria have been met. Although there is currently representation in all 3 pods, only 78 individuals exist in the entire population, down 19 from 1996.

There is representation in all three pods, J (24 whales), K (19 whales), and L (35 whales). There are currently 5 reproductive age males in J, 8 in K, and 9 in L pod. The current population is 31 percent juveniles, 33 percent reproductive females, 29 percent reproductive males, and 7 percent post-reproductive females.

3.4.1 Threats Criteria

Factor A: The present or threatened destruction, modification, or curtailment of a species' habitat or range.
Objective: Ensure adequate habitat to support a recovering population of Southern Resident killer whales. Habitat needs include sufficient quantity, quality, and accessibility of prey species.

Criteria:
A1. Recovery or management plans for listed salmonids (and other prey species as appropriate) are in place to restore them to the point that they are self-sustaining members of their ecosystems.

A2. Research is underway to increase knowledge of the foraging ecology of Southern Residents and inform fishery management programs that determine harvest limits, hatchery practices, and evaluate consistency with recovery of salmon stocks and Southern Resident killer whales.

A3. Baseline information on legacy and emerging contaminant levels in killer whales, prey species, or surrogate marine mammal populations in the greater Puget Sound area is available to enable future monitoring of trends in contaminant levels in the whales and inputs into their habitat.

A4. Voluntary guidelines, education programs, and prohibitions under the MMPA to reduce vessel disturbance, auditory masking and risk of ship strikes, currently in place, should have remained in place.

Have the Threats Criteria for Factor A been met?

No, the threats criteria for Factor A have not been met; however, we have made progress on some of the threats. NMFS and the Pacific Northwest community have made progress in completing a number of salmon recovery plans and developing regulations to reduce vessel disturbance. Research is underway to learn more about foraging ecology, but there are still gaps in information needed to inform harvest, hatchery, and salmon recovery actions. We have baseline information for levels of some contaminants in Puget Sound, but the studies have small sample sizes and additional information is needed, particularly for emerging contaminants.

A1. Salmon ESA recovery planning is underway throughout the entire West Coast Region. While each recovery plan will meet ESA requirements and will use consistent scientific principles, each plan will be unique because of conditions in that domain, and because it will be based on local initiatives. Recovery-related products are in varying stages of development. Final recovery plans are in place for Puget Sound Chinook salmon, , Lake Ozette Sockeye salmon, the Lower, Middle, and Upper Columbia salmon, Willamette River salmon, Southern Oregon Northern California Coast Coho salmon, Central California Coast Coho salmon, California Central Valley salmon, and Southern California Coast Steelhead; other plans are in development. For additional information on the status of salmon recovery plans, please visit http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/recovery_plans_supporting_documents.html.

A2. Several research projects are underway to increase knowledge of the foraging ecology of Southern Residents. Hanson et al. (2010), O'Neill et al. (2014), and Ford et al. (2016) published summaries of information on prey consumed by Southern Resident killer whales, confirming a high percent of Chinook salmon in the diet of Southern Residents in their summer range. These studies also used genetic identification methods to estimate the river of origin of salmon consumed by the whales. Most Chinook salmon prey samples (80 to 90 percent) originated from the Fraser River, and stock identification also indicated a high likelihood that the whales consume hatchery fish (Hanson et al. 2010; O'Neill et al. 2014). In addition to information on prey consumed by the whales, we have updated information on the metabolic needs of the whales which also informs foraging ecology (Noren 2011; Williams et al. 2011; O'Neill et al. 2014). Finally, in 2011 and 2012 an Independent Science Panel convened to determine the effects of ocean salmon fisheries on Southern Residents. Their final report indicates that reducing fishing effort would not have long-term benefits for Southern Residents, and that more information regarding other sources of natural salmon mortality is needed to understand how reducing ocean salmon fishing would impact the

whales' prey availability (Hilborn et al. 2012). These studies and others conducted to implement the research actions in the Recovery Plan inform fishery management programs that determine harvest limits and hatchery practices (Table 3.3).

There are still major data gaps regarding the foraging ecology of the whales. Although still limited, we have substantially increased information on winter coastal distribution of Southern Resident killer whales through a coastal sighting network, ocean-class vessel survey cruises, and autonomous passive acoustic recorders (Hanson et al. 2008a, 2008b, 2009a, 2009b). However, we have very little information on the whales' diet in their winter range along the Pacific Coast. Another major data gap is a lack of information on foraging efficiency of the whales and we have not identified specific geographic areas or times of year when the whales may be prey limited. At this time, NMFS has not conducted an analysis to determine if salmon recovery goals are sufficient to support a recovered Southern Resident killer whale population. Appendix A includes information on NMFS funding for research actions in the Recovery Plan, including action B.2, Investigate the diet of the Southern Residents.

A3. As described under A3 in the delisting criteria, POPs are widely known to be of particular concern to marine mammals. Some studies document decreasing trends for bioaccumulated contaminants in Puget Sound harbor seals, including PCBs (Calambokidis et al. 1999, Ross et al. 2013) and one study indicates a decreasing trend in PCBs in killer whales from 1993-1995 and 2004 and 2006 (Krahn et al. 2007). In recent years, researchers have started collecting baseline information on emerging contaminants, such as flame retardants (PBDEs), in killer whales (Krahn et al. 2007; Mongillo 2012; Gockel and Mongillo 2013; Lundin et al. 2015). Many of the contaminant studies of killer whales rely on small sample sizes and additional work is needed to track trends in individual animals over time and to link physiological effects with different levels of various contaminants. Appendix A includes information on NMFS funding for research actions in the Recovery Plan, including action B.6.3, Assess the effects of contaminants.

A4. As described under A4 in the delisting criteria, NMFS has taken several management actions to reduce vessel disturbance. New federal regulations were codified in 2011 to regulate vessel behavior to reduce impacts on the whales (76 Fed. Reg. 20870, April 14 2011). We have continued to work with our partners to promote voluntary guidelines (Be Whale Wise) and implement education programs. Previous guidelines and education programs have remained in place while some education programs have expanded. Two ESA Section 6 grants have been provided to assist WDFW in their enforcement efforts, and the Soundwatch Boater Education Program has continued to receive funding for their education and outreach programs, as well as their on-the-water monitoring efforts. The new vessel regulations are currently under evaluation to determine their effectiveness over the last five years. More information can be found at: http://www.bewhalewise.org/.

Factor B: Overutilization for commercial, recreational, or educational purposes
Objective: Ensure commercial, recreational, or educational activities are not affecting the recovery of Southern Residents, including vessel effects from whale watching.

Criteria:
B1. No permanent removals of individual Southern Residents from their habitat, including live capture for public display, and there is sufficient information on any incidental takes associated with fisheries or other commercial or recreational activities to inform management programs responsible for addressing incidental takes.

Have the Threats Criteria for Factor B been met?
Yes.

B1. As described above under the B2 delisting criteria, the public display industry has not requested authorization to remove Southern Resident killer whales from the wild and NMFS has not authorized any live captures. Incidental take in fisheries is not currently a threat to Southern Resident killer whales, however some potentially harmful interactions do occur (Caretta et al. 2010; Balcomb 2015). NMFS will continue to rely on reports of any incidental take in fisheries from the fishing community and from observers to monitor any increase in takes. NMFS is currently evaluating the impact of research activities such as satellite tagging, which has been suspended following the death of L95 who was previously tagged.

Factor C: Disease or predation
Objective: Ensure that diseases and their effects on reproduction and survival are not a threat to the sustainability of the Southern Resident DPS.

Criteria:
C1. Sufficient knowledge to determine that disease is not limiting the recovery of Southern Resident killer whales.

Have the Threats Criteria for Factor C been met?
No, the threats criteria for Factor C have not been met. Additional information is needed to ensure that diseases are not affecting reproduction and survival of Southern Residents.

C1. As described above for C1 under the delisting criteria, we have not identified infectious disease as a limiting factor for the Southern Resident killer whale population. We do not, however, have sufficient information to ensure that disease is not affecting the population. In a review of 18 killer whale strandings since 2005, disease was not identified as a cause of death for the one confirmed Southern Resident (Gaydos and Raverty 2010). Two killer whales (one offshore and one transient) were diagnosed with bacterial infections and the cause of death for about half of all strandings was unknown. Additional monitoring of the population and thorough examinations of any stranded killer whales are needed to increase our understanding of how diseases are affecting the Southern Residents. A review of killer whale strandings along the West Coast is currently underway.

