24 HARVEST OF FISH AND WILDLIFE RESOURCES

24.1 Approach

The Peace River and area is used for the harvest of fish and wildlife resources. The Project would affect these opportunities through physical change of the land base. The Project effects on harvest of fish and wildlife resources were assessed by considering Project changes to the use of and access to hunting, fishing, trapline, and guide outfitter areas, tenures areas, or the availability of harvested species based on the results of the assessment of the Project on fish and wildlife resources. Harvest of fish and wildlife resources was chosen as a VC, as it reflects concerns raised in public and Aboriginal consultation on the Project. The Project is expected to have effects on the use of and access to harvesting areas (including tenured harvesting areas), and has the potential to affect the availability of harvested species. While Project effects on Aboriginal use of and access to tenured traplines are discussed in this section, they are also considered from an Aboriginal use and rights perspective in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes and Volume 5 Section 34 Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests, and Information Requirements.

24.1.1 Regulatory and Policy Setting

The assessment was prepared in accordance with Section 15.2 of the Site C Clean Energy Project Environmental Impact Statement Guidelines (the Minister of Environment of Canada and the Executive Director of the BCEAO 2012) (EIS Guidelines).

The Project would require both authorizations and approvals to secure use of the land base where there are existing tenures. Due to the Project's interaction with land and water, engagement of Crown tenure holders and regulatory bodies is required to secure short-term and long-term use approvals under the *Land Act*. Working through identified conflicts with existing tenure holders (e.g., trapline holders and guide outfitters) is required as a part of permitting.

In B.C., fishing is regulated by the *Wildlife Act* and administered by the Fish and Wildlife Branch of the British Columbia Ministry of Environment (BCMOE). The Branch establishes legislation, policies, and procedures for managing fishing activities, and for the allocation of fish resources for recreational and commercial use.

In B.C., hunting is regulated by the *Wildlife Act* and administered by the Fish and Wildlife Branch of the BCMOE. The BCMOE manages hunting through various legislative, policy, program, and procedural tools, issues rights and permits for the commercial and recreational use of wildlife, manages the guiding industry, and systematically collects hunter and harvest activity data. Non-B.C. residents hunting big game must be accompanied by a licensed B.C. guide; however, a non-resident of B.C. who is a resident of Canada or a Canadian citizen may be accompanied by a resident of B.C. who holds a Permit to Accompany. Guide outfitters are subject to the conditions laid out in the Commercial Activities Regulation of the *Wildlife Act.* The federal Migratory Birds Regulations, including regulatory requirements regarding migratory bird hunting, is managed by Environment Canada under the *Migratory Birds Conventions Act.*

Commercial trapping for fur-bearers is regulated under the provincial *Wildlife Act*. A trapline is defined in the Act as "an area for which registration is granted to one or more licensed trappers for the trapping of furbearing animals". A trapline gives the holder exclusive trapping rights to the trapline area, but does not exclude other uses (e.g., timber, mineral, oil and gas exploration, and grazing). Section 42 of the Act provides for the granting of registration to persons or groups of persons. A "registered trapper" includes any trapper who holds a current trapping licence and has permission from the registered trapline owner to trap that line. The Act and regulations set out the legal framework in which the registered trapper conducts trapping activities. The trapline holder is not required to prepare a management plan, nor does the Crown set harvest quotas for the individual traplines. Treaty 8 First Nations do not need a licence to trap for personal use. Traplines, which may be held by First Nations bands, families, and individuals, are often used by several community members and are viewed as a community asset. Furs sold commercially by First Nations are subject to the Act.

Although not compelled by law, the oil and gas industry has established a referral and compensation policy in cooperation with the BCMOE to address those cases where traps and structures need to be moved.

24.1.1 Key Issues and Identification of Potential Effects

There is the potential for adverse effects on harvest of fish and wildlife resources due to changes in the following as a result of the Project:

- Changes in fishing opportunities, which considers the following key aspects:
  - Use of and access to fishing area
  - Availability of harvested species based on the results of the assessment of the potential effects of the Project on the fish and fish habitat VC
- Changes in hunting opportunities, which considers the following key aspects:
  - Use of and access to hunting areas
  - Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC
- Changes in use of harvesting areas, which considers the following key aspect:
  - Use of and access to hunting and fishing areas
- Changes in trapping opportunities, which considers the following key aspects:
  - Use of and access to trapline areas
  - Tenured areas, and specific harvest areas within tenured areas, using spatial analysis
  - Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC
- Changes in guide outfitting activities, which considers the following key aspects:
  - Use of and access to guide outfitter areas
  - Tenured areas, and specific harvest areas within tenures areas, using spatial analysis

- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC

Project construction activities would interact with the use of and the access to fishing, hunting, trapping, and guide outfitting harvesting activities, as well as with the habitat supporting harvested species. The use of public fishing and hunting areas could also be affected by population change forecast during construction.

At the end of the construction period, the filling of the Site C reservoir would permanently change the areas available for fishing, trapping, and guide outfitting. In particular, fishing use and access would change from a river setting to reservoir setting.

Measurable population change due to Project operational workforce requirements is not anticipated; therefore, there would be no further changes to use of public fishing and hunting areas through this phase.

Issues, concerns, and interests identified during consultation with the public, Aboriginal groups, and government agencies guided the scope of the harvest of fish and wildlife resources assessment (refer to Volume 1 Section 9 Information Distribution and Consultation). The key issues identified and the approaches used to address issues are outlined in Table 24.1. In all of these consultations, members of the public, Aboriginal groups, regulatory agencies, and local government representatives voiced concerns regarding how access to and the use of harvesting areas would be affected by the Project during construction and during operations as a result of physical works, potential effects on the availability of harvested species, or due to demands of the temporary workforce population or in-migrants arriving in the region as a result of the Project. These concerns were considered in the development of mitigation measures, in the design of the Project (e.g., access consideration), and in management plans, including the Outdoor Recreation Mitigation Plan (Volume 3 Appendix E) and the Vegetation, Clearing, and Debris Management Plan (Volume 1 Appendix A).

Table 24.1 Key Issues: Harvest of Fish and Wildlife Resources

Key Issues	Approach to Addressing Key Issues
Fishing Opportunities	
The Project would change access to and navigation of fishing areas	▪ Changes in access to and navigation of fishing areas is assessed in Section 24.4 Effects Assessment ▪ Mitigation measures were developed to develop access and support navigation of the Site C reservoir (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation). ▪ Potential effects on sport fish populations are assessed in Volume 2 Section 12 Fish and Fish Habitat and Section 24.4 Effects Assessment considers effects of the Project on the availability of harvested species.
The Project could affect sport fish populations	

Key Issues	Approach to Addressing Key Issues
Hunting Opportunities	
The Project would change access to hunting areas	▪ Changes in access to hunting areas is assessed in Section 24.4 Effects Assessment ▪ Mitigation measures were developed to develop access and support navigation of the Site C reservoir (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation). ▪ Potential effects on wildlife populations are assessed in Volume 2 Section 14 Wildlife Resources and Section 24.4 Effects Assessment considers effects of the Project on the availability of harvested species.
The Project could affect game populations	
Use of Harvesting Areas	
The Project will result in changes to the temporary and resident population, which could lead to changes in the use of harvesting areas.	• Volume 4 Section 28 Population and Demographics assessed the changes in population and demographics that may occur in the Regional Assessment Area (RAA) during construction and operations. • The results of this assessment were used to estimate the increase in licensed hunters and anglers in the RAA that may occur as a result of the Project.
Trapping Opportunities	
The Project would change access to trapping areas	▪ Potential effects on wildlife populations are assessed in Volume 2 Section 14 Wildlife Resources and Section 24.4 Effects Assessment considers effects of the Project on the availability of harvested species.
The Project could affect fur-bearer populations	
Guide Outfitting Activities	
The Project would change access to guide outfitter areas	▪ Potential effects on wildlife populations are assessed in Volume 2 Section 14 Wildlife Resources and Section 24.4 Effects Assessment considers effects of the Project on the availability of harvested species.
The Project could affect game populations	
Additional Concerns from Aboriginal Groups	
Concern about loss of income from reduced harvesting opportunities (DLFN [a], MLIB [b], T8TA [c])	▪ Section 24.4 Effects Assessment considers changes in reported trapline harvest volumes, trapline operations and revenue.
Concern about increased access for recreational non-Aboriginal harvesters to the area between the Project and Hudson's Hope, including tributary rivers	▪ Section 24.4 Effects Assessment considers changes in access for harvesting ▪ Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes considers effects of changes in access on Aboriginal use of lands and resources
Concern that an increase in population of some fish species has the potential to increase sport fishing and promote charter fishing tours (T8TA [c])	▪ Volume 3 Section 26 Navigation considers changes to access and boat traffic

NOTES:
[a] DFN – Duncan's First Nation
[b] MLIB – McLeod Lake Indian Band
[c] T8TA – Treaty 8 Tribal Association

Potential project interactions with harvest of fish and wildlife resources are summarized in Volume 2 Appendix A Project Interactions Matrix, Table 2. As defined in Volume 2 Section 10 Effects Assessment Methodology, a rank of "2" was given where interactions may result in an adverse effect and the nature of the effect and/or the effectiveness of

mitigation measures is uncertain. These interactions were taken forward through the effects assessment.

Project interactions with a ranking of "2" are set out in Table 24.2 below.

Table 24.2 Interactions of the Project With Harvest of Fish and Wildlife Resources

Project Components and Activities	Key Aspects				
	Changes in Fishing Opportunities	Changes in Hunting Opportunities	Changes in Use of Harvesting Areas	Changes in Trapping Opportunities	Changes in Guide Outfitting Activities
Construction					
Dam and Generating Station Construction	✓	✓	✓	✓	✓
Reservoir Preparation and Filling	✓	✓	✓	✓	✓
Transmission System		✓	✓	✓	✓
Quarried and excavated material source development					
West Pine Quarry		✓	✓	✓	✓
Portage Mountain Quarry		✓	✓	✓	✓
Highway 29 Realignment		✓	✓	✓	✓
Construction Access Road Development					
Transmission Line Access Roads		✓	✓	✓	✓
Jackfish Lake Road Works		✓	✓	✓	✓
Worker Accommodation Construction and Operations		✓	✓	✓	✓
Operation					
Reservoir and Generating Station Operations (including Hudson's Hope Shoreline Protection Maintenance)	✓			✓	

24.1.2 Standard Mitigation Measures and Effects Addressed

A "1" ranking was given where an adverse effect may result from an interaction, but standard mitigation measures to avoid or minimize the potential effects are available and well understood to be effective, and any residual effect is negligible. These interactions were not carried forward through the effects assessment.

A "1" ranking was assigned to activities associated with the construction access road development component including: Old Fort Road realignment, extension of 240 and 369 roads, West Pine quarry access, West Pine siding construction, and Septimus rail siding construction. A Traffic Management Plan (including access restrictions where

required) will mitigate potential effects on the harvest of fish and wildlife resources (see Volume 5 Section 35 Summary of Environmental Management Plans).

All other project activities listed in Table 2 of Volume 2 Appendix A Project Interactions Matrix were ranked “0” because no interaction is predicted between the Project component and the harvest of fish and wildlife resources.

Any overlap or conflict between existing third-party tenure holders and BC Hydro’s proposed activities, or BC Hydro’s required tenure over Crown land, will be addressed through discussions, and where appropriate, through agreements with the tenure holders. Further information is available in Volume 2 Section 11.3 Land Status, Tenure, and Project Requirements in Volume 2 Section 11 Environmental Background.

24.1.3 Selection of Key Indicators

Key indicators for the harvest of fish and wildlife resources VC include relevant measures of public fishing and hunting activity, and tenured trapline and guide outfitting activity. The indicators include potential Aboriginal participation in tenured activities.

A list of key indicators, including a rationale for their selection is provided in Table 24.3.

Table 24.3 Key Indicators for Harvest of Fish and Wildlife Resources

Key Aspects	Key Indicators	Rationale for Selection of the Key Indicators [a]
Changes in fishing opportunities	▪ Public fishing licence sales ▪ Public fishing areas ▪ Public fishing harvest information including numbers and species ▪ Angler creel survey results	▪ Fishing and hunting licence sales are indicators of participation in fishing and hunting in the Peace region ▪ Creel survey results and harvest data are indicators of level of effort and participation in fishing and hunting and targeted or available species ▪ Harvesting areas indicate where fishing, hunting, trapping and guide outfitting activities are most likely to be affected by the Project ▪ Trapline and guide outfitter infrastructure are indicators of where harvesting activities take place or where harvesting activities are staged ▪ Aboriginal employment or use of tenured areas is a descriptor of the operation of a trapline or guide outfitter territory
Changes in hunting opportunities	▪ Public hunting licence sales ▪ Public hunting areas ▪ Public hunting harvest information including numbers and species	
Changes in use of harvesting areas	▪ Public hunting and fishing licence sales ▪ Public hunting and fishing areas ▪ Public hunting and fishing harvest information including numbers and species ▪ Angler creel survey results	
Changes in trapping opportunities	▪ Tenured trapline areas ▪ Tenured trapline infrastructure (e.g., cabins, trails) ▪ Tenured trapline harvest volumes and areas ▪ Tenure trapline operating and economic information ▪ Aboriginal employment or use of tenured traplines	
Changes in guide outfitting activities	▪ Tenured guide outfitter areas ▪ Tenure guide outfitter infrastructure (e.g., cabins, trails) ▪ Tenured guide outfitter harvest volumes and areas ▪ Tenured guide outfitter operating and economic information ▪ Aboriginal participation in tenured guide outfitting operations	

NOTE:
[a] Includes input from consultation with regulators, First Nations, affected stakeholders, and the public, as well as regulatory guidelines, policies and programs

24.1.4 Spatial and Temporal Boundaries

24.1.4.1 Spatial Boundaries

The Local Assessment Area (LAA) in the EIS Guidelines for the assessment of the VC of harvest of fish and wildlife resources is the Project activity zone and the Peace River downstream to Alberta Border. The Regional Assessment Area (RAA) in the EIS Guidelines is the Peace River Regional District (PRRD).

