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File No.: 2080

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***Sent via email: [ministre-minister@ec.gc.ca](mailto:ministre-minister@ec.gc.ca); [information@iaac-aeic.gc.ca](mailto:information@iaac-aeic.gc.ca)***

Hon. Steven Guilbeault  
Minister of Environment and Climate Change  
Fontaine Building 12<sup>th</sup> floor  
200 Sacré-Coeur Blvd  
Gatineau QC K1A 0H3

Dear Minister Guilbeault:

## **Re: Request for Designation of Snake Lake Reservoir Expansion Project**

### **Request for Designation**

I am writing on behalf of our clients Alberta Wilderness Association, Bow Valley Naturalists, Society of Grasslands Naturalists, Sierra Club Canada Foundation – Prairie Chapter, Canadian Parks and Wilderness Society – Southern Alberta Chapter (CPAWS), Southern Alberta Group for Environment (SAGE), Nature Alberta, Arlene Kwasniak, and David Swann (together the “Interested Parties”). The Interested Parties hereby request that the Minister exercise his discretion pursuant to section 9(1) of the Impact Assessment Act to designate the Snake Lake Reservoir Expansion project (the “Project”).

The Interested Parties became aware of the Project from several sources, starting with public media releases ([09 October](#) and [21 December](#), 2020), and then in a Government of Alberta (GOA) [technical fact sheet](#) (09 October, 2020), informal discussions with irrigation district representatives in the summer of 2021, and information posted on the Alberta Water Portal ([Why Alberta Irrigation Matters](#), 05 August 2021).

The Interested Parties make this request in accordance with the Impact Assessment Agency of Canada’s [“Operational Guide: Designating a Project under the \*Impact Assessment Act\*”](#).

## **Project Description**

Project name: Snake Lake Reservoir Expansion

Project proponent: Eastern Irrigation District

Proponent contact information:

550 Industrial Road West,  
Brooks, AB T1R 1B2  
403-362-1400  
[eid@eid.ca](mailto:eid@eid.ca)

Project details:

According to the Alberta Water Portal Society,

The proposed Snake Lake Reservoir expansion plan will increase the reservoir live storage by approximately 53000 acre-feet to 67000 acre-feet.

Currently, 140000 irrigated acres are either unsupported by a reservoir or receive limited reservoir support. Approximately 50000 of these acres are downstream of the Snake Lake Reservoir. The Snake Lake Reservoir expansion will reduce the unsupported acres in the District by 35 per cent.

The remaining 90000 acres will continue to be unsupported by a reservoir, but will see increased indirect support due to the increase of acres being supported from the Snake Lake Reservoir Expansion.<sup>1</sup>

The Project's construction schedule has not yet been disclosed.

The Project is one activity of a broader, coordinated irrigation expansion and modernization program proposed by Irrigating Alberta Inc., itself an entity wholly owned and controlled by ten of Alberta's Irrigation Districts, including the Eastern Irrigation District. This broader program consists of the modernization of 85 components of irrigation infrastructure and the construction or expansion of four off-stream reservoirs, including the Snake Lake Reservoir Expansion project. The broader program would be the largest expansion of irrigation infrastructure and irrigated lands in Alberta's history, including over 200 kilometers of new or converted pipelines and canals, over 1,850 hectares of new reservoir footprint, and over 95,000 hectares of newly irrigated land. The broader program of physical activities has total funding of \$933 million, 50% of which is being provided by the Government of Canada through the Canada Infrastructure Bank. The Government of Alberta is providing 30% of the funding and the involved irrigation districts are providing 20% of the funding. The Project's cost is expected to be \$170 million.<sup>2</sup>

To be clear, this request for designation is only for the Snake Lake Reservoir Expansion project, and not for the entire expansion and modernization program which Irrigating Alberta Inc. is

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<sup>1</sup> Online at <<https://albertawater.com/eastern-irrigation-district-projects-overview/>>.

<sup>2</sup> Online at <<https://majorprojects.alberta.ca/details/Snake-Lake-Reservoir-Expansion/4373>>.

undertaking. However, the Snake Lake Reservoir Expansion project exists within the broader context of the overall expansion and modernization program, and its potential effects must be viewed in light of their contribution to the broader program, which is likely to have a very significant cumulative impact on the already stressed South Saskatchewan River Basin and its subbasins.