Factor D: The inadequacy of existing regulatory mechanisms
Objective: Ensure that regulatory mechanisms other than the ESA are adequate to ensure that no threats to the sustainability of the DPS recur.

Criteria:
D1. Regulations in place to limit the introduction of harmful contaminants are under evaluation to determine if they are sufficiently protective for Southern Residents.

D2. Guidelines and regulations in place to reduce potential impacts from vessels have been evaluated to determine if additional regulations/protected areas are needed (see Criterion A4).

Have the Threats Criteria for Factor D been met?
No, the threats criteria for Factor D have not been met. Additional information is necessary to evaluate the adequacy of existing regulatory mechanisms, particularly to address pollution and contaminants. NMFS has made progress in addressing impacts from vessels by developing regulations to reduce disturbance.

D1. Regulations are under evaluation as part of the Puget Sound Partnership program described above under D2 in the delisting criteria. Through ESA consultations, NMFS will evaluate the effects of Federal actions associated with regulations and standards for harmful contaminants on the Southern Resident killer whales.

D2. NMFS has taken several management actions to reduce vessel disturbance, the most significant of which has been implementing mandatory regulations in May of 2011 (76 Fed. Reg. 20870, April 14, 2011). NMFS has also continued to work with partners to educate boaters as well as monitor vessel behavior and enforce the regulations on the water. These actions are described above under A4 of the delisting criteria.

Factor E: Other natural or manmade factors affecting its continued existence
Objective: Maintain protection from oil spills and improve oil spill response techniques for killer whales. Continue monitoring the population and identify any new natural or manmade factors affecting the recovery of Southern Residents.

Criteria:
E1. Effective oil spill prevention plans are in place that are no less protective than those in place at time of listing.

E2. An annual census is in place which has and will continue to assess the population status of Southern Residents.

E3. An effective research program is in place to evaluate risks to Southern Resident killer whales.

E4. Research on the distribution, habitat use and potential risks to the population in the coastal portion of the range of Southern Residents is underway.

Have the Threats Criteria for Factor E been met?
No, not all of the threats criteria for Factor E have been met. Additional information is necessary to evaluate the distribution, habitat use, and potential risks to the Southern Residents in the coastal portion of their range. NMFS, along with partners, has made significant progress on other criteria. Federal, state, and industry oil spill prevention activities are ongoing. NMFS participates in an active research program with many partners and supports the annual census.

E1. A description of ongoing oil spill prevention efforts are include above under E2 of the delisting criteria.

E2. As described above under E3 of the delisting criteria, the annual census conducted by the Center for Whale Research is expected to continue. NMFS' support for the Center for Whale Research annual census implements action A.1, Continue the annual census, from the Recovery Plan and cost information is included in Appendix A.

E3. NMFS is part of an active research program. Appendix A identifies NMFS support for research actions in the Recovery Plan, many of which are designed to assess the threats to the whales. Recent publications can be found in section 3.5.1, as well as in the 10-year report and on the NWFSC website at: https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/marinemammal/research.cfm.

E4. The research programs underway to increase our knowledge of coastal distribution and habitat use are described above under E4 in the delisting criteria. Support for research actions in the Recovery Plan, including B.1.1, Determine distribution and movements in outer coastal waters, is included in Appendix B.

4.0 RESULTS

4.1 Updated Information and Current Species Status

The 2008 Recovery Plan for Southern Resident Killer Whales includes the best available information on Southern Resident killer whale biology, habitat, and threats. This information is reflected in the recovery criteria taken from the Recovery Plan. The latest NMFS population viability analysis and Center for Whale Research Census for the Southern Residents contains updated information. There is an active research program and researchers have completed new papers since we completed the Recovery Plan and 2011 5-year review. Additional papers related to the major threats are provided below, although this list is not meant to be comprehensive of all research done on killer whales worldwide. Recent biological opinions also incorporate the latest information from scientific papers and unpublished data. This new information increases our knowledge, but does not change the status of the species or change the magnitude or imminence of the threats since the listing.

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4.2 Synthesis

Southern Resident killer whales were listed as endangered in 2005. In the 10 years since the listing, and in years prior to the listing, a variety of Federal, state, non-profit, and local organizations have implemented conservation actions to benefit the whales, their prey, and the ecosystem. The Final Recovery Plan (NMFS 2008a) was an important step in laying out a roadmap of specific recovery actions and goals. While we have made some progress toward the goals in the plan, recovery of this population of long-lived, slow-reproducing killer whales is a long-term effort that requires cooperation and coordination of West Coast communities from California to British Columbia. It will take many years to fill key data gaps and assess the effectiveness of ongoing recovery actions for the whales, salmon, and their habitat, and to observe significant increases in the Southern Resident population.

NMFS, working with many partners, has made progress in filling data gaps. There is an active research program with new information and publications regularly available. We still have much to learn. Additional research is needed to increase our knowledge of the whales' coastal range and habitat use, where and when the whales may be food limited, the health status of individuals, physiological effects from contaminant loads, and how sound impacts the whales. We must continue population assessments, prey and vessel studies, and contaminant monitoring to evaluate our impacts on the whales and identify new and better ways to address threats.

Since completing the Recovery Plan, NMFS has prioritized actions to address the threats with highest potential for mitigation: prey availability, oil spill response, and reducing vessel impacts (Table 2.1). Progress has also been made on additional threats such as contaminants. Several threats criteria have been met, but many will take years of research and dedicated conservation efforts to satisfy. Salmon recovery is a high priority on the West Coast and there are numerous actions underway to address threats and monitor populations. Recovery of depleted salmon populations is complex, including finalizing and implementing recovery plans, and seeing subsequent population increases is a long-term process. NMFS, along with our state and academic partners, has successfully developed an oil spill response plan for killer whales; however, we still have additional work to prepare for a major spill event. The 2011 vessel regulations are an important step to reduce disturbance from vessels. It will take time to evaluate the effectiveness of any new regulations in improving conditions for the whales. Even with progress toward minimizing the impacts of the threats, each of the threats still pose a risk to the survival and recovery of the whales.

At the time of listing in 2005, there were 88 whales in the population and at the time of this report there are 78. Population growth has varied during this time with both increasing and decreasing years. The biological downlisting and delisting criteria, including sustained growth over 14 and 28 years, respectively, have not been met.

While some of the biological downlisting and delisting criteria have been met, including some that were met even prior to the listing and recovery plan (i.e., representation in all

three pods, multiple mature males in each pod) the overall status of the population is not consistent with a healthy, recovered population. Considering the status and continuing threats, the Southern Resident killer whales remain in danger of extinction. Therefore, the recommended classification for Southern Resident killer whales is to remain the same: Endangered.

4.2.1 Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (*Indicate reasons for delisting per 50 CFR 424.11):*
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X**__ No change is needed**

3.5.4 New Recovery Priority Number: Number One

5.0 RECOMMENDATIONS FOR FUTURE ACTIONS

Recovery of Southern Resident killer whales depends upon implementation of a variety of actions detailed in the Recovery Plan, as well as the full participation and support of all Federal, state, and private stakeholders. These actions should be pursued aggressively to prevent the extinction of this species, and funding decisions should give highest priority to actions that will contribute directly to mitigating impacts and research that will inform management and conservation.

There is a comprehensive research section in the Recovery Plan, and research actions are highlighted in the Species in the Spotlight profile and the 10-year report. Many research projects are identified as Priority 1, actions that must be taken to identify those actions necessary to prevent extinction. We have assigned Priority 1 to research actions addressing each of the main threats: prey, contamination, and vessels and sound. There are also Priority 1 actions to fill key data gaps to inform management of threats, protect habitat, and identify risks. Priority 1 research actions include determining distribution and movements in coastal waters, causes of mortality, metabolic rates, responses to changes in oceanographic conditions, and risk of inbreeding. The 10-year report and Species in the Spotlight Action Plan also outline priority actions to be focused on over the next 5 to 10 years.

In the next 10 years, particular priority should be focused on the following management and research actions. Priority actions are listed in Table 4.1 and described in more detail in the 10-year report and the Species in the Spotlight Priority Actions report.

Table 4.1 Priority actions for Southern Resident killer whale recovery to be taken over the next 10 years.