The areas used for reporting in this assessment were updated from the originally proposed spatial boundaries in the EIS Guidelines. The spatial boundary for the LAA for harvest of fish and wildlife (harvesting) is the Project activity zone, the area within reservoir impact lines, and the Peace River downstream to the Alberta border. This

includes the areas that may be changed due to Project activities where changes in the land or setting would affect harvesting activities, or which overlap with administrative boundaries for harvesting related tenures and licences, including the Peace River downstream to the Alberta border for fishing activities.

The RAA is the PRRD, and corresponds to the administrative boundary where the Project is occurring. Interactions of other project activities with the Project in relation to harvest of fish and wildlife resources could occur outside the RAA, but they would not be detectable or measurable.

The spatial study areas for the harvest of fish and wildlife resources VC are noted in Table 24.4 and illustrated in Figure 24.1.

Table 24.4 Spatial Assessment Areas for Harvest of Fish and Wildlife Resources

Local Assessment Area	Regional Assessment Area
Project activity zone, the area within preliminary reservoir impact lines, and the Peace River downstream to the Alberta border	Peace River Regional District

24.1.4.2 Temporal Boundaries

The assessment has been conducted for the project construction and operations phases, which are described in Volume 1 Section 4 Project Description. Where applicable, seasonal and annual variations in effects on harvesting are also considered in the assessment.

24.2 Information Sources and Methods

24.2.1 Literature Review

The following information was used to formulate the baseline, and assist with assessment of potential effects:

- Project description and other project-related information
- B.C. Ministry of Forestry, Lands and Natural Resource Operations data, including harvests, licence sales, quotas, numbers of resident and non-resident hunters, and hunter days, pelt prices, and trapping royalties for management units and tenured trapping and guide outfitter areas within the LAA
- Reports on LGL (2010) creel survey and other fishing survey results

Public hunting data were acquired from B.C. Ministry of Forestry, Lands and Natural Resource Operations hunter harvest data, studies on economic effects and value of resident hunting, wildlife studies, traditional land use studies, and other data as made available to BC Hydro.

Fishing data were acquired from B.C. Ministry of Forestry, Lands and Natural Resource Operations licence sales, creel survey results, regional angling surveys, fisheries studies, and traditional land use studies.

While traditional land use studies were reviewed to confirm the types of harvested animals and key harvesting areas in the LAA, details regarding potential effects on traditional land use are addressed in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes and Volume 5 Section 34 Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests, and Information Requirements.

Trapline tenure and harvest data were acquired from provincial government sources and supported by interviews with trapline holders.

Guide outfitting data were acquired from B.C. Ministry of Forestry, Lands and Natural Resource Operations hunter harvest data, guide outfitter licence areas, the Guide Outfitting Association of British Columbia database, interviews with guide outfitters, and studies on the economic effects and value of guided hunting.

24.2.2 Interviews

Individual and group interviews were conducted to gather information regarding harvesting activities in the LAA and potential interactions with the Project. Government representatives from the BCMOE and B.C. Ministry of Forestry, Lands and Natural Resource Operations, and hunting and fishing group representatives were interviewed to identify secondary data sources, validate secondary data, and gain perspectives on key access points and harvesting areas that may be affected by the Project. The following hunting and fishing group representatives were interviewed:

- Dawson Creek Sportsman's Club
- Hudson's Hope Rod and Gun Club
- Chetwynd and District Rod and Gun Club
- North Peace Road and Gun Club (based in Fort St. John)

BC Hydro conducted interviews with trappers and guide outfitters with tenures in the Project activity zone to identify cabins, access points, trapping areas, and hunting areas that may be affected by the Project. This information was considered in the trapping and guide outfitting effects assessment.

Volume 3 Appendix C Land and Resource Use Assessment, Part 1 Land and Resource Use Assessment Interview Methodology summarizes interview methodology. Personal communications are listed in References at the end of this section.

24.2.3 Field Investigations

A field visit took place on July 14, 2011 to view formal and informal recreation sites potentially used for harvesting activities on the Peace River within the Project activity zone and along Highway 29 between Fort St. John and Hudson's Hope. The visit was conducted to identify potential site-specific interactions with areas potentially used for harvesting or access to harvesting areas.

Field surveys were completed in 2008 to 2009 (LGL 2010) to develop an understanding of outdoor recreation sites, features, and amenities, as well as use levels and activities. The survey objectives also included completion of an angler and creel survey to obtain information on fishing areas, fishing activity, and fish harvest in the Peace region.

24.2.4 Data Management, Mapping and Modelling

A spatial analysis was undertaken to identify the overlap between the Project activity zone and area within reservoir impact lines, and limited entry hunting areas, traplines, and guide outfitting areas.

Data were geospatially represented using Geographic Information System (GIS) analysis. The GIS results were also used for figure preparation.

24.2.5 Aboriginal Community and Traditional Knowledge

Aboriginal community and traditional knowledge related to the harvest of fish and wildlife resources VC was obtained from results of BC Hydro's consultation with Aboriginal groups, First Nations Traditional Use Studies, and First Nations Community Baseline Studies. First Nations concerns and information pertaining to tenured activities are included in this section. Details regarding potential effects on traditional land and resource use are addressed in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes, and Volume 5 Section 34 Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests, and Information Requirements.

24.3 Baseline Conditions

The sections that follow present an overview of current conditions related to the public and tenured harvest of fish and wildlife resources within the LAA.

24.3.1 Public Hunting and Fishing

24.3.1.1 Public Hunting and Fishing Licence Sales

Both hunting and fishing licence sales indicate a general trend of sustained or increased interest in hunting and fishing in the Peace Region, compared to a decrease in the province as a whole.

Hunting licence sales data available for the Peace Region (Region 7B under B.C. hunting regulations) and the province of B.C. are shown in Table 24.5. The LAA is within Region 7B. The number of licences sold in Region 7B increased by 2% between 2000 and 2007, compared to a provincial decline of 6%.

Table 24.5 Hunting Licence Sales in the Peace Region and British Columbia, 2000 to 2009

Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	% Change 2000–2007
Peace Region (Region 7B) [a]											
Licences sold	8,524	7,697	7,995	7,955	7,685	8,198	8,543	8,659	NA	NA	2
Fee revenue ($)	219,577	199,630	205,583	264,096	249,945	263,042	280,029	272,519	NA	NA	24
British Columbia											
Licences sold – resident [b]	93,740	86,580	85,714	81,736	84,003	85,633	87,170	87,722	90,867	92,235	-6
Licences sold – non-resident [b]	5,887	5,612	5,752	5,785	5,931	6,387	6,244	5,891	5,620	5,112	<1
Fee revenue [$000] [a]	2,165	1,996	2,022	2,659	2,797	2,784	2,862	2,844	NA	NA	31

NOTES:

NA – data not available

Sources:

[a] BCMOE (2009); [b] B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011a pers. comm.)

The lowest yearly sales for Region 7B was in 2004, and for the province it was in 2003. While licence sales are indicative of hunting activity, they do not indicate where the licensee hunted.

Fishing licence sales for Region 7B and the province of B.C. are shown in Table 24.6. The number of licences sold in the Peace Region increased by 8% between 2000 and 2007, while sales in B.C. decreased by 6% over the same time period. While licence sales are considered to be broadly indicative of regional fishing activity, they do not distinguish between resident and non-resident purchases, and do not indicate where the licensee fished.

Table 24.6 Fishing Licence Sales for Region 7B and British Columbia, 2000 to 2009

Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	% Change 2000–2007
Peace Region [a]											
Licences sold	11,449	11,879	11,570	10,839	10,627	11,309	13,361	12,303	NA	NA	7
Fee revenue ($)	175,412	179,605	175,923	284,697	284,670	295,427	357,341	330,791	NA	NA	89
British Columbia											
Licences sold – resident [b]	278,646	285,517	275,554	276,206	248,052	251,993	260,135	261,505	246,388	287,561	-6
Licences sold – non-resident [b]	76,853	79,932	79,868	69,402	68,328	67,370	70,512	70,937	59,081	64,555	-8
Fee revenue ($'000)	5,007	5,069	4,979	7,796	7,759	7,601	7,998	7,883	NA	NA	57

NOTES:
NA – data not available
Sources:
[a] BCMOE (2009);
[b] B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011a pers. comm.)

24.3.1.2 Public Hunting and Fishing Areas

24.3.1.2.1 Fishing

The Peace River and its tributaries support angling for a variety of sport fish including lake trout, northern pike, walleye, Arctic grayling, bull trout, rainbow trout, mountain whitefish, lake whitefish, kokanee, goldeye, and burbot (GSGislason 2009; LGL 2010). Tributaries within the LAA, or entering the LAA, that support angling include the Moberly, Halfway, Beatton, and Pine rivers, and several smaller streams.

Fishing as a percentage of total outdoor recreation activity on the Peace River and its tributaries has been as high as 16% in the LAA (LGL 2010). There are 49 recreation sites on the Peace River between Hudson's Hope and the Alberta border, 15 of which were noted as sites where fishing occurs. These locations provide shore or boat access

for fishing. Table 24.7 shows the general location on the river segment for the 15 recreation sites where fishing occurs, along with the number of fishing participants (2008–2009).

Table 24.7 Recreation Sites where Fishing Occurs in the LAA

Site Name	River Segment		
	Peace Canyon Dam to Hudson's Hope	Hudson's Hope to Site C Dam Site	Site C Dam Site to Alberta Border
Number of Fishing Participants (2008–2009)	313	419	232
Recreation Sites and Locations			
Highway 29 Bridge	●	○	○
Alwin Holland Memorial Park	●	○	○
Hudson's Hope Boat Launch	○	●	○
Lynx Creek Boat Launch	○	●	○
Lynx Creek RV Park	○	●	○
The Gates Boat Launch	○	●	○
Unmaintained Campsite B	○	●	○
Farrell Creek	○	●	○
Peace Island Park	○	○	●
Confluence of Beatton River	○	○	●
Blackfoot Park/"Clayhurst"	○	○	●
Shoreline Access D	○	○	●
Shoreline Access E	○	○	●
Pine River: East Pine	○	○	○
Pine River: Twidwell Bend	○	○	○

NOTES:
● – indicates presence of recreation site within river stratum
○ – indicates that the recreation site is not present within the river stratum
N/A – not applicable
River stratum refers portions of the Peace River or Pine River as defined in LGL 2010
Source: LGL (2010)

24.3.1.2.2 Hunting

The RAA has four rod and gun clubs with an estimated total of over 2,000 members, of which about 80% are active hunters. The North Peace Rod and Gun Club (based in Fort St. John) has a current membership of over 600 (including youths, adults, and families), the Hudson's Hope Rod and Gun Club has about 50 single and family memberships, the Chetwynd Rod and Gun Club has about 153 members, and the Dawson Creek Club has about 1,200 members.

The Peace River is valued for its hunting opportunities, notably the islands and the north bank, south-facing slopes where wildlife is more abundant, and (in the case of the islands) where less hunter effort is needed. Within the LAA, the south bank of the Peace River receives about 20% of total hunter effort, while the islands and north bank receive about 80% of effort (Holland 2009, pers. comm.).

For hunters from Hudson's Hope, specific hunting areas within the LAA include Bear Flat, the Gates, up the Halfway River, and Farrell Creek (Hudson's Hope Rod and Gun Club, Members 2011, pers. comm.).

Most North Peace club members also hunt throughout the Peace River Regional District, north of the Peace river, and as far north as the Muskwa-Kechika area (North Peace Rod and Gun Club, Members 2011, pers. comm.).

Hunters from Chetwynd use the Peace River corridor; however, they also choose to hunt closer to the Del Rio and Stewart Lake areas south of the Peace River (Eastman 2009, pers. comm.). The Del Rio is a hunting area with oil and gas roads that provide good access (Chetwynd and District Rod and Gun Club, Members 2011, pers. comm.).

Roughly half of the 1,200 members of the Dawson Creek Sportsman's Club use the Peace River and its major tributaries for hunting due to its proximity to the community and ease of access via the Peace Island Park boat launch (Mathias 2009, pers. comm.; Mayor 2011, pers. comm.). Areas north of Chetwynd, Stewart Lake, and especially the Del Rio area are also used by club members.

As evidenced in the areas used by club members, access is a factor in the distribution of hunting activities within the LAA. Hunting on the north bank occurs on private (where permissible) and Crown land. Hunting on private land occurs between Bear Flat and the Halfway River. During April and May 2011, BC Hydro mailed questionnaires to property owners who own or lease land within areas potentially affected by the Project. Of those who responded, 24% indicated that they allow hunting on their property. Eighteen per cent of those who allow hunting on their property indicated that they allowed hunting for deer, 16% allowed hunting for elk, 8% allowed hunting for moose, 8% allowed hunting for black bear, and 3% allowed hunting for Nabor's buffalo.

Hunters use river boats to travel along the Peace, Pine, and Halfway rivers, making the islands and the south bank accessible. Boats are launched from Peace Island Park (near Taylor), Halfway River, and Lynx Creek (Hudson's Hope), as well as from informal locations. Approximately half of the hunters launching from Peace Island Park travel upstream to river islands, while the other half travel downstream or up the Pine River. Hunters launching at the Halfway River typically head both upstream and downstream on the Peace, while some also go up the Halfway River (Holland 2009, pers. comm.). There is also a variety of public and resource development roads that allow for access to hunting areas within the LAA.

24.3.2 Public Fishing and Harvest Information

24.3.2.1 Public Fishing

The LGL (2010) creel study indicated that total angling effort was 24,622 angler-hours (6,757 angler-days), of which 18,489 angler-hours (5,070 angler-days) were in the Peace River mainstem (LGL 2010). Within the Peace River, 53% of the angling activity occurred in the river stratum from Hudson's Hope to the Site C dam site. Similar levels of angler effort were identified 20 years prior by DPA (1991) (Table 24.8). The similarity in angler-hour estimates across a 20-year period indicates that overall demand for fishing is not increasing. A discussion of the limitations of creel data is included in Volume 3 Appendix C Land and Resource Use Assessment Supporting Documentation, Part 3 Harvest of Fish and Wildlife Resources.

Table 24.8 compares fishing levels on the Peace River from historical creel surveys to the most recent data available. Whitefish and rainbow trout were the most commonly caught fish across all of the studies. Walleye or perch were more common downstream of the Site C dam site. The 2008–2009 catch (fish harvested and released) estimates showed that Arctic grayling (2,446 fish) and mountain whitefish (2,443 fish) were the species that were caught in greatest numbers, the majority of which were caught in the Pine River (LGL 2010). The total catch of rainbow trout and bull trout, summed across all strata, was estimated at 1,883 fish and 1,569 fish, respectively. Annual catch estimates for the Peace River mainstem indicated that rainbow trout were caught most frequently (1,786 fish), followed by bull trout (983 fish), and mountain whitefish (978 fish). For certain species (e.g., rainbow trout), the distribution of catch across river strata varies, with larger numbers of fish caught in areas upstream of the Project. Retention rates were highest for lake trout and northern pike, with 27% and 14% of catch retained, respectively.

Table 24.8 Peace River Fishing Surveys

Year	Area	Season	Angler-Hours	Angler-Days	Hours per Angler-Days	Effort per River km	Total Catch (No.)	Catch per Hour	Catch by Species (No. and %)
1985 [a]	Peace Canyon Dam to Farrell Creek (14 km)	June 1985 to October 1985	16,898	NA	NA	1,207 hrs/km	7,667	0.45/hr	▪ rainbow trout: 4,469 (58%) ▪ whitefish: 2,890 (38%) ▪ Arctic grayling: 164 (2%) ▪ bull trout: 144 (2%)
1989/90 [b]	Peace Canyon Dam to Farrell Creek (14 km)	May 1989 to April 1990	9,970	4,420	2.26	712 hrs/km 315 days/km	5,073	0.51/hr 1.15/day	▪ rainbow trout: 2,005 (40%) ▪ whitefish: 2,400 (47%) ▪ Arctic grayling: 389 (8%) ▪ bull trout: 149 (3%) ▪ kokanee: 101 (2%) ▪ northern pike: 29 (0.6%)
1989/90 [b]	Peace Canyon Dam to Site C (83 km)	May 1989 to April 1990	17,430	7,550	2.31	210 hrs/km 91 days/km	9,432	0.54/hr 1.25/day	▪ rainbow trout: 2,445 (26%) ▪ whitefish: 4,747 (50%) ▪ Arctic grayling: 1,399 (15%) ▪ bull trout: 304 (3%) ▪ kokanee: 129 (1%) ▪ northern pike: 359 (4%) ▪ walleye/pickerel: 49 (1%)
2008/09 [c]	Peace Canyon Dam to Hudson's Hope (7km)	April 2008 to March 2009	3,032	833	3.64 [d]	433 hrs/km 119 days/km	864	0.28/hr 1.04/day	▪ rainbow trout: 602 (70%) ▪ whitefish: 71 (8%) ▪ Arctic Grayling: 18 (2%) ▪ bull trout: 143 (17%) ▪ northern pike: 8 (1%) ▪ walleye/pickerel: 9 (1%) ▪ goldeye: 13 (2%)

Year	Area	Season	Angler-Hours	Angler-Days	Hours per Angler-Days	Effort per River km	Total Catch (No.)	Catch per Hour	Catch by Species (No. and %)
2008/09 [c]	Peace Canyon Dam to Site C (83 km)	April 2008 to March 2009	12,875	3,537	3.64[a]	155 hrs/km 43 days/km	3,418	0.27/hr 0.97/day	▪ rainbow trout: 1,692 (50%) ▪ whitefish: 515 (15%) ▪ Arctic Grayling: 300 (9%) ▪ bull trout: 635 (19%) ▪ northern pike: 102 (3%) ▪ walleye/pickerel: 70 (2%) ▪ goldeye: 104 (3%)
2008/09 [c]	Site C to Alberta Border (49 km)	April 2008 to March 2008	5,613	1,542	3.64[a]	114 hrs/km 31 days/km	1,439	0.26/hr 0.94/day	▪ rainbow trout: 70 (5%) ▪ whitefish: 120 (8%) ▪ Arctic grayling: 94 (7%) ▪ bull trout: 259 (18%) ▪ northern pike: 236 (16%) ▪ walleye/pickerel: 550 (38%) ▪ goldeye: 110 (8%)

NOTES:
[a] Data from Hammond (1986)
[b] Data from DPA (1991)
[c] Data from LGL (2010)
[d] Pooled study average (not corrected for river stratum)
hr – hour
hrs – hours
NA – data not available
Sources: DPA (1991); Hammond (1986); LGL (2010)

24.3.2.2 Public Hunting

The LAA overlaps four management units (MUs 7-32, 7-33, 7-34, and 7-35). Management Unit 7-20A is designated for Limited Entry Hunting (LEH) and fully encompasses MU 7-32, 7-33, and 7-34, as well as portions of 7-35. The provincial government manages game species and maintains hunting opportunities through hunting seasons, licensing, and regulations of various types and permits designed to retain the sustainability and health of the resource. For most species, the hunting season runs from late August to late November, with most species hunted in the late October and early November periods. Bag limits are one for all ungulates and cougar, two for black bear, and three for wolf (BCMOE 2012). There is no bag limit for coyote. Bag limits for birds range from nine for Sharp-Tailed Grouse to 30 for Spruce and Ruffed Grouse.

The LEH allocates hunting opportunities by lottery to help meet wildlife management objectives. LEH seasons are introduced where necessary to limit:

- The number of hunters
- The number of animals that may be taken
- The harvest to a certain class of animal

Elk (antlerless or unrestricted) and moose (calf only) LEH draws are available in the LAA. The elk LEH season is open from December 1 to February 28. The moose LEH season is August 15 to August 30, and October 16 to October 31. Although general open seasons are available for elk and moose, the class of animal available will often be different. Table 24.9 and Table 24.10 show elk and moose LEH harvest statistics for the most recent years available in the LAA (Management Unit 7-20A).

Table 24.9 Elk Limited Entry Hunting Harvest Statistics in the Management Unit Within the LAA

Year	Management Unit	Animal Class	Permits Available (No.)	Applicants (No.)	Respondents (No.)	Estimated Hunters (No.)	Success Rate (%)	Estimated Kills (No.)	Estimated Days Hunting	Days per Kill
Elk										
2008	7-20 Zone A	Antlerless	1,240	4,056	561	552.6	48.8	269.7	2,542	9.4
		Any sex/age	800	3,144	354	404.5	45.2	182.9	1,848	10.1
2009		Antlerless	1,240	4,500	609	635.3	44.2	281.0	3,026	10.8
		Any sex/age	800	3,450	433	423.2	48.5	205.1	1,850	9.0
2010		Antlerless	1,240	5,966	531	464.7	48.2	224.2	2,162	9.6
		Any sex/age	800	3,946	332	343.1	46.6	160.0	1,468	9.2
Percentage change antlerless			0.0	47.0	-5.3	-15.9	-1.2	-16.9	-14.9	2.1
Percentage change any sex/age			0.0	25.5	-6.2	-15.2	3.1	-12.5	-20.6	-8.9
Total antlerless			**3,720**	**14,522**	**1,701**	**1,652.6**	**46.9**	**775.0**	**7,730**	**10.0**
Total any sex/age			**2,400**	**10,540**	**1,119**	**1,170.8**	**46.8**	**548**	**5,166**	**9.4**

NOTE:
Success rate is the ratio of the number of estimated kills to the number of estimated hunters
Source: B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011a pers. comm.)

Table 24.10 Moose Limited Entry Hunting Harvest Statistics in the Management Units in the LAA

Year	Management Unit	Animal Class	Permits Available (No.)	Applicants (No.)	Respondents (No.)	Estimated Hunters (No.)	Success Rate (%)	Estimated Kills (No.)	Estimated Days Hunting	Days per Kill
Moose										
2000	7-32, 7-33, and 7-34	Calf only	137	161	90	76.1	15.1	11.5	289	25.1
2001			165	141	92	84.2	15.0	12.6	318	25.2
2002			165	179	99	78.7	38.2	30.1	317	10.5
2003			165	162	102	86.0	29.9	25.7	377	14.7
2004			165	137	85	76.5	30.1	23.0	400	17.4
2005			180	105	68	68.5	47.0	32.2	463	14.4
2006			240	135	71	94.6	45.2	42.8	457	10.7
2007			240	142	74	85.0	22.2	18.9	444	23.5
2008			240	130	62	74.4	17.7	13.2	510	38.6
2009			240	142	80	86.4	29.7	25.7	483	18.8
2010			240	163	73	70.0	32.9	23.0	626	27.2
Percentage change			75.2	1.2	-18.9	-8.0	117.9	100.0	116.6	8.4
Total			**2,177**	**1,597**	**896**	**880.4**	**29.4**	**258.7**	**4,684**	**18.1**

NOTE:
Success rate is the ratio of the number of estimated kills to the number of estimated hunters
Source: B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011a pers. comm.)

Harvest data by species for the LAA management units, and for the 11-year period ending in 2010 are shown in Table 24.11. Harvesting has increased overall for all of the animals hunted in the LAA since 1999. Hunting activity data for management units in the LAA for the 13-year period between 1996 and 2008 are shown in Table 24.12.

There has been a province-wide decline in hunting licences issued and hunting activity over the last 30 years; however, the number of resident hunters in the Peace Region increased by 33% between 1996 and 2008. Hunters from southern B.C. who hunt in the Peace region are contributing to this increase as hunting areas elsewhere in the province shrink due to the encroachment of urban development and the expansion of protected areas. In addition, with the creation of the Agriculture Zone Hunt, local hunting opportunities have increased in the last three to four years, creating hunter interest from inside and outside the PRRD. This trend is captured in Table 24.12 (BCMOE, Wildlife Biologist 2009a pers. comm.).

Table 24.11 Big Game Species Harvested in Management Units in the LAA, 1999 to 2010

Species	Number Harvested											
	1999 [a]	2000 [a]	2001 [a]	2002 [a]	2003 [a]	2004 [a]	2005 [a]	2006 [b]	2007 [b]	2008 [b]	2010 [c]	% Change
Black bear	63	129	79	101	55	68	75	58	102	63	83	32
Caribou	—	—	—	—	—	—	—	—	—	—	—	N/A
Cougar	—	—	—	—	—	—	—	—	—	—	0	N/A
Elk	99	122	172	170	246	243	376	387	375	746	652	559
Goat	—	—	—	—	—	—	—	—	—	—	—	N/A
Grizzly	—	1	—	—	—	—	—	—	3	1	0	N/A
Moose	452	570	782	885	1,009	542	897	936	310	267	552	22
Mule deer	634	935	782	773	773	715	893	1,234	1,254	1,108	635	<1
Sheep	—	—	—	—	1	—	—	—	—	—	—	N/A
White-tailed deer	258	406	110	300	318	277	423	342	438	524	731	183
Wolf	23	57	—	29	27	17	16	10	40	23	48	109
Total	**1,529**	**2,220**	**1,925**	**2,258**	**2,429**	**1,862**	**2,680**	**2,967**	**2,522**	**2,732**	**2,701**	**77**

NOTES:
N/A – not applicable
— data not collected
Sources: BCMOE (2008); B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011b, 2012a pers. comm.)