	Prey Availability	Pollution	Vessel Effects	Health Assessment
Science & Research	• Study competition between other salmon predators including seals and sea lions, Northern Resident killer whales, and fisheries • Continue efforts to identify salmon stocks that are most important to the whales • Continue research on whale health related to diet • Continue to study what whales eat in the winter • Investigate inter-year variability in killer whale diet • Investigate the role of hatchery fish in whale diet • Estimate ocean distributions of Chinook salmon	• Monitor levels of new and emerging contaminants in the whales • Test and refine models to predict future contaminant loads • Investigate whether contaminants have direct impacts on health and reproduction	• Investigate whether noise and vessels prevent whales from foraging efficiently • Measure the impacts of behaviors change due to vessel presence and noise • Conduct field studies to evaluate effectiveness of new vessel regulations • Quantify sources of human-generated noise throughout the whale's range and assess their impacts	• Continue and expand photogrammetric studies to monitor body condition • Combine health information for individuals from data collected to date (biopsies, feces, imagery, etc.) • Conduct new nutritional studies and breath analyses to understand conditions that may contribute to killer whale mortality • Expand stranding investigations and disease testing
Conservation & Management	• Continue to evaluate relationships between salmon abundance and whale health and minimize effects of actions that reduce salmon abundance • Target critical prey in the prioritization of recovery actions that will contribute most to the prey base of the whales	• Evaluate and minimize effects of actions that increase contaminants in the whales and their prey • Support oil spill prevention • Continued readiness in the event of a potentially catastrophic oil spill	• Continue to enforce and evaluate vessel regulations • Continue to educate boaters and promote responsible whale watching	• Use health assessment and stranding investigation results to help prioritize recovery actions

	Population Structure	Demographics	Winter Distribution
Science & Research	• Continue to collect and analyze data to inform killer whale taxonomy and breeding patterns • Collect data needed to estimate historical abundance	• Continue to monitor population size and response to changes in salmon abundance • Improve our estimates of carrying capacity of the environment for the whales • Study how the population responds to seasonal changes in prey abundance and competition with other salmon predators	• Address many questions about their life during the winter (diet, behavior, threats) to assess which risk factors may be impacting the whales in this portion of their range
Conservation & Management	• Use taxonomic and genetic information to assess the status of population and recovery criteria during reviews of listing status and in response to petitions	• Conduct periodic reviews under the ESA to assess progress toward recovery goals	• Evaluate expanding critical habitat areas to include waters along the west coast where they range

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NATIONAL MARINE FISHERIES SERVICE
5-YEAR REVIEW
Southern Resident Killer Whales *(Orcinus orca)*

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
_X__No change needed

Review Conducted By: National Marine Fisheries Service
West Coast Regional Office

REGIONAL OFFICE APPROVAL:

West Coast Regional Administrator, National Marine Fisheries Service
<Original signed by>

Approve _____ _____ Date 12/27/2016

APPENDIX A

Updated Implementation Schedule from the Recovery Plan for Southern Resident Killer Whales (NMFS 2008a).

RECOVERY MEASURES AND COSTS ($ Thousands)

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
1	**Protect Southern Resident killer whales from factors causing decline**									
1.1	Rebuild depleted populations of salmon and other prey to ensure an adequate food base for recovery of the Southern Residents			Many salmon recovery efforts and management programs are currently ongoing by a variety of agencies and stakeholders. It is possible that there could be additional salmon restoration costs identified based on recovery needs of Southern Resident killer whales; however, at this time we do not have sufficient information to estimate those potential costs or identify the actions under which they would fall.						
1.1.1	Support salmon restoration efforts in the region			See 1.1						
1.1.1.1	Habitat management	2	NMFS, state/tribal/ local recovery initiatives, NGO, DFO	See 1.1						
1.1.1.2	Harvest management	2	NMFS, state/tribal/ local recovery initiatives, NGO, DFO	See 1.1						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
1.1.1.3	Hatchery management	2	NMFS, state/tribal/ local recovery initiatives, NGO, DFO	See 1.1						
1.1.2	Support regional restoration efforts for other prey species	3	NMFS, state/tribal/ local recovery initiatives, NGO, DFO	See 1.1						
1.1.3	Use NMFS' authorities under the ESA and the MSFCMA to protect prey habitat, regulate harvest, and operate salmon hatcheries	2	NMFS	See 1.1						
1.2	Minimize pollution and chemical contamination in Southern Resident habitats			Many pollution control and site cleanup efforts are currently ongoing with support from a variety of agencies and stakeholders; (i.e., $570 million estimated by PSP, $182 million for PSAT 2005-2007) although these funds may not be sufficient. Additional costs which may be incurred to guide specific cleanup actions aimed at Southern Resident killer whales are shown below.						
1.2.1	Clean up contaminated sites and sediments			See 1.2						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
1.2.1.1	Identify and prioritize specific sites in need of cleanup	2	CTC, NMFS, EC, DFO, EPA, WDOE, WDNR							
1.2.1.2	Remediate sites in need of cleanup	1	EPA, WDNR, potentially responsible/ liable parties, Superfund sites, See Appendix C	See 1.2						
1.2.2	Minimize continuing inputs of contaminants into the environment			See 1.2						
1.2.2.1	Minimize the levels of harmful contaminants discharged by industrial, municipal, and other point sources of pollution	3	WDOE, EPA, ODEQ, DFO, local/ municipal/ provincial	See 1.2						
1.2.2.2	Minimize the levels of harmful contaminants released by non-point sources of pollution	2	WDOE, EPA, ODEQ, DFO, local/ municipal/ provincial	See 1.2						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
1.2.2.3	Reduce impacts to Southern Resident killer whales from emerging contaminants	3	WDOE, EPA, EC, local/ municipal	See 1.2						
1.2.3	Minimize contamination in prey	3	WDFW, ODFW, NMFS, USFWS, tribes, DFO	See 1.2						
1.3	Minimize disturbance of Southern Resident killer whales from vessels									
1.3.1	Monitor vessel activity around whales									
1.3.1.1	Expand efforts to monitor commercial and recreational whale-watching vessels	2	Soundwatch, M3, NMFS	Ongoing, see also B.6.2.2	35	43	30	30	35	30
1.3.1.2	Evaluate the relative importance of shipping, ferry, fishing, research, military, and other vessel traffic to disturbance of killer whales	3	NMFS, CTC, USCG, US Navy, industry associations	Initial report completed with FY06 funds; 1 year task to update report						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
1.3.2	Continue to evaluate and improve voluntary whale-watching guidelines	2	NMFS, M3, Soundwatch, DFO, NGO, WWOANW	Update guidelines in alternate years	25					
1.3.3	Evaluate the need to establish regulations regarding vessel activity in the vicinity of killer whales	2	NMFS, DFO, USCG, WDFW, tribes, industry associations	2 year task coordinated with 1.3.4	25	18	12	12		
1.3.4	Evaluate the need to establish areas with restrictions on vessel traffic or closures to vessel traffic	2	NMFS, DFO, USCG, WDFW, tribes, industry associations	2 year task coordinated with 1.3.3		35				
2	**Protect Southern Resident killer whales from additional threats that may cause disturbance, injury, or mortality, or impact habitat**									
2.1	Minimize the risk of large oil spills									

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
2.1.1	Prevent oil spills	1	USCG, WDOE, EC, industry associations	There are many ongoing oil spill programs including: Rescue Tug (1.44 million/yr) and ITOS (100K/yr)						
2.1.2	Prepare for and respond to oil spills to minimize their effects on Southern Resident killer whales	1	NMFS, USCG, WDOE, WDFW, NW Contingency Plan Wildlife Section Working Group, industry associations	One year task to develop Contingen-cy Plan and training in alternate years, FY is TBD						
2.1.3	Develop strategies to deter killer whales from entering spilled oil	2	NMFS, WDFW	One year project						
2.2	Monitor and minimize the risk of disease pathogens in Southern Resident habitats			Part of stranding response, see 4						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
2.3	Continue to use agency coordination and established MMPA mechanisms to minimize any potential impacts from human activities involving acoustic sources, including Navy tactical sonar, seismic exploration, in-water construction, and other sources	2	NMFS	Ongoing actions include section 7 consulta-tions; no additional costs specific to killer whale listing or recovery currently identified						
2.4	Reduce the impacts of invasive species in Southern Resident habitats									
2.4.1	Prevent the introduction and spread of invasive species	3	WDFW, USFWS, NMFS, USCG, WDOA, ODEQ, DFO, industry associations	Washington State has ongoing invasives prevention program (2.5 million/yr)						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
2.4.2	Eradicate existing populations of invasive species	3	WDFW, USFWS, NMFS, WDOA, ODEQ, DFO, industry associations	Washington State has ongoing invasives eradication program (3.5 million/yr)						
3	**Develop public information and education programs**									
3.1	Enhance public awareness of Southern Resident status and threats									
3.1.1	Exhibits at local museums, aquaria, parks, and other locations	3	SA, TWM, WSP, VA, Tribes, NMFS, Killer Whale Tales		40	30	25	34	50	45
3.1.2	School programs	3	NGO, Tribes		25	25	15	20	25	25
3.1.3	Naturalist programs	3	NGO, TWM							
3.1.4	Research programs	3	NWFSC, CWR, DFO and other researchers	Periodic research conferences, costs included under B.11						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
3.2	Expand information and education programs to reduce direct vessel interactions with Southern Resident killer whales									
3.2.1	Expand the on-water educational efforts of Soundwatch, M3, and enforcement agencies	2	NMFS, Soundwatch, M3, WDFW, DFO	NMFS costs are included here and do not include JEA funds, additional costs are in 1.3.1.1						
3.2.2	Outreach to private boaters	3	NMFS, Soundwatch, M3, WDFW, DFO, CG	Costs are included under 1.3.1.1	34	1	17	17	12	12
3.2.3	Encourage land-based viewing of killer whales	3	TWM, Orca Relief, Lifeforce, WSP, NGO	Update program in alternate years, Whale Trail program	7.5		1			10