Table 24.12 Hunting Activity in Management Units in the LAA, 1996 to 2008

Hunting Activity	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	% Change
Resident Hunters														
Number of hunters	5,797	5,907	7,089	6,514	6,411	5,329	6,204	5,991	4,905	6,454	6,766	7,301	7,704	33
Hunter days	34,357	34,332	41,409	42,028	41,393	36,704	37,322	32,899	27,611	38,627	37,552	48,011	49,215	43
Harvest (no. of animals)	1,574	1,849	2,216	1,504	2,172	1,882	2,227	2,398	1,825	2,632	2,924	2,492	2,691	71
Expenditure ($ million)	1.6	1.6	1.9	2.0	2.0	1.9	2.0	1.7	1.5	2.2	NA	NA	NA	38
Consumer surplus ($ million)	1.6	1.7	2.0	2.1	2.1	1.9	2.0	1.8	1.6	2.2	NA	NA	NA	37
Non-Resident Hunters														
Number of hunters	97	80	77	72	114	167	107	115	103	147	110	95	109	12
Hunter days	686	492	452	435	785	1,234	796	710	525	809	567	395	124	-82
Harvest (no. of animals)	48	36	38	25	48	43	31	31	37	48	43	30	41	-15
Expenditure ($ million)	0.2	0.2	0.2	0.2	0.3	0.5	0.3	0.3	0.2	0.4	NA	NA	NA	43
Consumer surplus ($ million)	0.04	0.03	0.03	0.03	0.05	0.1	0.06	0.05	0.04	0.07	NA	NA	NA	52

NOTES:
Due to rounding, percentage changes may not equal the percentage change of the dollar values presented in the table
NA – data not available
Source: BCMOE (2008)

24.3.3 Tenured Traplines

24.3.3.1 Tenured Trapline Areas, Infrastructure, and Harvest

Registered trapping tenures are administered by the Fish and Wildlife Branch of the BCMOE. The registered trapline system is the primary management tool for the commercial use of fur-bearing animals. In 1926, the province was divided into registered traplines, giving the trapline owner the exclusive right to trap fur-bearing animals inside the trapline area. Traplines typically cover a large land area, and there are 16 traplines overlapping with the LAA (Figure 24.2), half of which are held by or used by Aboriginal trappers through agreements with the registered trapline owners. Trappers also often build cabins on their traplines to facilitate trapping. There are cabins located within the Project activity zone and reservoir impact line, and BC Hydro is confirming the location of cabins that would need to be relocated.

Trappers access trapping areas by foot, snowshoe, horse, snowmobile, all-terrain vehicle, or truck. Methods chosen depend on the level of access and the desire to create or maintain new access to areas within the trapline. Linear access includes roads, trails, and cutlines. Boats are also used to reach trapping areas along the Peace and Moberly rivers. Local roads such as the Medicine Woman Road, Jackfish Lake Road, and the Del Rio Road are used by trappers south of the river. Trappers access the LAA regularly during the trapping season and noted the importance of these trails or roads for their traplines (Trapper Interviews 2012, pers. comm.).

Trapping does occur along the breaks and lower benches north of the Peace River. One trapper noted that the trapping locations are based on distribution of animals throughout a trapline, which is affected by plant growth and weather (Trapper Interviews 2012, pers. comm.). Two trappers commented that they avoid trapping along the Peace River due to water level fluctuations affecting trapping success. Marten, beaver, and fisher were the most commonly trapped species in the LAA (Figure 24.3). Table 24.13 summarizes the harvest from the traplines overlapping the LAA between 2001 and 2008. The data may not include harvest by Aboriginal trappers, as they are not required to supply the provincial government with harvest reports. As a result, harvest data from up to half of the traplines may not be presented here.

Table 24.13 Trapping Harvests in Traplines within the Local Assessment Area, 2001 to 2008

Species Harvested	Total Harvest (2001–2008)	Average Annual Harvest
Beaver	255	32
Black bear	2	<1
Coyote	90	11
Fisher	37	5
Fox	12	2
Lynx	31	4
Marten	1,684	211
Mink	25	3
Muskrat	73	9
Otter	1	<1
Squirrel	4,072	509
Weasel	334	42
Wolf	7	1
Wolverine	5	1
Total	**6,628**	**829**

NOTE:
Totals may not add up, due to rounding
Source: B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011b pers. comm.)

24.3.3.2 Tenured Trapline Operating and Economic Information

Collectively, marten, lynx, beaver, and fisher made up an average of 60% of the annual trapping revenue between 2005 and 2008 (Table 24.14). Based on low annual trapping revenues, trapping is pursued more often as a lifestyle or subsistence activity, rather than as a primary income source.

Table 24.14 Trapping Values for Traplines in the Local Assessment Area, 2005 to 2008

Animals Harvested	Average Annual Harvest	Average Price per Animal ($)	Price Range ($)	Average Annual Revenue ($)	Average Royalty per Animal ($)	Average Annual Royalty per Animal ($)
Beaver	47	26.68	22.47 – 28.27	1,253.96	0.77	36.19
Coyote	29	33.30	24.47 – 42.16	965.70	1.13	32.77
Fisher	13	87.10	70.68 – 94.33	1,132.30	1.99	25.87
Fox	3	25.87	21.33 – 31.66	77.61	0.85	2.55
Lynx	26	170.79	138.41 – 203.28	4,440.54	5.14	133.64
Marten	459	71.01	57.88 – 80.31	32,593.59	1.88	862.92
Mink	9	17.98	14.96 – 21.33	161.82	0.56	5.04
Muskrat	8	3.99	2.62 – 6.73	31.92	0.10	0.80
Otter	2	71.56	39.70 – 152.78	143.12	3.94	7.88
Squirrel	323	1.38	1.22 – 1.46	445.74	0.04	12.92
Weasel	79	7.50	5.31 – 9.30	592.50	0.19	15.01
Wolf	2	98.60	75.39 – 129.57	197.20	2.60	5.2
Wolverine	1	230.61	169.04 – 297.48	230.61	6.00	6.0
Total (all animals)	**1,001**	**65.11**	**2.62 – 297.48**	**65,175.11**	**1.94**	**1,941.94**

NOTE:
Source: B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011b pers. comm.)

Traplines are transferable and may be sold by the registered holder. The price of a trapline depends on abundance of valuable fur-bearers and presence of infrastructure (e.g., cabin). Recent prices for traplines ranged from $15,000 to $25,000 (BCMOE, Wildlife Biologist 2009c pers. comm.). The price of some traplines south of the LAA have sold for higher prices, but the primary purpose for these areas may be recreation, since a trapline licence allows one to construct a cabin on Crown land without additional permitting. In these cases, owners may only register the minimum harvest required to maintain active status, as opposed to actively trapping for fur.

24.3.3.3 Aboriginal Use of Tenured Traplines

Aboriginal people are involved in the use of half of the traplines overlapping the LAA, either as the registered owner or through agreements with the registered owner (Trapper Interviews 2012, pers. comm.). Aboriginal trapping is described in more detail in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes.

24.3.4 Tenured Guide Outfitting

24.3.4.1 Tenured Guide Outfitter Areas, Infrastructure, and Harvest

There are four guide outfitters with hunting territories overlapping the LAA (Figure 24.4). One guide outfitter identified up to three cabins within the LAA that may be affected by inundation (Guide Outfitter Interviews 2012, pers. comm.). Two cabins located near the Peace River downstream of the Site C dam site are not within the inundation area. One

guide outfitter has licence of occupation for a hunting camp within the footprint of the proposed Site C dam site.

One outfitter indicated that 40–50% of his hunts occur adjacent to the Peace River in November, and during the spring and fall bear hunts (Guide Outfitter Interviews 2012, pers. comm.). He offers charter fishing, boat operation, camping, and day use on islands on the Peace River. Another outfitter indicated that the Peace River valley is a good area for hunting as far up as Maurice Creek across from Hudson's Hope, and that he provides hunts on horseback in areas with limited access between Hudson's Hope and Taylor (Guide Outfitter Interviews 2012, pers. comm.). Another outfitter's spring bear hunt occurs in the area of Bullhead and Portage Mountain (Guide Outfitter Interviews 2012, pers. comm.).

Outfitters commented that traffic detours or access restrictions that result from construction or industrial activities in the region adversely affect guided outfitting hunting experience for clientele and, in turn, can affect outfitters' operations and revenue (Guide Outfitter Interviews 2012, pers. comm.). In general, the outfitters are concerned with increased competition for resources through increased access in the LAA and RAA, as well as diminished wilderness experience due to visible industrial activities or the need for or exposure to motorized access. (Guide Outfitter Interviews 2012, pers. comm.). Some outfitters indicate that the oil and gas industry and forestry have already disturbed their guiding areas to the point where few untouched hunting areas remain (Guide Outfitter Interviews 2012, pers. comm.).

Table 24.15 shows outfitters' quotas (2007 to 2011) and harvests (2006 to 2010) in the LAA.

Table 24.15 Quotas (2007 to 2011) and Harvests (2006 to 2010) for the Full Tenured Areas for Guide Outfitters whose Territories Overlap with the Local Assessment Area ~~Guide Outfitters~~

Tenure #	700551		701241		701222		701245	
Species	**Quota**	**Harvest**	**Quota**	**Harvest**	**Quota**	**Harvest**	**Quota**	**Harvest**
Black bear	N/A	36	N/A	15	N/A	39	N/A	12
Cougar	0	0	N/A	1	0	0	0	0
Elk (antlerless)	15	44[b]	6	10[b]	0	3[b]	37	43[b]
Other elk	8[a]		4[a]		0[a]		24[a]	
Grizzly bear	5	2[a]	5	0	15	2	11	7
Lynx	0	0	0	0	N/A	1	0	0
Moose (bull)	N/A	14	N/A	3	N/A	22	N/A	17
Mountain goat	0	0	0	0	5	1	12	7
Mule deer	N/A	38	N/A	18	N/A	2	N/A	8
Stone sheep	4	1	0	0	0	0	0	0
Whitetail deer	N/A	31	N/A	27	N/A	18	N/A	80
Wolf	N/A	0	N/A	0	N/A	2	N/A	2
Total	**32**	**165**	**15**	**71**	**20**	**90**	**84**	**176**

NOTES:
[a] 2008 to 2011
[b] Including bulls not included in the quota
N/A – not applicable
Source: B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator (2011b pers. comm.)

24.3.4.2 Tenured Guide Outfitter Operating and Economic Information

Outfitters whose tenures overlap the LAA offer a variety of species and hunts, with moose and deer accounting for the majority of hunter effort, harvest, and expenditures (Table 24.15 and Table 24.16). Approximately half of the outfitters' clients are American, with the remainder coming from Europe, New Zealand, Australia, and other parts of Canada outside of B.C. One outfitter identified that the recent downturn in the U.S. economy has affected their operation, experiencing almost a 50% drop in clientele over the last five years (Guide Outfitter Interviews 2012, pers. comm.).

Table 24.16 Business Profile of Guide Outfitters in the Technical Study Area

Guide Outfitter Tenure #	Location	Management Unit	Hunts and Adventures Offered
700551	Hudson's Hope	7-35, 7-43	Black bear, cougar, deer, elk, grizzly bear, lynx, moose, wolf, freshwater angling, photo safaris, trail rides, wildlife viewing, cross-country skiing
701241	Charlie Lake	7-31, 7-35, 7-36	Black bear, deer, grizzly bear, moose, wolf, stone sheep
701222	Chetwynd	7-31	Black bear, cougar, deer, elk, grizzly bear, goat, lynx, moose, wolf, wolverine, photo safaris, wildlife viewing
701245	Chetwynd	7-21, 7-22, 7-32	Black bear, cougar, deer, elk, grizzly bear, goat, lynx, moose, wolf, trail rides, photo safaris, wildlife viewing

NOTE:
Source: GOABC (2012)

24.3.4.3 Aboriginal Participation in Tenured Guide Outfitting Operations

Three elders from the West Moberly First Nation were identified as working as guides for one guide outfitter operation (Guide Outfitter Interviews 2012, pers. comm.). There are no Aboriginal-owned tenured guide outfitter operations overlapping the LAA.