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
3.3	Educate public on positive actions they can take to improve the current condition for Southern Resident killer whales	2	NGO, NMFS	Some costs included under 3.1						
3.4	Solicit the public's assistance in finding killer whales									
3.4.1	Solicit reports of killer whale sightings	3	NMFS, TWM, OrcaNet-work, CWR, BC Sighting Network	Costs included under B1.1						
3.4.2	Solicit reports of killer whale strandings from the public	3	NMFS, NMMSN, OrcaNet-work, CWR, BC Sighting Network	Education and outreach for NWMMSN program						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
4	**Respond to killer whales that are stranded, sick, injured, isolated, pose a threat to the public, or exhibit nuisance behaviors**			It is not possible to estimate costs for stranding response. Killer whale strandings are rare events and the cost of stranding response varies greatly depending on situation, location, local capabilities, status and number of whales. The NWMMSN is involved in ongoing stranding response and the advent of the Prescott stranding grant program has been instrumental in increasing NWMMSN capabilities to respond to all strandings including killer whales. NMFS contracted with UC Davis FY05-FY10 for $65K to assist with any killer whale stranding along the west coast (4.2.3).						
4.1	Manage atypical individual Southern Residents	3	NMFS, WDFW, DFO	Dependent on severity of situation, costs could range 100K-500K based on past atypical cases						
4.2	Respond to strandings of killer whales			See Task 4						
4.2.1	Develop protocols for responding to stranded killer whales	3	NMFS, NMMSN, DFO, VA	Action completed						
4.2.2	Respond to live-stranded killer whales	2	NMFS, NMMSN, DFO, VA	See Task 4						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
4.2.3	Investigate strandings of dead killer whales	3	NMFS, NMMSN, DFO, VA	Cost for response to stranded killer whales in OR, CA	10			17	17	17
4.3	Respond to future resource conflicts between the Southern Residents and humans	3	NMFS, others as identified	As identified in the future						
5	**Trans-boundary and interagency coordination and cooperation**									
5.1	Cooperative research and monitoring	3	NMFS, DFO, WDFW, researchers	Future costs included under B.11					25	25
5.1.1	Population monitoring	3	NMFS, DFO, WDFW, CWR	Costs included under A.1						
5.1.2	Stranding response coordination	3	NMFS, DFO, WDFW	Costs estimated as < 1K per stranding event, see 4						
5.2	Complimentary conservation and recovery planning			No costs identified at this time						
5.2.1	Plans are subject to periodic review	3	NMFS, DFO, WDFW	1 year task to update plan						
5.2.2	Encourage public participation	3	NMFS, DFO, WDFW	1 year task to update plan						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
5.3	Inter-jurisdictional enforcement cooperation and coordination	3	NMFS, DFO, WDFW							
				TOTALS	212	117	100	130	164	147
					TOTAL FY11-FY16			$870		

RESEARCH AND MONITORING

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
A	**Monitor status and trend of Southern Resident killer whales**									
A.1	Continue the annual population census	2	CWR		81	88	89	90	91	93
A.2	Maintain a current photo-identification catalog for Southern Residents and staff able to photographically identify whales	2	CWR	Costs included under A.1						
A.3	Standardize the results of annual population surveys	3	CWR, DFO, NMFS	1 year task FY to be determined						
B	**Conduct research to facilitate and enhance conservation efforts for Southern Resident killer whales**									
B.1.1	Determine distribution and movements in outer coastal waters	1	NWFSC, DFO, WFDW, researchers		129	140	110	203	203	213

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.1.2	Improve knowledge of distribution and movements in the Georgia Basin and Puget Sound	1	NWFSC, SWFSC, UW, TWM		73	35	36	37	40	32
B.1.3	Determine the effects of prey abundance and availability, and other factors on whale distribution and movements	1	NWFSC, UW, TWM, researchers	Costs included under B.2.1						
B.2	Investigate the diet of the Southern Residents		NWFSC, DFO, WFDW, researchers							
B.2.1	Determine the diet of the Southern Residents	1			26	20		2	15	61
B.2.2	Determine the importance of specific prey populations to the diet	1		Costs included under B.2.1						
B.2.3	Determine the extent of feeding on hatchery fish	3		Costs included under B.2.1						
B.3	Analyze the population dynamics of the Southern Residents		NWFSC, DFO, WFDW, researchers	Total costs for B.3.1-B.3.5						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.3.1	Determine causes of mortality	1								
B.3.2	Evaluate survival patterns	2								
B.3.3	Evaluate reproductive patterns	2								
B.3.4	Evaluate population structure	2								
B.3.5	Evaluate changes in social structure	2								
B.4	Investigate the health and physiology of the Southern Residents		NWFSC, DFO, WFDW, CWR, researchers	Photogrammetry support (2016)	31	28	11	71	6	25
B.4.1	Assess the health of population members	2		Future costs TBD						
B.4.2	Assess individual growth rates	2		TBD						
B.4.3	Determine metabolic rates and energy requirements	1	NWFSC	Some costs included under B.4.1						
B.5	Investigate the behavior of the Southern Residents	3	NWFSC, DFO, WFDW, researchers	Some costs included under B.6.2.1						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.6	Assess threats to the Southern Residents		NWFSC, DFO, WFDW, researchers							
B.6.1	Assess the effects of changes in prey populations	1								
B.6.1.1	Determine historical changes in prey distribution and abundance, and their effects on Southern Resident population dynamics	1	NWFSC, UW							
B.6.1.2	Assess changes in prey quality and their effects on Southern Resident population dynamics	1	NWFSC, UW							
B.6.1.3	Determine whether the Southern Residents are limited by critical periods of scarce food resources	1		Costs included under B.6.1.1 and B.6.1.2						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.6.1.4	Assess threats to prey populations of the Southern Residents	2		Costs included under B.6.1.1 and B.6.1.2						
B.6.2	Assess the effects of human-generated marine noise and vessel traffic				132	103	15	69	6	104
B.6.2.1	Determine vessel characteristics that affect the Southern Residents	1	NWFSC, DFO, UW, researchers							
B.6.2.2	Determine the extent that vessels disturb or harm the Southern Residents	1	NWFSC, DFO, UW, researchers	Some costs included under B.6.2.1						
B.6.2.3	Determine the extent that other acoustic sources disturb or harm the Southern Residents	2	NWFSC, DFO, UW, researchers	Costs included under B.6.2.4						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.6.2.4	Determine the acoustic environment of the Southern Residents	2	NWFSC, DFO, UW, researchers	Some costs included under B.6.2.1						
B.6.2.5	Determine the hearing capabilities and vocalization behavior of the Southern Residents near sound sources	2		Some costs included under B.6.2.4 and B.6.2.1						
B.6.2.6	Assess the effects of human-generated marine sound on Southern Resident prey	3		TBD						
B.6.3	Assess the effects of contaminants									
B.6.3.1	Determine contaminant levels in the Southern Residents and other killer whale communities in the northeastern Pacific	1	NWFSC, DFO, WDFW			1				
B.6.3.2	Determine contaminant levels in Southern Resident prey	1	NWFSC, DFO, WDFW	Costs for FY07-FY11 included under B.6.3.1						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.6.3.3	Determine the sources of contaminants entering Southern Resident prey	1		Costs included under B.6.3.1						
B.6.3.4	Determine the effects of elevated contaminant levels on survival, physiology, and reproduction in the Southern Residents	1								
B.6.4	Determine risks from other human-related activities	2		As identified						
B.6.5	Evaluate the potential for disease	3		No costs identified at this time						
B.7	Identify important habitats for the Southern Residents	1	NWFSC, DFO, WFDW, researchers	Costs included under B.1.1-B.1.3						
B.8	Determine the effects of variable oceanographic conditions on the Southern Residents and their prey	1	NWFSC, DFO, WFDW, researchers	Costs included under B.1.1-B.1.3						

Task No.	Task Description	Priority	Responsible Parties	Comments	FY11	FY12	FY13	FY14	FY15	FY16
B.9	Determine genetic relationships		NWFSC, DFO, WFDW, researchers		10					10
B.9.1	Determine paternity patterns in the Southern Residents	2		Costs included under B.9	40	23	3			10
B.9.2	Determine the risk of inbreeding	1		Costs included under B.9						
B.9.3	Determine historical population size	2		Costs included under B.9						
B.9.4	Determine genetic relationships among populations	2		Costs included under B.9						
B.9.5	Expand the number of genetic samples available for study	2		Costs included under B.9						
B.10	Improve research techniques and technology	3	NWFSC, DFO, WFDW, researchers		79	39				
B.11	Research support and coordination	2	NWFSC		17	20	18	20	37	39
				TOTALS	619	497	282	492	398	587
					TOTAL FY11-FY16			$2,875		

Exhibit 21

JAY INSLEE
Governor

STATE OF WASHINGTON
OFFICE OF THE GOVERNOR
P.O. Box 40002 • Olympia, Washington 98504-0002 • (360) 902-4111 • www.governor.wa.gov

EXECUTIVE ORDER 18-02

SOUTHERN RESIDENT KILLER WHALE RECOVERY AND TASK FORCE

WHEREAS, Southern Resident Killer Whales (Southern Residents) are an iconic and treasured species in Washington and throughout the Pacific Northwest;

WHEREAS, Southern Residents are classified as endangered in Washington and surrounding waters, under the U.S. Endangered Species Act and in Canada under the Species at Risk Act;

WHEREAS, the population of Southern Residents has declined, from a high of 98 in 1995, to 76 today, which is the lowest number of Southern Residents in more than three decades. Recent science also indicates that many Southern Residents are in poor condition and are struggling to raise calves;

WHEREAS, if Southern Residents were to become extinct, we would suffer an unacceptable loss to our environment, economy, and way of life. We would also lose an essential component of our marine ecosystem and an indicator of the health of our waters;

WHEREAS, Southern Residents hold significant cultural value to native tribes and all Washingtonians;

WHEREAS, Southern Residents, through the whale watching industry alone, contribute as much as $60 million to the local economy annually and provide hundreds of jobs to the Puget Sound region;

WHEREAS, Southern Residents make their home in Washington's marine waters for a portion of the year, but they are also highly migratory seeking prey along the west coast from Northern California to Southeast Alaska. Therefore, Southern Residents rely on healthy ecosystems and food sources from Washington and throughout the west coast of the United States and Canada;

WHEREAS, three primary factors threaten Southern Resident populations: (1) prey availability, (2) legacy and new toxic contaminants, and (3) disturbance from noise and vessel traffic. The health of Southern Residents and Chinook salmon are tightly linked. Recent scientific studies indicate that reduced Chinook salmon runs undermine the potential for the Southern Resident population to successfully reproduce and recover. Both Southern Residents and Chinook salmon populations are adversely impacted by warming oceans and ocean acidification due to climate change. Presence of contaminants and accumulation of pollutants in Washington's waters are

also linked to the decline of Southern Residents. Key sources of contamination in storm water runoff remain to be addressed and the potential for a catastrophic oil spill continues to threaten Southern Residents and the entire ecosystem of Puget Sound. In addition, increased boat and ship traffic has caused greater underwater noise that interferes with Southern Resident critical feeding and communication;

WHEREAS, both swift near-term actions and effective long-term actions are necessary to recover these iconic and endangered animals. Essential recovery actions that are described in both United States and Canadian federal plans and federally approved regional plans must be implemented through close coordination with all of our partners including state, local, tribal, and Canadian governmental entities and other private sector partners to be successful;

NOW THEREFORE, I, Jay Inslee, Governor of the state of Washington, by virtue of the power vested in me by the Constitution and statutes of the state of Washington do hereby order and direct as follows:

Implement Immediate Actions to Benefit Southern Resident Killer Whales
Within existing resources, I ask the following state agencies, in consultation with the appropriate local governments, federal agencies, and tribal governments, to conduct the immediate actions listed below to further the purpose of this Executive Order.

- Washington Department of Fish and Wildlife (WDFW) with review from the Governor's Salmon Recovery Office (GSRO) and the Puget Sound Partnership (PSP)—By July 31, 2018, identify the highest priority areas and watersheds for Southern Resident prey in order to focus or adjust, as needed, restoration, protection, incentives, hatcheries, harvest levels, and passage policies and programs.
- WDFW and Washington State Parks and Recreation Commission (WSPRC)—By April 30, 2018, develop implementation plans for increased enforcement, outreach and education of vessel regulations as well as enforcement of Chinook fisheries regulations in areas frequented by orcas.
- Washington State Department of Ecology (Ecology)—By April 30, 2018, create a curriculum to improve and increase the number of trainings for vessels in the whale watching industry to become "vessels of opportunity" to assist in the event of an oil spill.
- Washington State Department of Transportation (WSDOT)—By May 31, 2018, develop strategies for quieting state ferries in areas most important to Southern Residents.
- WDFW—By April 30, 2018, review and amend, as needed, 2018 recreational and commercial fishing regulations prioritizing protection of key areas and fish runs for Southern Resident recovery. I will also ask our tribal co-managers, and international and federal fisheries managers to work directly with WDFW and its Commission in developing recommendations for implementing this action.
- WDFW—By April 30, 2018, explore options and develop a proposal to alter fish food used in state hatcheries to limit the amount of Polychlorinated Biphenyls (PCBs) in Southern Resident prey.

- PSP, WDFW, GSRO—By December 15, 2018, demonstrate how Chinook recovery projects benefit Southern Resident recovery, beginning in the 2018 grant round, for the Pacific Coast Salmon Recovery Fund, the Puget Sound Acquisition and Restoration Program, the Estuary and Salmon Restoration program and the Washington Coastal Restoration Initiative.
- PSP, WDFW, GSRO, WSPRC, Washington State Department of Licensing (DOL)—By July 1, 2018, prioritize existing outreach resources to support Southern Resident recovery. Collaborate with the Governor's Office to develop a public education program and identify needed resources.
- Ecology—By July 31, 2018, develop criteria to prioritize financial assistance beginning in the 2019-21 biennium for storm water projects that benefit Southern Resident recovery.

Establishment of the Southern Resident Killer Whale Task Force
A Southern Resident Killer Whale Task Force is hereby created to identify, prioritize, and support the implementation of a longer term action plan needed for the recovery of Southern Residents and necessary to secure a healthy and sustained population for the future. The plan shall include actions needed to make significant progress in addressing all three of the identified threats to Southern Residents. The Task Force should monitor and evaluate the immediate actions undertaken by state agencies and build upon the progress and effectiveness of that work when developing longer term actions. Where available and applicable, the Task Force should build upon existing state, regional and federal plans.

Members of the Task Force will include directors or their senior designees from the Washington Departments of Agriculture, Commerce, Ecology, Health, and Transportation, as well as the Puget Sound Partnership, the Governor's Office of Indian Affairs, the Recreation and Conservation Office, and the Governor's Salmon Recovery Office. I also invite the Department of Fish & Wildlife and its Commission, the Department of Natural Resources, and the Washington State Parks and Recreation Commission to participate on the Task Force as members in full.

I will separately invite representatives of appropriate federal, tribal, and local governments, the private sector and the non-profit sector, to participate in the Task Force. I will invite each Washington legislative caucus to appoint a member to participate in the Task Force.

I shall appoint co-chairs and convene the Southern Resident Killer Whale Task Force (Task Force) beginning in April 2018.

The Task Force shall work with all levels of government and other partners to identify needed policies and programs, recommend priority actions to support recovery efforts, highlight budget needs, and recommend any legislation needed to support this Executive Order. The Task Force shall coordinate their work with appropriate representatives of the Government of Canada, the Province of British Columbia, and the states of Oregon, California, Idaho, and Alaska.