24.4 Effects Assessment

Potential Project effects on the harvest of fish and wildlife resources are presented for all construction phase components and for all operations phase components because:

- The effects mechanism is the same for all project components (i.e., harvesting is affected by changes in access due to the Project activity zone)
- Government response to potential effects (e.g., changes in harvest quotas) and proposed mitigation would be associated with the combined effects on licensees and the public

24.4.1 Effects Assessment – Construction – Changes in Fishing Opportunities

The potential to adversely affect fishing opportunities is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to fishing areas
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the fish and fish habitat VC

The following indicators are used to describe potential effects during construction:

- Public fishing areas
- Public fishing harvests

24.4.1.1 Changes in Public Fishing Areas

During the construction phase, there are two key changes that would affect use of and access to public fishing areas:

- Access restrictions due to construction activities
- Change of the Peace River to a reservoir during Site C reservoir filling

Some access restrictions due to public safety and site management would apply during construction and Site C reservoir filling. The following public access and safety approach would apply to the Peace River during construction:

- Due to public safety concerns associated with boat traffic within the Site C dam site area, boat passage would be permanently restricted at the Site C dam site beginning in Year 1 of construction
- Boat access would be restricted on either side of the Site C dam site construction zone, including approximately 3 km upstream of the Site C dam site, through the entire construction period
- Due to the placement of a debris collection boom in construction Year 2, boat access on the Peace River would be restricted approximately 12 km from the Site C dam site in the vicinity of Wilder Creek
- Based on debris boom placement, access to the Peace River upstream of Wilder Creek would be permitted through the final six years of construction. However, temporary restrictions would occur throughout the river during periods when specific project activities (e.g., vegetation clearing, Hudson's Hope shoreline protection, and Highway 29 construction) would take place.
- It is expected that both the Lynx Creek and Halfway River boat launches would remain open during construction through to Site C reservoir filling, which is proposed late in construction Year 7, with temporary closures
- The Site C reservoir may be closed to navigation during the Site C reservoir filling period and early Site C reservoir operations due to debris and slope stability hazards

The access restrictions and initial Site C reservoir use limitations would reduce use of and access to fishing opportunities in the LAA during construction. Anglers would likely use alternative fishing areas when restricted on the Peace River, such as the Peace River downstream of the Site C dam site, the Pine River, Dinosaur Reservoir, or other areas in the region.

24.4.1.2 Changes in Public Fishing Harvests

During construction, the movement of fish and aquatic productivity patterns would change, with some species benefiting and others adversely affected, due to habitat changes. Per Volume 2 Section 12 Fish and Fish Habitat, Project effects on fish during the construction period include:

- During river channelization (Years 1–4), fish would successfully pass through the dam site with no expected effect on harvested fish populations
- During river diversion (Years 5–7), fish passage will be affected at the dam site due to diversion works:

  - Anticipated decrease in harvest opportunities of cold/clear water sport fish group including bull trout, arctic grayling, and mountain whitefish from the dam site to Peace Canyon dam, due to blocked passage at the dam site
  - No anticipated effect to harvest of cool/turbid water group including walleye, burbot, and northern pike within the LAA
- During river diversion (Years 5–7), fish will be affected by changes in water quality and associated increases in turbidity (i.e., increased sedimentation due to headponding upstream of the dam):
  - Anticipated decreased harvest opportunities of cold water species from Cache Creek to the Pine River confluence, due to avoidance of turbidity
  - No anticipated effect to harvest of cool water species, given tolerance for turbid conditions
- During reservoir filling in Year 8, harvest opportunities will be disrupted throughout the reservoir as the river environment transitions to a reservoir environment

Areas of the river where fish will be affected by turbidity will be largely closed to public access beginning in Year 1 of construction (dam site closure 3 km upstream and downstream) and in Year 2 (up to Wilder Creek due to debris boom placement); therefore, in these cases, the effects on fishing opportunities will be due to changes in access, rather than effects on the availability of harvested species.

24.4.2 Effects Assessment – Operations – Changes in Fishing Opportunities

The potential to affect fishing opportunities is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to fishing areas
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the fish and fish habitat VC

The following indicators are used to describe potential effects during operations:

- Changes in public fishing areas
- Changes in public fishing harvests

24.4.2.1 Changes in Public Fishing Areas

During the initial years of Project operations, it is expected that Site C reservoir access would be managed for public safety by monitoring floating debris and slope stability hazards. Volume 3 Section 25 Outdoor Recreation and Tourism identifies BC Hydro's approach to providing new Site C reservoir and shoreline access. As access restrictions are lifted, the Site C reservoir would provide new fishing areas, both from the water and the shoreline. Both the surface area of the Site C reservoir and the length of the shoreline would increase.

Boat and shoreline access would be provided at three BC Hydro boat launches (see Volume 3 Appendix E Outdoor Recreation Mitigation Plan). The Site C reservoir is expected to provide good navigational opportunities to support fishing (Volume 3

Section 26 Navigation), and would be supported by amenities constructed to facilitate access and use.

Fishing opportunities downstream of the Site C dam site would also change. Boating access would be limited to areas accessible from Peace Island Park, including the downstream Peace River and the Pine River. The Pine River would likely remain the main destination for anglers launching from Peace Island Park. Angling opportunities at the Pine River would be unchanged by the Project.

In general the Site C reservoir would likely support fishing opportunities similar to the Dinosaur Reservoir upstream with similar fish species available for harvest (B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment Coordinator 2012b pers. comm.). The Site C reservoir would support a wider variety of boats than the river does today, and would also be expected to offer new winter ice fishing opportunities (Section 11.7 Thermal and Ice Regime in Volume 2 Section 11 Environmental Background).

In summary, the Project would result in a beneficial effect on fishing areas during operations.

24.4.2.2 Changes in Public Fishing Harvests

During operations, the movement of fish and aquatic productivity patterns would change, with some species benefiting and others adversely affected, due to habitat changes. As described in Volume 2 Section 12 Fish and Fish Habitat, results from the fish community scenario modelling indicate an estimated ~~three~~1.8-fold increase in total biomass of fish in the reservoir relative to baseline conditions in the Peace River, though with a different species composition. Burbot, lake trout, rainbow trout, walleye, and northern pike are expected to increase in their overall biomass (increases in burbot, lake trout, northern pike, and rainbow trout offset decreases in walleye). The total biomass of Arctic grayling, mountain whitefish, and bull trout is expected to decline due to declines in the biomass of mountain whitefish and Arctic grayling. The changes in overall biomass are driven by an increase in kokanee and lake whitefish over both the near and long term, which would sustain harvestable fish populations in the reservoir.

Site C operations would result in ecological conditions that would allow Arctic grayling, bull trout, mountain whitefish, and rainbow trout populations to extend their distribution downstream into Alberta. Other species such as kokanee and lake trout would establish distributions immediately downstream of the Site C Dam, similar to the pattern that presently exists downstream of the Peace Canyon Dam. Downstream of the dam, modelling indicates the total biomass of fish is expected to increase by 1.2 to 1.4-fold. A 45% to 80% decrease in burbot, lake trout, rainbow trout, walleye, and northern pike is predicted to occur, but this would be counteracted by a 1.8 to 1.9-fold increase in the biomass of Arctic grayling, mountain whitefish and bull trout. This is due primarily to a doubling of mountain whitefish, which are assumed to benefit from increased water clarity downstream of the dam. Bull trout and Arctic grayling are expected to decline. Kokanee and lake whitefish are expected to contribute a negligible amount of biomass to the river downstream of the dam.

Volume 2 Section 12 Fish and Fish Habitat provides further information about expected Site C reservoir fish species composition, abundance, and harvest opportunities.

24.4.3 Mitigation Measures – Change in Fishing Opportunities

Mitigation measures to address adverse Project effects on fishing opportunities during construction will be achieved through the following commitments described in other sections of the EIS, including:

- Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism, and Volume 3 Section 26 Navigation) will mitigate construction effects on fishing opportunities (i.e., changes in public fishing harvest areas)
- Measures that support fish and fish habitat (Volume 2 Section 12 Fish and Fish Habitat), and therefore that support fish populations, will assist in mitigation of construction effects on fishing opportunities (i.e., changes in public fishing harvests). For example:
    - Bull trout passage upstream of the dam site during the river diversion phase will be facilitated by a trap and haul process to allow migration upstream to spawning locations in the Halfway River, which is expected to mitigate potential effects on bull trout population during construction and operations, therefore maintaining bull trout availability for harvest

24.4.4 Effects Assessment – Construction – Changes in Hunting Opportunities

The potential to adversely affect hunting opportunities is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to hunting areas
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC (Volume 2 Section 14 Wildlife Resources)

The following indicators are used to describe potential effects during construction:

- Changes in public hunting areas
- Changes in public hunting harvests

24.4.4.1 Changes in Public Hunting Areas

The Project effects on hunting areas would occur when Project activities begin. No-access zones would be put in place within Project activity zone areas where BC Hydro has obtained legal rights. These areas would include the Site C dam site and off-site construction materials locations.

Hunting within other Project work areas such as the Project access road, Highway 29 realignment corridors, and Site C reservoir vegetation clearing areas would be restricted as defined by existing regulations governing the use of firearms.

As described in Section 24.4.1.1, access restrictions due to public safety and site management would apply during construction and Site C reservoir filling. The access restrictions and initial Site C reservoir use limitations would reduce use of and access to hunting opportunities in hunting areas along the Peace River access during construction.

Table 24.17 shows the area of LEH area 7-20a that is within the Project activity zone and reservoir impact lines.

Table 24.17 Limited Entry Hunting Area in LAA

LEH Area (ha)	Five-Year Beach Line [a]	Site C Dam Site Area [b]	Transmission Line [c]	Construction Access Roads [d]	Quarried & Excavated Materials [e]	Five-Year Beach Line to Outermost Impact Line [f]	Total
	ha						
1,786,224	9,522.1	1,653.2	1,316.6	413.0	630.7	8,663.7	22,199.3

NOTES:

[a] Five-Year Beach Line is the predicted extent of shoreline retreat at the maximum normal reservoir level five years after impoundment of the proposed reservoir as defined in Volume 2 Appendix B Geology, Terrain Stability, and Soil Reports, Part 2 Preliminary Reservoir Impact Lines

[b] Site C dam site and substation construction areas and restricted access zones, as described in Volume 1 Section 4 Project Description

[c] Transmission line corridor and one-time clearing areas as described in Volume 1 Section 4 Project Description

[d] Permanent and temporary roads, Highway 29 realignment as described in Volume 1 Section 4 Project Description

[e] Off-site construction material sources as described in Volume 1 Section 4 Project Description

[f] Five-Year Beach Line to outermost impact line including the stability impact line, landslide-generated wave impact line, or flood impact line, as defined in Volume 2 Appendix B Geology, Terrain Stability, and Soil Reports, Part 2 Preliminary Reservoir Impact Lines

Source: Adapted from Hillcrest Geographics (2012)

New temporary construction access roads would include all-season clearing roads (approximately 23 km) along the Site C reservoir and construction sites, and winter clearing roads (approximately 113 km), and temporary spans would be used to access islands for clearing activities. As these roads do not currently exist, there would be no change to hunting areas or access, compared with baseline conditions. In consideration of public safety hazards and associated use restrictions, these roads could be used during the construction period by hunters to gain access to previously inaccessible areas, but these temporary access roads would be reclaimed or inundated after clearing is complete.

The maximum hunting area affected by construction would be 0.8% of hunting areas in the LEH. Hunting would not be restricted within the reservoir impact lines. As a result of reduced hunting areas, hunting on Peace River islands would be lost and hunting activity would be displaced to other areas within and outside the LAA such as the Pine River.

24.4.4.2 Changes in Public Hunting Harvests

The Wildlife Resources Effects Assessment (Volume 2 Section 14) assesses potential Project effects on non-migratory game birds (key indicators: Sharp-Tailed and Ruffed Grouse), ungulates (key indicators: moose, elk, mule deer, and white-tailed deer) and large carnivores (key indicators: grey wolf and grizzly bear).

Ruffed Grouse and Sharp-Tailed Grouse are affected by direct loss of habitat and habitat fragmentation. These birds are also expected to be disturbed and displaced by construction activities. Direct and indirect mortality is expected due to construction activities, flooding, and collisions with equipment, machinery, and vehicles. Hunting

pressure was also assumed to increase due to increased human presence in the region during construction.

Ungulates are expected to move away from areas directly affected by construction activities. Construction activities, including flooding, may result in direct and indirect mortality of ungulates; however, there is a harvestable surplus of ungulates in the region under baseline conditions. Hunters are expected to shift the focus of their activities to new areas away from the Project activity zone.

Grizzly bear have been locally extirpated from the Peace River valley under baseline conditions, and grey wolf are affected by local predator control measures. The Project is not expected to have an additive effect on large carnivores, and hunting of large carnivores is not expected to be affected.

As the agency responsible for the implementation of the *Wildlife Act*, the BCMOE would determine the availability of hunting opportunities and manage any change in availability of harvestable animals through changes to the current hunting regulations.

24.4.5 Effects Assessment – Operations – Changes in Hunting Opportunities

The potential to adversely affect hunting during operations is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to hunting areas
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on wildlife resources (Volume 2 Section 14 Wildlife Resources)

The following indicators are used to describe potential effects during operations:

- Changes in public hunting areas
- Changes in public hunting harvests

24.4.5.1 Change in Public Hunting Areas

Public hunting areas correspond to any accessible public land where game is present (unless otherwise restricted by regulations). After the first several years of operation, full boater use would be expected in the majority of the Site C reservoir, providing access to hunting areas inaccessible during construction. Hunting areas closer to the Site C dam site and the Moberly reach could be restricted for longer periods of time, due to public safety considerations related to slope stability and woody debris hazards.

The area available for public hunting would not be changed due to Project operations, and there would be no restrictions on hunting activity within the reservoir impact lines. No effects on hunting areas are expected as a result of operation of the Site C reservoir and the Site C dam and generating station.

24.4.5.2 Changes in Public Hunting Harvests

Changes in hunting harvests during operations would be dependent upon Project effects on game animals. Game birds, ungulates, and large carnivores are not expected to be affected by the Project during operations.