The Task Force shall prepare a comprehensive report and recommendations for recovering Southern Residents, with a full draft due by October 1, 2018, and a final report by November 1, 2018. The report should detail ongoing and new actions that will address all of the major threats

to Southern Residents, including prey availability, legacy and ongoing toxic contaminants, and disturbance from noise and vessel traffic. A second report outlining the progress made, lessons learned, and outstanding needs shall be completed by October 1, 2019. With the submission of its second report, the Task Force shall dissolve.

I direct the Puget Sound Partnership and ask the Department of Fish and Wildlife to organize the necessary agency experts and staff to support the work of the Task Force. The Governor's Policy Office and the Office of Financial Management will provide assistance and guidance to the lead agencies as needed to ensure the success of the Task Force.

The Governor's Office will work with both the State Legislature and State Congressional delegation to solicit their early and ongoing advice and guidance.

The Southern Resident Killer Whale Task Force shall conduct its business in an open, transparent manner, and its meetings will be open to the public.

Signed and sealed with the official seal of the state of Washington on this 14th day of March, 2018, at Olympia, Washington.

By:

/s/
Jay Inslee
Governor

BY THE GOVERNOR:

/s/
Secretary of State

Exhibit 22

EARTHJUSTICE

November 30, 2018

Via e-filing

Ms. Sheri Young
Secretary of the Board
National Energy Board
Suite 210, 517 Tenth Ave. SW
Calgary, AB T2R 0A8

Re: Trans Mountain Expansion Project - Reconsideration
Hearing Order MH-052-2018
File OF-Fac-Oil-T260-2013-03 59
Letter of Support for Living Oceans/Raincoast, Tsleil-Waututh Nation Notice of Motion

Greetings:

In accordance with the National Energy Board ("NEB") November 21, 2018 letter (A96006-1), intervenors Swinomish Indian Tribal Community, Tulalip Tribes, Suquamish Tribe, and Lummi Nation (collectively "U.S. Tribes") write in support of Living Oceans Society, Raincoast Conservation Foundation, and Tsleil-Waututh Nation notices of motion and applications for review.

Request 1

The U.S. Tribes support the relief requested by Living Oceans Society, Raincoast Conservation Foundation, and Tsleil-Waututh Nation that the Board require Trans Mountain to conduct a proper risk assessment of Project-related marine shipping that includes all Species At Risk Act ("SARA") listed species that may be affected by Project-related marine shipping.

Request 2

The U.S. Tribes support Tsleil-Waututh Nation's application for a need to review the determinations by the Board: a) excluding Project-related marine shipping activities in the EEZ from the designated project that must be assessed under the Canadian Environmental Assessment Act; b) failing to conduct a de novo hearing because of differences in this panel and the previous panel; and c) excluding the need for and the socio-economic effects from the list of issues.

The U.S. Tribes believe that the "designated project" and its associated review should at least encompass marine shipping traffic to the outer boundary of Canada's exclusive economic

zone ("EEZ"), and that it also should include harms and risks of marine shipping on U.S. and international waters. Including marine vessel shipping up to the outer boundary of the EEZ in the Board's review falls squarely under the *Canadian Environmental Assessment Act, 2012* ("CEAA 2012"), as outlined in the U.S. Tribe's submission dated October 9, 2018 (A94695). A full review of environmental impacts to the EEZ will fulfill one of the purposes of CEAA 2012, which is to protect the components of the environment that are within the legislative authority of Parliament.

The U.S. Tribes believe that a full review of Project risks and impacts of marine shipping from the Westridge Marine Terminal to the boundary of the EEZ allows for a review that would capture the full environmental impact associated with the Trans Mountain Expansion Project, including impacts to fisheries, navigation, traffic, imperiled species, and cumulative impacts from the transportation and burning of fossil fuels. These are known impacts that will result from the Project that can be categorized and quantified. In the United States the full scope of known or reasonably foreseeable impacts are included in environmental assessments. By way of example, the Millennium Bulk Terminal, an export facility located in Longview, Washington, included greenhouse gas impacts resulting from vessel transport from the Washington-based terminal to final destinations in Asia as part of the final Environmental Impact Statement.[1] Requiring Trans Mountain to examine marine vessel and shipping related impacts resulting from the Project out to the EEZ would give both the Board and the public the full view of the risk and impacts associated with this Project. Even if final destination ports are not yet known, a risk and impacts analysis extending to the Canadian EEZ would provide a more comprehensive view of the Project and would capture the impacts that would occur regardless of the final destination: it is reasonably certain that any export via marine vessel would go beyond the Canadian EEZ, and at least beyond the current 12-nautical mile territorial sea limit.

The U.S. Tribes urge the NEB to expand its review to include the risks and harms resulting from marine shipping traffic to the outer boundary of Canada's EEZ.

Request 3

The U.S. Tribes support the Living Oceans Society and Raincoast Conservation Foundation request that the Board review its decision to limit the scope of Reconsideration between the Westridge Marine Terminal and the 12 nautical-mile territorial sea limit for the same reasons outlined in support of Request 2.

[1] The relevant portions of the Millennium Bulk Terminal are attached to this filing. The full final Environmental Impact Statement is available online at https://www.millenniumbulkeiswa.gov/sepa-eis.html (last accessed November 30, 2018).

In support of Living Oceans Society, Raincoast Conservation Foundation, and Tsleil-Waututh Nation, the U.S. Tribes respectfully request the Board issue relief consistent with their requests.

Sincerely,
<Original signed by>

Stephanie Tsosie
Kristen L. Boyles
Jan Hasselman
Earthjustice
705 Second Avenue, Suite 203
Seattle, WA 98104
<contact information removed>

Representatives for U.S. Tribes:
Swinomish Indian Tribal Community,
Tulalip Tribes, Suquamish Tribe, and
Lummi Nation

cc: Trans Mountain: regulatory@transmountain.com

Exhibit 23

Accessed via the Internet 9 May 2014
http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/killerwhale.htm

Species
- Marine Mammals
  - Cetaceans
  - Pinnipeds
- Marine Turtles
- Marine & Anadromous Fish
- Marine Invertebrates & Plants
- Species of Concern
- Threatened & Endangered Species
  - Critical Habitat Maps

Contact OPR
Glossary
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Killer Whale *(Orcinus orca)*

Status | Taxonomy | Species Description | Habitat | Distribution | Population Trends | Threats | Conservation Efforts | Regulatory Overview | Key Documents | More Info | Photos

Status

Killer whales are widely distributed around the world, but certain populations are:
ESA Endangered - Southern Residents
MMPA Depleted - AT1 Transients
MMPA - all populations (all marine mammals)
CITES Appendix II - all populations



Killer Whales
(Orcinus orca)
Credit: NOAA



Killer Whale Range
(click for larger view PDF)

Species Description

Weight: males can weigh up to 22,000 pounds (10,000 kg); females can weigh up to 16,500 pounds (7,500 kg)

Length: males can reach 32 feet (10 m); females can reach 28 feet (8.5 m)

Appearance: black on top with white undersides and white patches near their eyes

Lifespan: males typically live for about 30 years, but can live as long as 50-60 years; females typically live about 50 years,but can live as long as 80-90 years

Diet: diet is often geographic or population specific and varies from fish to other marine mammals to sharks

Behavior: highly social animals; rely on underwater sound for orientation, feeding, and communication; make whistles and pulsed calls, believed to be used for communication and during social activities

Did You Know?

- Finding on Petition To Revise the Critical Habitat Designation for the Southern Resident Killer Whale
- Killer whales can grow as long as 32 feet (9.8 m) and can weigh as much as 22,000 pounds (10,000 kg)!
- Killer whales are actually a member of the dolphin family, Delphinidae.
- Killer whales are highly social and often travel in groups of up to 40-50.

Killer whales are the most widely distributed cetacean species in the world and likely represent the most widely distributed mammal species in the world.

Killer whales are generally considered monotypic (belonging to one species); however, over the years, scientists have proposed several new species, such as dwarf forms in Antarctic waters.[1] Genetic studies and morphological evidence have led many cetacean biologists to now consider the existence of multiple species or subspecies of killer whales worldwide.

Killer whales have a distinctive color pattern, with black back (dorsal) and white belly (ventral). They also have a conspicuous white patch above and behind the eye and a highly variable gray or white saddle behind the dorsal fin.

The species shows considerable size "dimorphism". Adult males develop larger pectoral flippers, dorsal fins, tail flukes, and girths than females.

Most information on killer whale life history and biology is from long-term studies of several populations in the eastern North Pacific.

Sexual maturity of female killer whales is achieved when the whales reach lengths of approximately 15-18 feet (4.6 m-5.4 m), depending on geographic region. The gestation period for killer



Public display of killer whales
Credit: Jennifer Skidmore



Video: Orphan Orca- Saving Springer

Credit: NOAA

whales varies from 15-18 months, and birth may take place in any month--there is no distinct calving season. Calves are nursed for at least 1 year, and may be weaned between 1 and 2 years of age. The birth rate for killer whales is not well understood, but, in some populations, is estimated as every 5 years for an average period of 25 years.

The diet of killer whales is often geographic or population specific:

- In the eastern North Pacific, the "resident" killer whale populations mainly feed on
  - salmonids, such as Chinook salmon and chum salmon
- "Transient" populations in the eastern North Pacific feed on marine mammals, such as (in order of frequency of observation)
  - harbor seals
  - Dall's porpoises
  - harbor porpoise
  - California sea lions
  - gray whale calves
  - Steller sea lions
  - elephant seals
  - minke whales
  - various other species of pinnipeds and cetaceans
- Off the coast of Norway, some killer whales feed mainly, often in a coordinated manner, on
  - herring
  - other schooling fish
- In waters off New Zealand, some killer whales feed on
  - stingrays
  - sharks
- In Antarctic waters, there are different types of killer whales. They have each been observed feeding off of various species:
  - type 'A' killer whales feed on minke whales
  - type 'B' killer whales feed on seals within the seasonal ice pack
  - type 'C' killer whales feed on Antarctic toothfish (*Dissostichus mawsoni*) and other fish species



Killer Whale pod
(Orcinus orca)
Credit: NOAA

Killer whales are highly social animals that occur primarily in relatively stable social groups that often range in size from 2 to 15 animals. Larger groups (rarely as large as several hundred individuals) occasionally form, but are usually considered temporary groupings of smaller social units that probably congregate near seasonal concentrations of prey, for social interaction, or mating. Single whales, usually adult males, also occur in many populations. Differences in spatial distribution, abundance, behavior, and availability of food resources probably account for much of the variation in group size among killer whale populations.

Like all cetaceans, killer whales depend heavily on underwater sound for orientation, feeding, and communication. Killer whales produce three categories of sounds:

1. clicks
2. whistles
3. pulsed calls

Echolocation clicks are believed to be used primarily for navigation and discriminating prey and other objects in the surrounding environment, but are also commonly heard during social interactions and may have a communicative function.

Whistles and pulsed calls are believed to be used for communication and during social activities. Whistles are frequency modulated sounds (pitch changes with time) with multiple harmonics. Pulsed calls are the most common type of vocalization in killer whales and resemble squeaks, screams, and squawks to the human ear. Most calls are highly distinctive in structure, and are characterized by rapid changes in tone and pulse repetition rate. Many calls are repeated, with some clicks reaching up to 4,000 or more pulses per second.[2]

Killer whales of different populations have specific vocalization types. In addition, even within the same population, dialects are known to exist among different pods of "resident" populations in the eastern North Pacific.[3]

In the eastern North Pacific Ocean, three distinct forms, or types, of killer whales are recognized.[4]

1. residents
2. transients
3. offshores



Killer Whale Ecotypes and Forms

poster
NOAA Southwest Fisheries Science Center

The three types differ in morphology, ecology, behavior, and genetics. A recent genetic study[5] suggests the transient type has been separated from all other killer whales for approximately 750,000 years and might represent a separate species or subspecies. All three types of killer whales share at least part of a home range, yet they are not known to intermix with one another. The resident and transient types both have multiple populations within their range.

Resident Killer Whales are noticeably different from both transient and offshore forms. The dorsal fin is rounded at the tip and curved and tapering, or "falcate". Resident whales have a variety of saddle patch pigmentations with five different patterns recognized. They've been sighted from California to Russia. Resident whales primarily eat fish.



Southern Resident Killer Whale Satellite Tagging
NOAA Northwest Fisheries Science Center

Resident killer whales in the North Pacific consist of the following populations:

- Southern residents
- Northern residents
- Southern Alaska residents
- Western Alaska North Pacific residents

Resident type killer whales occur in large social groups termed "pods," which are defined to be groups of whales that are seen in association with one another greater than 50% of the time. The pods represent collections of matrilines (a matriarch and all her descendents), which have been found to be the stable social unit.

The Southern Resident killer whale population contains three pods--J, K, and L pods--considered one "stock" under the Marine Mammal Protection Act (MMPA) and as a "distinct population segment" (therefore, "species") under the Endangered Species Act (ESA).

Their range during the spring, summer, and fall includes the inland waterways:

- Puget Sound (Washington state)
- Strait of Juan de Fuca (boundary between the United States and Canada)
- Southern Georgia Strait (between Vancouver Island and British Columbia, Canada)

Their occurrence has also been documented in the coastal waters off of:

- Oregon
- central California
- Queen Charlotte Islands

Relatively little is known about the winter movements and range of the Southern Resident stock. Southern Residents have not been observed associating with other resident whales, and genetic data suggest that Southern Residents rarely, if ever, interbreed with other killer whale populations.

Transient Killer Whales occur throughout the eastern North Pacific, and have primarily been studied in coastal waters. Their geographic range overlaps that of the resident and offshore killer whales. The dorsal fin of transient whales tends to be straighter at the tip than those of resident and offshore whales.[6] Saddle patch pigmentation of transient killer whales is restricted to two patterns, and the large areas of black color don't mix into the white of the saddle patch that is seen in resident and offshore types. Transient type whales are often found in long-term stable social units of less than 10 whales, smaller than resident social groups. Transient killer whales feed nearly exclusively on other marine mammals.[7]

Offshore Killer Whales are similar to resident whales, but can be distinguished generally[8] by features such as their:

- rounded fins with multiple nicks on the edge
- smaller overall size
- tendency for males and females to be more similar in size (less "sexual dimorphism")

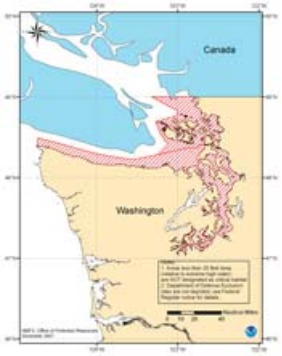
Offshores have the largest geographic range of any killer whale community in the northeastern Pacific and often occur 9 miles (15 km) or more offshore, but also visit coastal waters and occasionally enter protected inshore waters. Animals typically congregate in groups of 20-75 animals with occasional sightings of larger groups up to 200 whales. They are presumed to feed primarily on fish, though they have been documented feeding on sharks. Genetic analyses indicate that offshore killer whales are reproductively isolated from other forms of killer whales.

Habitat

Killer whales are most abundant in colder waters, including Antarctica, Norway, and Alaska. However,

killer whales can also be fairly abundant in temperate waters. Killer whales also occur, though at lower densities, in tropical, subtropical, and offshore waters.

Following the listing of the Southern Residents as an endangered species in 2005, NMFS designated critical habitat in November 2006



Southern Resident Killer Whale Critical Habitat
(click for larger view PDF)

Distribution

Killer whales are the most widely distributed marine mammals. They are found in all parts of the oceans and in most seas from the Arctic to the Antarctic.

In the North Pacific Ocean, killer whales are often sighted in all parts of Alaska, including:

- Bering Sea
- Aleutian Islands
- Prince William Sound
- southeastern Alaska

They are also often sighted in other areas of the North Pacific Ocean, such as:

- nearshore and intercoastal waterways of British Columbia, Canada and Washington state
- along the U.S. Pacific coast in Washington, Oregon, and California
- along the Russian coast in the Bering Sea and the Sea of Okhotsk on the eastern side of Sakhalin and the Kuril Islands

In the North Atlantic Ocean, sightings of killer whales are commonly documented up to the pack ice edge:

- in Norwegian waters
- around Iceland

In the South Atlantic and Pacific Oceans, killer whales are frequently sighted off the coasts of:

- Antarctica, along the pack ice
- Patagonia
- southern Argentina
- New Zealand

Population Trends

Scientific studies have revealed many different populations--or even potentially different species or subspecies--of killer whales worldwide. These different populations of killer whales may exhibit different dietary needs, behavior patterns, social structures, and habitat preferences. Therefore, interbreeding is not expected to occur between different populations, in spite of the overlap between home ranges. Because of its cosmopolitan distribution, there is no global population assessment for killer whales.