If success rates change for LEH as a result of Project activities, then the province would adapt its quotas to maintain its harvesting objectives. The province would monitor ungulate populations and adjust harvest levels and seasons as required.

24.4.6 Mitigation Measures – Changes in Hunting Opportunities

Mitigation measures to address Project effects on hunting opportunities during construction will be achieved through the following commitments described in other sections of the EIS, including:

- Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Appendix E Outdoor Recreation Mitigation Plan) will mitigate construction effects on hunting opportunities (i.e., changes in public hunting areas)
- Measures that support wildlife and wildlife habitat, and therefore that support harvestable game populations, will mitigate construction effects on hunting opportunities (i.e., changes in public hunting harvests) (see Volume 2 Section 14 Wildlife Resources)

No effects on hunting opportunities are expected as a result of operations and therefore no mitigation is proposed.

24.4.7 Effects Assessment – Construction – Changes in Use of Harvesting Areas

The potential to affect harvest of fish and wildlife resources is assessed by taking into account the potential for the Project to result in changes to the following key aspect:

- Use of hunting and fishing areas

Change to the following key indicator is used to describe potential changes in the number of local fishers and hunters during construction:

- Public hunting and fishing licence sales

Table 24.18 shows the estimated change in use of harvesting areas due to direct, indirect, and induced population changes attributable to the Project. The full results of the Project population model are available in Volume 4 Section 28 Population and Demographics. The assumptions that were used to estimate demand are based on a study of mobile workers, and a survey of Peace region residents and questions regarding their likelihood of recreating on the Site C reservoir (Nichols Applied Management 2007; Kirk & Co. Consulting Ltd. and Synovate Ltd. 2009). Calculations are also based on recent licence sales in the Peace Region as a percentage of the total population of the Peace River Regional District (Table 24.5 and Table 24.6). People who migrate to the Peace Region would be expected to remain in the region at least for the duration of the construction phase. The demand for hunting and fishing opportunities would increase in the first five years of construction, as predicted by the analysis. As the workforce requirements of the Project would start to decline in Year 6, so too would the associated incremental change in demand for hunting and fishing licences.

Table 24.18 Estimated Changes in Use of Harvesting Areas

Workforce and Population Assumptions	Year of Construction								
	0	1	2	3	4	5	6	7	8
	Incremental Change in Number of Licensed Anglers and Hunters								
20% of camp workers would engage in outdoor recreation or harvesting activities	29	71	37	0	26	116	-29	-100	-107
22% of camp workers engaged in outdoor recreation or harvesting activities would fish	6	16	8	0	6	25	-6	-20	-24
22% of in-migrants will fish	66	107	50	7	60	65	-23	-70	-150
Total camp workers and in-migrants expected to fish	**72**	**123**	**58**	**7**	**66**	**90**	**-29**	**-90**	**-174**
14% of camp workers engaged in outdoor recreation or harvesting activities would hunt	4	10	5	0	4	16	-4	-12	-15
14% of in-migrants would hunt	42	68	32	4	38	42	-15	-44	-95
Total camp workers and in-migrants expected to hunt	**46**	**78**	**37**	**4**	**42**	**58**	**-19**	**-56**	**-110**

NOTES:

Use estimates should not be considered additive for any given year, as the same person could engage in all activities. Changes in demand are based on assumptions adapted from Nichols Applied Management 2007, Kirk & Co. Consulting Ltd. and Synovate Ltd. 2009, and recent fishing and hunting licence sale data. Population changes are based on modelling of Project population effects (Volume 4 Section 28 Population and Demographics).

The Project is expected to increase the number of licensed anglers by 416 by Year 5 of construction, or an average of 69 anglers per construction year, equivalent to a 3% increase above the baseline. After Year 5 of construction, licensed anglers would be expected to decrease by 293 up to the end of the construction period. The net change in licensed anglers during the construction period would be an estimated increase of 112 anglers, or an average increase of 12 anglers per year.

The number of hunting licence holders in the Peace Region in 2007 (latest year available) was 8,659, or approximately 14% of the population of the Peace River Regional District. The Project would be expected to increase the number of licensed hunters by 265 by Year 5 of construction or an average of 44 per year; 265 hunters represents 3% of the baseline number of hunters. After Year 5 of construction, demand for hunting licences would be expected to decrease by 185 hunters over the last three years of the construction phase. The net change in licensed hunters during the construction period would be an estimated increase of 80, or an average increase of nine hunters per year. The potential effect of the Project on use of harvesting areas is considered positive.

24.4.8 Mitigation Measures – Changes in Use of Harvesting Areas

An increase in the use of harvesting areas attributable to the Project is not considered an adverse effect. The Fish and Wildlife branch of the Ministry of Environment manages fish and wildlife harvesting. It is a management objective of the Ministry of Environment to increase participation in fishing and hunting at a provincial level (B.C. Ministry of Forests, Lands and Natural Resource Operations, Environmental Assessment

Coordinator 2012b pers. comm.). As a result, mitigation measures by BC Hydro are not warranted.

24.4.9 Effects Assessment – Construction – Changes in Trapping Opportunities

The potential to adversely affect trapping opportunities is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to trapline areas
- Tenured areas, and specific harvest areas within tenured areas, using spatial analysis
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC

Changes to the following indicators are used to describe potential effects during construction:

- Tenured trapping areas and infrastructure
- Trapline harvest volumes, and trapline operations and revenue
- Aboriginal use of tenured traplines

24.4.9.1 Changes in Tenured Trapping Area and Infrastructure

The Site C dam site area would be restricted as a trapping area throughout construction, whereas other Project components would only be restricted as trapping areas during active work periods. Project activities would overlap with a maximum of 13,701.5 ha (2.3%) of the 16 registered traplines within the LAA (not including the reservoir impact lines). Trapping will be permitted to continue within the reservoir impact lines. For individual traplines, overlaps with the Project activity zone would range from 0% to 11.7% (Table 24.19) of total trapline area, or 0% to 5.9%, not including the reservoir impact lines.

Table 24.19 Trapline Areas in LAA

Trapline	Total Trapline Area	Five-Year Beach Line [a]	Site C Dam Site Area [b]	Transmission Line [c]	Construction Access Roads [d]	Quarried & Excavated Materials [e]	5-Year Beach Line to Outermost Impact Line [f]	Total	% of Trapline Area
	ha								
TRO731T002	77,425	0.0	0.0	0.0	0.0	104.0	0.0	104.0	0.1
TRO731T005	48,911	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRO731T007	32,229	65.7	0.0	53.5	0.0	0.0	13.8	133.0	0.4
TRO732T001	8,289	131.7	0.0	77.3	0.0	0.0	18.4	227.4	2.7
TRO732T002	36,181	41.9	0.0	346.7	0.0	0.0	16.0	404.6	1.1
TRO732T003	32,779	1,669.1	0.0	0.0	14.2	0.0	818.7	2,502.0	7.6
TRO732T004	21,634	867.1	0.0	0.0	15.4	0.0	1,303.6	2,186.1	10.1
TRO732T005	46,741	525.9	964.7	532.2	54.5	0.0	1,269.3	3,346.6	7.2
TRO732T006	43,278	0.0	0.0	313.9	5.7	142.4	0.0	462.0	1.1
TRO734T001	55,256	2,010.2	688.5	1.4	15.4	198.5	2,185.0	5,099.0	9.2
TRO734T002	37,062	1,223.7	0.0	0.0	112.7	46.6	867.2	2,250.2	6.1
TRO734T003	17,765	1,031.3	0.0	0.0	9.3	3.9	1,038.7	2,083.2	11.7
TRO735T001	11,755	144.1	0.0	35.5	0.6	148.2	26.7	355.1	3.0
TRO735T002	24,386	148.0	0.0	0.0	18.0	40.8	23.3	230.1	0.9
TRO735T004	57,334	352.9	0.0	0.0	65.2	15.6	117.8	551.5	1.0
TRO735T005	48,359	1,328.7	0.0	0.0	102.1	34.8	967.5	2,433.1	5.0
Total	**599,384**	**9,540.2**	**1,653.2**	**1,360.5**	**413.0**	**734.6**	**8,665.9**	**22,367.4**	**3.7**

NOTES:

[a] Five-Year Beach Line is the predicted position extent of shoreline retreat at the maximum normal reservoir level five years after impoundment of the proposed reservoir, as defined in Volume 2 Appendix B Geology, Terrain Stability, and Soil Reports, Part 2 Preliminary Reservoir Impact Lines

[b] Site C dam site and substation construction areas and restricted access zones, as described in Volume 1 Section 4 Project Description

[c] Transmission line corridor and one-time clearing areas, as described in Volume 1 Section 4 Project Description

[d] Permanent and temporary roads, and Highway 29 realignment, as described in Volume 1 Section 4 Project Description

[e] Off-site construction material sources as described in Volume 1 Section 4 Project Description

[f] Five-Year Beach Line to outermost impact line including the stability impact line, landslide-generated wave impact line, or flood impact line, as defined in Volume 2 Appendix B Geology, Terrain Stability, and Soil Reports, Part 2 Preliminary Reservoir Impact Lines

Source: Hillcrest Geographics (2012)

The Project would displace trapping activities on existing traplines that overlap the Project footprint. For example, flats along the Peace River and its tributaries where trapping occurs would no longer be available.

Up to six cabins associated with traplines would be inundated by the Project or are within the reservoir impact lines. Safety considerations related to existing or proposed trapline cabins and supporting structures within reservoir impact lines would be evaluated based on erosion, stability, and landslide-generated wave hazards. There is a possibility that some of the existing cabins could be moved to another area of the tenure, or remain where they are, pending further site-specific analysis. BC Hydro would engage existing tenure holders and, where appropriate, based on further geotechnical investigations, enter into agreements to address the removal or relocation of these buildings, or outline the conditions upon which the buildings could remain. Standard mitigation of effects on tenure holders would apply for cabins affected by the Project (Section 24.1.3). Project-related road access would increase fragmentation of the landscape, and could increase vandalism or damage to traps, stands, cabins, and informal camp sites. These potential effects would be temporary, as the majority of Project roads are temporary and would be decommissioned following construction activities. The Project access road would be permanent; however, it is in an area already accessible to the public on existing resource roads.

Due to the implementation of standard mitigation measures (i.e., BC Hydro will have discussions with affected registered trappers and, where appropriate, enter into agreements) the Project is not expected to affect tenured trapping areas and infrastructure.

24.4.9.2 Changes in Trapline Harvest Volumes, Trapline Operations and Revenue

Project construction activities are expected to negatively affect beavers and fisher due to habitat loss, disturbance, and displacement as well as direct and indirect mortality. As a result, fur harvests during construction in those portions of traplines in the reservoir may be affected. Portion of traplines outside the reservoir are not expected to experience a change in fur harvests.

24.4.9.3 Changes in Aboriginal Use of Tenured Traplines

First Nations use approximately 50% of the affected traplines (or eight of the 16 traplines) either as registered owners or through agreements with the registered trapline owner (Trapper Interviews 2012, pers. comm.). The Project is not expected to change the level of Aboriginal use of tenured traplines because all eight of the traplines will be available for use. Over 90% of tenured trapline areas would remain available for use during construction. Other aspects of Aboriginal use of traplines and trapping are addressed in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes.

24.4.10 Effects Assessment – Operations – Changes in Trapping Opportunities

The potential to adversely affect trapping opportunities is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to trapline areas

- Tenured areas, and specific harvest areas within tenured areas, using spatial analysis
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC (Volume 2 Section 14 Wildlife Resources)

Changes to four key indicators are used to describe potential changes in trapping opportunities and success during operations:

- Changes in tenured trapping areas and infrastructure
- Changes in trapline harvest volumes and areas
- Changes in trapline operation or revenue
- Changes in Aboriginal use of tenured traplines

24.4.10.1 Changes in Tenured Trapping Areas and Infrastructure

No additional effects on trapping areas and infrastructure would be expected as a result of operation of the Project reservoir and generating station.

24.4.10.2 Changes in Trapline Operation or Revenue

The Site C reservoir operations would have relatively small reservoir level fluctuations (1.8 m), which could improve conditions for trapping along the shoreline compared with baseline conditions (Volume 2 Section 11.4 Surface Water in Volume 2 Section 11 Environmental Background).

24.4.10.3 Changes in Aboriginal Use of Tenured Traplines

No change to Aboriginal use of tenured traplines would be expected during Project operations.

24.4.11 Mitigation Measures – Changes in Trapping Opportunities

Mitigation of effects on trapping opportunities will be achieved through commitments described in other sections of the EIS, including:

- Mitigation measures that support fur-bearing populations, within Volume 2 Section 14 Wildlife Resources, will support the availability of harvestable species for trapping. For example, BC Hydro may permit local trappers to hunt beaver prior to inundation to further prevent losses of the fur resource during flooding.