Killer Whale spyhopping
(Orcinus orca)
Credit: NOAA

Little information is available on the historical abundance of killer whales worldwide. Nevertheless, it is likely that many populations have declined significantly since 1800 in response to greatly diminished stocks of fish, whales, and pinnipeds (seals and sea lions) in the ocean. The population size of killer whales is difficult to measure in many areas because of their general scarcity as well as their widespread and often unpredictable movement patterns.

During the past few decades, populations have been surveyed primarily through

- photo-identification studies
- line-transect counts

Photo-identification catalogs for killer whales were first established in the early 1970s for the resident communities of Washington and British Columbia and currently are conducted with most population studies.

Line-transect surveys from ships or aircraft generally occur in large areas of open ocean where photo-identification is impractical. However, this technique cannot be used for gathering most demographic data, such as age of sexual maturity.

As top-level predators, killer whales occur in low densities throughout most of their geographic range. Densities are typically much greater in colder waters than in tropical regions. One estimate put the worldwide population of killer whales at over 100,000 animals.[9] However, the most recent estimate revised this figure to a minimum of about 50,000 animals.[10] In the northeastern Pacific (from California to the western Aleutian Islands and Bering Sea) the population is estimated around 2,500 killer whales.

The Southern Resident Killer Whale population is currently estimated at about 85 whales, a decline from its estimated historical level of about 200 during the late 1800s. Beginning in the late 1960s, the live-capture fishery for oceanarium display removed an estimated 47 whales and caused an immediate decline in Southern Resident numbers.[11] The population fell an estimated 30% to about 67 whales by 1971.[12] By 2003, the population increased to 83 whales.[13] Due to its small population size, NMFS listed this segment of the population as endangered under the Endangered Species Act (ESA).

The AT1 Transient Killer Whale group was one of the most frequently encountered groups and, in the 1980s, was sighted year-round in Prince William Sound. The AT1 group was made up of at least 22 whales, but has been reduced by more than half since the 1989 Exxon Valdez oil spill. Several confirmed deaths of AT1 killer whales were recorded since the 1990s, while other missing animals are presumed dead.[14] In June 2004, NMFS designated the AT1 group of transient killer whales as a depleted stock under the MMPA. Scientists estimate there are only 7 killer whales remaining in this group.

Threats

Historically

- commercial hunting
- live capture for aquarium display
- culling due to depredation of fisheries, especially of the Southern Resident stock

Currently

- contaminants (e.g., PCBs)
- depletion of prey due to overfishing and habitat degradation
- ship collisions
- oil spills
- noise disturbance from industrial and military activities
- entanglement in fishing gear
- whale-watching can be a threat if not conducted responsibly

Outside U.S. waters, directed catch of killer whales still occurs, though these levels are presumed low.

Conservation Efforts

A final recovery plan for the Southern Resident killer whales [pdf] [1.7 MB] was published on January 24, 2008. The Recovery Plan for Southern Resident Killer Whales was based on the Proposed Conservation Plan for Southern Resident Killer Whales (under the MMPA), after comments on it were addressed and required ESA elements incorporated into it. The proposed ESA recovery plan was released for comment in November 2006. Public and peer review comments as well as new research results and references were then incorporated into the final Southern Resident recovery plan.

Conservation measures in the plan include to:

- Support salmon restoration efforts in the region including habitat, harvest, and hatchery management considerations and continued use of existing NMFS authorities under the ESA and Magnuson-Stevens Fishery Conservation and Management Act to ensure an adequate prey basis.
- Clean up existing contaminated sites, minimize continuing inputs of contaminants harmful to killer whales, and monitor emerging contaminants.
- Continue evaluating and improving guidelines for vessel activity near Southern Resident and evaluate the need for regulations or protected areas.
- Prevent oil spills and improve response preparation to minimize effects on Southern Resident and their habitat in the event of a spill.
- Continue agency coordination and use of existing MMPA mechanisms to minimize potential impacts from anthropogenic sound.
- Enhance public awareness, educate the public on actions they can participate in to conserve killer whales, and improve reporting of Southern Resident sightings and strandings.
- Improve responses to live and dead killer whales to implement rescues, conduct health assessments, and determine causes of death to learn more about threats and guide overall conservation efforts.
- Coordinate monitoring, research, enforcement, and complementary recovery planning with international, Federal, and state partners.
- Conduct research to facilitate and enhance conservation efforts. Continue the annual census to monitor trends in the population, identify individual animals, and track demographic parameters.

Conservation of the Southern Resident stock is a long-term effort that requires the cooperation and coordination of the Washington and British Columbia communities. The Plan was developed with input from a variety of stakeholders, including federal and state agencies, tribes, non-profit groups, industries, the academic community, and concerned citizens.

Regulatory Overview

All marine mammals, including killer whales, are protected in the United States under the MMPA.

The AT1 stock of the North Pacific transient killer whale was designated as depleted under the MMPA after its drastic decline after the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska.

In November 2005, the Southern Resident population was listed as endangered under the ESA. NMFS designated critical habitat in November 2006 for the Southern Resident population.

In 2011, NMFS' Northwest Region developed vessel regulations in Washington state (76 FR 20870) to prohibit vessels from approaching killer whales within 200 yards.

NMFS conducted a 5-year review of the Southern Residents in January 2011.

Taxonomy

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Cetacea
Family: Delphinidae
Genus: *Orcinus*
Species: *orca*

Key Documents

(All documents are in PDF format.)

Title	*Federal Register*	Date
Positive 90-Day Finding on a Petition To Revise the Critical Habitat Designation for the Southern Resident Killer Whale ▪ Submit information on this finding, through 06/24/2014	79 FR 22933	04/25/2014
Positive 12-month finding on a petition to include "Lolita" in the ESA Listing of Southern Resident Killer Whales ▪ Petition to include "Lolita" in the Southern Residents	79 FR 4313	01/27/2014
Negative 12-month finding on a petition to delist the Southern Resident killer whale ▪ Public comments on the finding ▪ Petition to delist	78 FR 47277	08/05/2013
Positive 90-day finding on a petition to include "Lolita" in the ESA Listing of Southern Resident Killer Whales ▪ Regulations.gov docket folder ▪ Petition to include "Lolita" in the Southern Residents	78 FR 25044	04/29/2013
Positive 90-day finding on a petition to delist the Southern Resident killer whale ▪ Public comments on the finding ▪ Petition to delist	77 FR 70733	11/27/2012
Vessel regulations in Washington state for Southern Residents	76 FR 20870	04/14/2011
5-year Review Initiated for Southern Residents	75 FR 17377	04/06/2010
Proposed killer whale vessel regulations in Washington state	74 FR 37674	07/29/2009
Recovery Plan for Southern Residents	73 FR 4176	01/24/2008
Critical Habitat Designation for Southern Residents	71 FR 69054	11/29/2006
ESA Listing Rule for Southern Residents	70 FR 69903	11/18/2005
Proposed Conservation Plan for Southern Residents	70 FR 57565	10/03/2005
Status Review of Southern Residents	n/a	12/2004
Depleted Designation of AT1 Transients	69 FR 31321	06/03/2004
Depleted Designation for Southern Residents	68 FR 31980	05/29/2003

Stock Assessment Reports	n/a	various

More Information

- Public Display of Killer Whales and Other Marine Mammals
- NMFS National Marine Mammal Laboratory Killer Whale Information and Research
- Satellite Tagging of Southern Residents
- NMFS Northwest Fisheries Science Center Southern Resident Research
- NMFS West Coast Regional Office Killer Whale information
- NMFS Southwest Fisheries Science Center Killer Whale information
- Publications about Killer Whales

Footnotes and Further Reading

1. Pitman and Ensor, 2003
2. Jehl *et al.*, 1980; Ford, 1989
3. Ford, 1991
4. Ford *et al.*, 2000
5. Morin *et al.*, in press
6. Ford and Ellis, 1999; Ford *et al.*, 2000
7. Ford and Ellis, 1999
8. Ford *et al.*, 2000
9. Reeves and Leatherwood, 1994
10. Forney and Wade, 2006
11. Ford *et al.*, 2000
12. Olesiuk *et al.*, 1990
13. Ford *et al.*, 2000
14. Matkin and Saulitis, 1997

Updated: April 25, 2014