24.4.12 Effects Assessment – Construction – Changes in Guide Outfitting Activities

The potential to adversely affect guide outfitting activities is assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to guide outfitter areas
- Tenured areas, and specific harvest areas within tenured areas, using spatial analysis

- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC (Volume 2 Section 14 Wildlife Resources)

Changes to four key indicators are used to describe potential changes in guide outfitting activities during construction:

- Changes in guide outfitter areas and infrastructure
- Changes in guide outfitter harvest volumes and areas
- Changes in guide outfitter operations or revenue
- Changes in Aboriginal participation in tenured guide outfitting operations

24.4.12.1 Changes in Guide Outfitter Areas and Infrastructure

The Site C dam site area would be restricted as an outfitting area throughout construction, whereas other Project components would only be restricted as outfitting areas during active work periods. Maximum occupation of the land base during construction activities would be 9,719.2 ha (0.6%) of the guide outfitting areas (not including the Site C reservoir impact line) (Table 24.20). Guide outfitting activities will be permitted to continue within the reservoir impact lines. About 97% (14,410.5 ha) of the Project activity zone and the area within the reservoir impacts lines is located within guide outfitting areas held by two outfitters.

Table 24.20 Guide Outfitter Territories in LAA

Guide Outfitter Tenure #	Total Guiding Area	Five-Year Beach Line [a]	Site C Dam Site Area [b]	Transmission Line [c]	Construction Access Roads [d]	Quarried & Excavated Materials [e]	Five-Year Beach Line to Outermost Impact Line [f]	Total	% of Guiding Area
	ha								
700551	300,679	1,811.7	0.0	0.0	185.3	91.2	1,108.5	3,196.7	1.1
701241	158,079	139.1	0.0	35.6	0.6	148.2	26.7	350.2	0.2
701222	470,324	9.0	0.0	42.9	0.0	104.0	2.3	158.2	<0.1
701245	830,497	4,501.2	1,056.1	1,281.9	89.8	222.6	4,026.1	11,213.8	1.4
Total	**1,759,579**	**6,461.0**	**1,056.1**	**1,360.5**	**275.7**	**565.9**	**5,199.6**	**14,918.8**	**0.8**

NOTES:

[a] Five-Year Beach Line is the predicted extent of shoreline retreat at the maximum normal reservoir level five years after impoundment of the proposed reservoir, as defined in Volume 2 Appendix B Geology, Terrain Stability, and Soil Reports, Part 2 Preliminary Reservoir Impact Lines

[b] Site C dam site and substation construction areas and restricted access zones, as described in Volume 1 Section 4 Project Description

[c] Transmission line corridor and one-time clearing areas, as described in Volume 1 Section 4 Project Description

[d] Permanent and temporary roads, and Highway 29 realignment, as described in Volume 1 Section 4 Project Description

[e] Off-site construction material sources, as described in Volume 1 Section 4 Project Description

[f] Five-Year Beach Line to outermost impact line including the stability impact line, landslide-generated wave impact line, or flood impact line, as defined in Volume 2 Appendix B Geology, Terrain Stability, and Soil Reports, Part 2 Preliminary Reservoir Impact Lines

< – less than

Totals may not add up, due to rounding

Source: Hillcrest Geographics (2012)

Up to three cabins used by guide outfitters on the Peace River shoreline would be inundated by the Site C reservoir or are within the reservoir impact lines. A hunting camp in the area of the proposed Site C dam site would also need to be relocated. Safety considerations relating to any existing or proposed new guide outfitter cabins and supporting structures within reservoir impact lines would be evaluated based on erosion, stability, and landslide-generated wave hazards. There is a possibility that some of the existing cabins could be moved to another area of the tenure, or remain where they are today, pending further site-specific analysis. BC Hydro would engage existing tenure holders and, where appropriate, based on further geotechnical investigations, enter into agreements to address the removal or relocation of these buildings, or outline the conditions upon which the buildings could remain. Standard mitigation of effects on tenure holders would apply for cabins affected by the Project (refer to Section 24.1.3).

24.4.12.2 Changes in Guide Outfitter Harvest Volumes and Areas

One outfitter's spring bear hunt occurs in the area of Bullhead and Portage Mountain. His activities would be permanently displaced from areas used for the proposed Portage construction materials source (Guide Outfitter Interviews 2012, pers. comm.).

After Site C reservoir filling, guide outfitting activities would be permanently displaced from the area of the Site C reservoir and the Site C dam site. Guide outfitters would hunt in adjacent areas or perhaps further afield in their territories, depending on effects on the movement of large game.

The Project access road would be permanent; however, it is in an area already accessible to public hunting on existing resource roads.

The change in harvest areas is very small relative to the total guiding areas, and activities will continue in areas not affected by Project activities. No effects are expected on guide outfitter harvest volumes of ungulates and large carnivores.

24.4.12.3 Changes in Guide Outfitter Operations and Revenue

Outfitters would avoid Project construction areas in response to major construction activities, including clearing of the Site C reservoir and realignment of Highway 29. Guide outfitting operations would be expected to continue during the construction phase and therefore no effects on guide outfitter operations and revenue are expected.

As described in Section 24.4.1.1, access restrictions due to public safety and site management would apply during construction and Site C reservoir filling. The access restrictions and initial Site C reservoir use limitations would reduce use of and access to guide outfitter operations along the Peace River during construction.

24.4.12.4 Changes in Aboriginal Participation in Tenured Guide Outfitting Operations

The Project would not be expected to change Aboriginal participation in tenured guide outfitting operations, as guide outfitting activities would be able to continue during the construction phase.

24.4.13 Effects Assessment – Operations – Changes in Guide Outfitting Activities

The potential to adversely affect harvest of wildlife resources would be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to guide outfitter areas
- Tenured areas, and specific harvest areas within tenured areas, using spatial analysis
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the wildlife resources VC (Volume 2 Section 14 Wildlife Resources)

Changes to the following key indicators are used to determine potential changes in guide outfitting activities during operations:

- Guide outfitter areas and infrastructure
- Guide outfitter harvest volumes and areas
- Guide outfitter operations or revenue
- Aboriginal participation in tenured guide outfitting operations

No potential effects during operations are identified on guide outfitter areas, infrastructure, harvest volumes and areas, or operations and revenue.

The Project would not be expected to change Aboriginal participation in tenured guide outfitting operations, as guide outfitting activities would be able to continue during the Project operating phase.

24.4.14 Mitigation Measures – Changes in Guide Outfitting Activities

Mitigation of changes in guide outfitting opportunities and success during construction will be achieved through commitments described in other sections of the EIS, including:

- Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation) will mitigate construction effects on guide outfitting operations
- Communications regarding area or road closures, as part of a Public Safety Mitigation Plan, would help outfitters plan their guided adventures (Volume 5 Section 35 Summary of Environmental Management Plans)
- Mitigation measures that support game populations, within Volume 2 Section 14 Wildlife Resources, will support the availability of harvestable species for guide outfitting activities

24.5 Summary of Effects Assessment and Mitigation Measures

A summary of potential effects and mitigation measures is shown for harvest of fish and wildlife in Table 24.21.

Table 24.21 Project Effects and Mitigation Measures on Harvesting of Fish and Wildlife Resources

Project Phase	Potential Effect	Mitigation Measures	Mitigation Effectiveness	Responsibility
Construction	Changes in fishing opportunities	▪ Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation) will mitigate construction effects on fishing opportunities (i.e., changes in public fishing harvest areas). ▪ Measures that support fish and fish habitat (Volume 2 Section 12 Fish and Fish Habitat) and therefore that support fish populations will mitigate construction effects on fishing opportunities (i.e., changes in public fishing harvests).	Mitigation measures that address boating, shoreline and navigational access are common approaches in the construction of dams by BC Hydro province-wide and are expected to be effective. The effectiveness of mitigation measures for fish and fish habitat are included in Volume 2 Section 12 Fish and Fish Habitat. A residual adverse effect is expected, due to temporary losses of fishing opportunities as a result of construction.	BC Hydro and those groups and municipalities provided funds from BC Hydro to permit and build new infrastructure
Operations	Changes in fishing opportunities	▪ Not applicable.	Not applicable. A residual positive effect on fishing opportunities is expected during the operations phase.	Not applicable

Project Phase	Potential Effect	Mitigation Measures	Mitigation Effectiveness	Responsibility
Construction	Changes in hunting opportunities	▪ Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation) will mitigate construction effects on hunting opportunities (i.e., changes in public hunting areas). ▪ Measures that support wildlife and wildlife habitat and therefore that support harvestable game populations will mitigate construction effects on hunting opportunities (i.e., changes in public hunting harvests) (see Volume 2 Section 14 Wildlife Resources).	Mitigation measures that address boating, shoreline and navigational access are common approaches in the construction of dams by BC Hydro province-wide and are expected to be effective. The effectiveness of mitigation measures for wildlife resources are included in Volume 2 Section 14 Wildlife Resources. A residual adverse effect is expected due to temporary losses of hunting opportunities as a result of construction.	BC Hydro and those groups and municipalities provided funds from BC Hydro to permit and build new infrastructure.
Operations	Changes in hunting opportunities	▪ Not applicable.	Not applicable. There are no residual effects expected on hunting opportunities during operations.	Not applicable
Construction	Changes in use of harvesting areas	▪ Not applicable.	Not applicable. A residual positive effect on use of harvesting areas is expected during the construction phase.	Not applicable
Construction	Changes in trapping opportunities	▪ Mitigation measures that support fur-bearing populations, described within Volume 2 Section 14 Wildlife Resources, will support the availability of harvestable species for trapping.	The effectiveness of mitigation measures for wildlife resources are included in Volume 2 Section 14 Wildlife Resources. There are no residual effects expected on trapping opportunities during contruction.	BC Hydro
Operations	Changes in trapping opportunities	▪ Not applicable	Not applicable. There is no residual effect.	Not applicable

Project Phase	Potential Effect	Mitigation Measures	Mitigation Effectiveness	Responsibility
Construction	Changes in guide outfitter activities	▪ Communications regarding area or road closures, as part of a Public Safety Management Plan, will help outfitters plan their guided activities. ▪ Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation) will mitigate construction effects on guide outfitter operations ▪ Mitigation measures that support game populations, described within Volume 2 Section 14 Wildlife Resources, will support the availability of harvestable species for guide outfitting activities.	Not applicable There is no residual effect.	Not applicable
Operations	Changes in guide outfitter activities	▪ Mitigation measures that support large game populations, described within Volume 2 Section 14 Wildlife Resources.	Not applicable. There is no residual effect.	Not applicable

As summarized in Table 24.21, with mitigation, Project construction would have an adverse effect on fishing, due to reduced access to fishing areas and potentially reduced fish harvest. During operations, the Project would have a beneficial effect, and fishing opportunities would be expected to increase over baseline conditions, as the Site C reservoir would support increased boating and angling use, and would continue to support sport fish.

With mitigation, construction activities would adversely affect hunting opportunities in the LAA. While mitigation measures are intended to maintain baseline conditions for access to hunting opportunities beyond the construction period, access would be affected by construction activities until boat launches could be replaced and full access to hunting areas accessed from the Site C reservoir would be available – that is, after the first year of operation and in consideration of ongoing access restrictions to the Site C dam site for public safety reasons.

Fur-bearer trapping harvests and revenue could decrease during construction as a result of potential decreases to fur-bearers due to habitat loss. Effects on trapping opportunities or harvest levels caused by Project activities would be mitigated through discussions and, where appropriate, agreements with the affected tenure holders

(Section 11.3 Land Status, Tenure, and Project Requirements in Volume 2 Section 11 Environmental Background). This mitigation measure is considered standard mitigation, per Section 24.1.3 Standard Mitigation Measures and Effects Addressed. Trapping will remain viable on all traplines overlapping with the Project. No residual effects are expected for the construction phase.

Effects on guide outfitting activities will be mitigated through discussions and, where appropriate, agreements with the affected tenure holders (Section 11.3 Land Status, Tenure, and Project Requirements in Volume 2 Section 11 Environmental Background). This mitigation measure is considered standard mitigation, per Section 24.1.3 Standard Mitigation Measures and Effects Addressed. No residual effects are expected.

24.5.1 Other Mitigation Options Considered

There were no other mitigation measures considered by BC Hydro for effects on harvest of fish and wildlife resources.

24.6 Residual Effects

24.6.1 Characterization of Residual Effects

The potential for adverse effects on harvest of fish and wildlife resources is evaluated for significance based on the consideration of attributes summarized in Table 24.22.

Table 24.22 Characterization Criteria for Residual Harvest of Fish and Wildlife Resources Effects

Criterion	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The ultimate long-term trend of the effect	**Increase:** key indicators of the VC are increasing in comparison to baseline conditions and trends
		Decrease: key indicators of the VC are decreasing in comparison to baseline conditions and trends
		Neutral: indicators of the VC are unchanged in comparison to baseline conditions and trends
Magnitude	The amount of change in a key indicator or variable relative to baseline case	**Low:** effect cannot be distinguished from baseline case conditions
		Moderate: effect would result in demonstrable change, but remain within historic norms
		High: effect results in changes that are beyond historic norms
Geographical Extent	The geographic area in which an effect of a defined magnitude occurs	**Local:** the expected measurable changes occur within the LAA
		Regional: the expected measurable changes occur within the RAA
Frequency	The number of times during a project or a specific project phase that an effect may occur	**Once:** the effect occurs once
		Sporadic: the effect occurs rarely and at irregular intervals
		Continuous: the effect occurs on a regular basis and at regular intervals
Duration	The period of time required until the VC returns to its baseline condition, or the effect	**Short term:** effect is limited to < 1 year
		Medium term: effect occurs > 1 year but not beyond the construction of the Project

Criterion	Description	Quantitative Measure or Definition of Qualitative Categories
	can no longer be measured or otherwise perceived	**Long term**: effect lasts beyond the construction phase and up to 10 years of the operations phase
		Far future: effect extends > 10 years or for the life of the Project
Reversibility	The likelihood that a key indicator will recover from an effect	Effect reversible with reclamation and/or over time
		Effect irreversible and cannot be reversed with reclamation and/or over time
Context	This refers to the extent to which the area within which an effect may occur has already been adversely affected by human activities; and is ecologically fragile, has little resilience and resistance to imposed stresses	**Resilient:** the area is resilient to change and can respond to imposed stresses
		Not resilient: the area has little resilience to change and is resistant to imposed stresses
Level of Confidence	Certainty in quantifying or estimating the effect; the quality and/or quantity of data; the understanding of the effect mechanisms; and the effectiveness of mitigation	**Low:** assessment is based on professional judgment and experience, but hampered by incomplete understanding of cause-effect relationships or lack of data
		Moderate: assessment is based on professional judgment and experience, including a reasonable understanding of cause-effect relationships and ample data
		High: assessment is based on professional judgment and experience, including a good understanding of cause-effect relationships and ample data.
Probability	The likelihood that an adverse effect will occur	**Low:** < 50% probability that the effect will occur
		High: > 50% probability that the effect will occur
		Unknown: the probability of the effect is unknown, due to incomplete understanding of the cause-effect relationship or lack of data

The magnitude of residual adverse effect on fishing opportunities is moderate, as changes in public fishing areas and harvests would represent a demonstrable change, but changes are not considered beyond historical norms. Shifting activities away from development areas occurs in response to oil and gas and forestry activities in the region. The river itself has also been dammed previously. As was the case for the construction of the two other dams on the Peace River, there would be a decrease in access to fishing opportunities in the LAA during construction and, as a result, anglers would be displaced away from the river. The geographic extent of the effect would be local (i.e., restricted to the LAA). The effect would be long term (i.e., until after the first year of operation) and continuous (due to changes in access), but reversible. While fishing areas and fish harvest would be restricted during construction prior to inundation, with the creation of the Site C reservoir, restrictions to fishing areas and harvest would be reversed. In terms of social context, existing fishing opportunities are limited by the general need to have a motorized boat, but the region has many good fishing opportunities. The area is considered resilient to changes, as alternative opportunities are available outside the LAA and within the RAA, and the Peace River is also already a regulated river. The level of confidence in the adverse effects is moderate based on the reliability of effects on fish and fish habitat and the schedule for changes in access. The probability of an adverse effect during construction is high because physical changes in the Project activity zone, particularly Site C reservoir filling, would alter fishing areas.

The magnitude of the residual adverse effect on hunting opportunities is low, as changes in public hunting areas and harvests cannot be distinguished from baseline case conditions. The geographic extent of the effect would be local (restricted to the LAA). The effect would be long term (i.e., until after the first year of operation) and continuous but reversible, as hunters would adapt their activities to suit new wildlife distribution. In terms of social context, existing hunting opportunities are widely available in the RAA. The area is considered resilient to changes, as alternative opportunities are available outside the LAA and within the RAA. The level of confidence in the effects is moderate based on the reliability of effects on wildlife resources and the schedule for changes in access. The probability of an adverse effect during construction is high because physical changes in the Project activity zone, particularly the Site C reservoir, would alter hunting areas.

Residual adverse effects on fishing and hunting opportunities would result in an overall residual adverse effect on the harvest of fish and wildlife resources VC. The characterization of the residual effects is summarized in Table 24.23.

Table 24.23 Characterization of Residual Effects on Harvest of Fish and Wildlife Resources

Effect	Phase	Residual Environmental Effects							
		Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Social Context	Level of Confidence	Probability
Changes in Fishing Opportunities	Construction	Decrease (adverse)	Moderate	Local	Long term and continuous	Reversible	Resilient	Moderate~~High~~	High
Changes in Hunting Opportunities	Construction	Decrease (adverse)	Low	Local	Long term and continuous	Reversible	Resilient	Moderate~~High~~	High

24.6.2 Standards of Thresholds for Determining Significance

All of the residual effects criteria were taken into consideration in the determination of significance, as described in Section 24.6.1. Particular consideration was given to magnitude, duration, and context. These criteria take into account the way the provincial government manages wildlife and fish resources in response to industrial activities. The province evaluates changes in the status of fish and wildlife populations to set catch and bag limits for specific bodies of water and management units. If a Project were to affect fish and game such that catch limits and bag limits would be reduced, that may be considered a significant effect. Geographic extent and context are also important criteria to consider, as fishing and hunting opportunities in the PRRD are not limited to local water bodies or management units. Anglers and hunters can adapt their hunting and fishing locations to unaffected and accessible areas, and to places away from large construction zones. Therefore, significant adverse effects on fishing and hunting opportunities would occur if the changes are beyond historic norms (magnitude), result in the reduction of catch limits in the LAA or bag limits in management units in the LAA (geographic extent), occur over the long term (duration), and are such that anglers and hunters cannot respond and adapt their fishing and hunting locations to take advantage of alternative opportunities in the PRRD (context).

In all cases, changes should be reasonably attributed to the Project against base case conditions, which include macro-economic factors and broader trends in fish and wildlife harvesting. Specific thresholds are discussed in the context of identified potential effects and apply expert knowledge of government and industry.

24.6.3 Determination of Significance of Residual Effects

The potential residual effects during construction and operations on fishing, hunting, and trapping do not meet the above threshold. Fishing opportunities will increase during operations, and catch limits will not be reduced as a result of the Project. Hunting will continue in areas around the Site C reservoir and bag limits will not be reduced as a result of the Project. Therefore, the effects are not considered significant.

A summary of potential residual project effects, mitigation, and significance determination is presented in Table 24.24.

Table 24.24 Summary of Assessment of Potential Significant Residual Adverse Effects

Valued Component	Project Phase	Potential Adverse Effect	Key Mitigation Measures	Significance Analysis of Residual Effects
Harvest of fish and wildlife resources	Construction	Decrease in fishing opportunities	▪ Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation) will mitigate construction effects on fishing opportunities (i.e., changes in public fishing harvest areas). ▪ Measures that support fish and fish habitat (Volume 2 Section 12 Fish and Fish Habitat), and therefore that support fish populations, will mitigate construction effects on fishing opportunities (i.e., changes in public fishing harvests).	Not significant
	Construction	Decrease in hunting opportunities	▪ Measures that support recreational shoreline use, boating access, and water-based navigation (Volume 3 Section 25 Outdoor Recreation and Tourism; Volume 3 Section 26 Navigation) will mitigate construction effects on hunting opportunities (i.e., changes in public hunting areas). ▪ Measures that support wildlife and wildlife habitat, and therefore that support harvestable game populations, will mitigate construction effects on hunting opportunities (i.e., changes in public hunting harvests) (see Volume 2 Section 14 Wildlife Resources),	Not significant

24.7 Cumulative Effects Assessment

24.7.1 Screening of Cumulative Effects

A screening of the Project's potential contribution to the cumulative effects was done in accordance with the procedures described in Volume 2 Section 10 Effects Assessment Methodology. The screening process establishes two conditions to warrant further assessment. These conditions are: (1) the Project results in a residual effect, and (2) these effects would act in a cumulative fashion with those of other projects and activities (i.e., spatial and temporal overlap).

The potential residual adverse effects of the Project on harvest of fish and wildlife would be a result of effects on fishing, hunting, and trapping resources (namely fishing,

hunting, and trapping areas, and fishing, hunting, and trapping harvests) during construction.

Other projects that are expected to interact with harvest of fish and wildlife resources residual effects are listed in Table 24.25. A full project inclusion list is included at the end of Volume 2 Section 10 Effects Assessment Methodology.

Table 24.25 Projects that could Interact with Harvest of Fish and Wildlife Resources Residual Effects

Site C Clean Energy Project Residual Effect	**Other Project (Name of Project)**	Description of**Project**	**Potential Overlap with Site C**	Potential Cumulative Effect **Interaction with Harvest of Fish and Wildlife Resources**
Long-term (i.e., during the construction period and first year of operation) decrease in hunting and fishing opportunities	Montney Gas Play	Shale rock deposits containing large quantities of natural gas	Potential for oil and gas development to continue near the Site C dam site and within Project impact lines	No: may result in increased access in the LAA; not expected to result in adverse residual cumulative effects on harvest of fish and wildlife
	All other reasonably foreseeable projects in the RAA	▪ Underground and surface mines ▪ Pipelines ▪ Waste management projects ▪ Wind projects	Temporal overlap is unknown; none of the projects are within the LAA	Yes: expected to contribute to residual adverse effects on hunting displaced from the LAA as a result of the Project
	Land tenure[a]	Applications for oil, gas, water, range and other land tenures, forest harvest plans	Temporal overlap is unknown; some overlap with Project activity zone	No: land tenure applications represent a continuation of existing multiple use patterns and levels

NOTES:

[a] Further information is available in Section 11.3 Land Status, Tenure, and Project Requirements in Volume 2 Section 11 Environmental Background

The Montney Gas play is expected to have a positive effect on road and trail access in the LAA over time. Therefore, no residual adverse cumulative effects are expected on harvest of fish and wildlife in the LAA.

The reasonably foreseeable Projects above would not affect the harvest of fish resources within the LAA, and therefore would not combine with Project effects on the harvest of fish resources in the LAA. Further assessment of cumulative effects of changes in fishing is not required.

Reasonably foreseeable projects in the RAA are expected to have similar effects on hunting opportunities as the Project, in relation to changes in access and displacement of activities and wildlife away from the Project activity zone. As a result, access to public hunting areas in the RAA~~LAA~~ would be affected.

Applications for *Land Act* tenures, new oil and gas facilities, and forestry harvest plans and tenures would overlap spatially with the Project activity zone, but these would represent a continuation of existing baseline conditions. Oil and gas facilities, as

approved by the Oil and Gas Commission, are already included in the consideration of the Montney Gas play. Range tenures issued by B.C. Ministry of Forests, Lands and Natural Resource Operations represent a continuation of grazing activity for the region's livestock sector. Similarly, harvesting plans are typical licences to cut that are regularly issued under the terms of a licensee's forest tenure. Harvest of fish and wildlife already interacts with these activities and therefore no residual effect is anticipated in the LAA.

Population changes in the RAA due to the workforce requirements of reasonably foreseeable projects could increase the use of harvesting areas during the construction and operations phases of the Project. However, population projections for the region that were used in the assessment of changes in the use of harvesting areas consider the population effects of reasonably foreseeable projects. Therefore, the assessment of residual project effects considered the cumulative population effects of reasonably foreseeable projects during the construction and operations phases of the Project. Based on this, further assessment of cumulative effects of changes in the use of harvesting areas was not carried out.

24.7.2 Description of Cumulative Effects

During project construction, hunting would be displaced from the LAA to other parts of the RAA. The same effect is expected to occur with the above identified RAA projects. Therefore, access to public hunting areas would be expected to decrease overall, resulting in a cumulative residual adverse effect.

24.7.3 Cumulative Effects Mitigation Measures

In general, proponents (including BC Hydro) determine measures to minimize effects on public access to areas used for harvesting activities. For example, BC Hydro is mitigating effects on access to the Peace River by replacing boat launches. This will help to mitigate changes in access to harvesting areas for hunting. BC Hydro will also implement mitigation measures to mitigate potential effects on wildlife populations.

24.7.4 Residual Cumulative Effects

Conservatively, the residual cumulative adverse effects of changes in access and increased disturbances on hunting opportunities could result in a cumulative effect of moderate magnitude and regional geographic extent. Due to the lack of ample data regarding footprints and effects on access of the reasonably foreseeable projects, the level of confidence in estimating this cumulative effect is low.

24.7.5 Characterization of Residual Cumulative Effects

The characterization of the residual effects described above is summarized in Table 24.23.

Table 24.26 Characterization Criteria for Residual Cumulative Harvest of Fish and Wildlife Resources Effects

Effect	Phase	Residual Cumulative Effect							
		Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Social Context	Level of Confidence	Probability
Changes in Hunting Opportunities	**Construction**	Decrease	Moderate	Regional	Long term and continuous	Reversible	Resilient	Low	High

24.7.6 Determination of Significance of Residual Cumulative Effects

Cumulative effects on hunting opportunities are not expected to result in the reduction of bag limits within LAA management units. Therefore, the effect is not considered significant.

24.8 Monitoring and Follow-Up

As the level of confidence in residual effects predicted for harvest of fish and wildlife resources is high, there are no monitoring or follow-up programs proposed for this VC.

Monitoring and follow-up programs dealing specifically with fish and wildlife are described in Volume 2 Section 12 Fish and Fish Habitat and in Volume 2 Section 14 Wildlife Resources.

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