### **Project Effects Warranting Designation**

1. Is the project near a threshold set in the Project List?

Answer: No. However, the Project would result in the Snake Lake Reservoir's surface area increasing by roughly 700 hectares (a 200% increase from its existing ~375 hectares), and would result in the Snake Lake Reservoir's storage capacity increasing by 43 million m<sup>3</sup> (a 300% increase from its existing 14.0 million m<sup>3</sup>). The Project would therefore result in a significant increase in the Snake Lake Reservoir's size in relative terms.

2. Is the project near or in an environmentally or otherwise sensitive location?

Answer: Yes. The Project is located within the Red Deer and Bow River subbasins, which are stressed watersheds already suffering from increasingly high water demand. Enlarging reservoirs on these systems could add further pressures to instream flow, aquatic life and biodiversity, and regional water security.

One of the stated goals of the Project, and the broader Alberta irrigation expansion and modernization program to which it belongs, is to support the future development of irrigated land which implies enabling conversion of dryland cropland and native grasslands to irrigated agricultural lands. The Project footprint also largely consists of native grasslands, including wetlands. Native grasslands are especially important habitats for Alberta's migratory birds and species at risk. The Government of Alberta has identified the conservation of native grasslands as crucial to protecting the ecological integrity of Alberta's natural environments.<sup>3</sup> Less than half of Alberta's natural grasslands remain intact, and are already under extreme and increasing cumulative pressures, including the onset of climate change. The *Principles for Minimizing Surface Disturbance in Native Grassland* ("*Principles*") recognize agricultural conversion as one of the activities resulting in cumulative effects on native grassland ecosystems.<sup>4</sup> The *Principles* state that Alberta's remaining native grasslands are environmentally significant in protecting wildlife habitat, natural landscapes and undisturbed archaeological sites, and provide ecological services such as groundwater recharge, carbon storage, wildlife habitat and biodiversity.<sup>5</sup>

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<sup>3</sup> Alberta Environment and Parks, "Guidelines for native grasslands", online at <<https://www.alberta.ca/land-conservation-and-reclamation-guidelines-for-native-grasslands.aspx>>.

<sup>4</sup> *Principles* at 3, 4, 6.

<sup>5</sup> *Ibid* at 4.

The Project may result in flooding of permanent and temporary wetland habitats for waterfowl and migratory bird species, and may similarly result in the agricultural conversion of permanent and temporary wetland habitats and habitat for waterfowl and migratory bird species, including the Thick-billed (McCown's) Longspur. The cumulative pressures on these sensitive ecosystems in Alberta are already immense.

Furthermore, the Project and the broader expansion program could contribute to the susceptibility of soils for increased erosion in the semi-arid Southern Alberta region. Potatoes, soybeans and sugar beets, high value crops usually grown under irrigation in southern Alberta, are harvested late in the fall, thereby limiting the ability to establish a cover crop for overwintering. As Canada is a signatory to the 2022 *Communique from the Global Forum for Food and Agriculture - Sustainable Land Use: Food Security Starts with the Soil*, the Minister should consider this risk posed by the Project and the broader expansion program.

Because of the sensitivity of the ecosystems in the Project footprint and the significant gaps in publicly available information about the Project's potential impacts, the Interested Parties submit that the Minister should exercise his discretion to designate the Project under the *Impact Assessment Act*.

3. Does the project involve new technology or a new type of activity?

Answer: No.

4. Does the project have the potential to cause adverse effects that are of concern to you and fall within federal jurisdiction?

Answer: Yes. The potential adverse effects are as follows:

- effects on fish, fish habitat, and aquatic species, as defined in subsection 2(1) of the *Species at Risk Act*:

Many downstream aquatic habitats could be implicated in the Project's effects on instream and return flow levels throughout the South Saskatchewan River Basin, as part of the impacts of the broader irrigation expansion and modernization program. Riparian habitat availability and the inadequacy of reservoirs for habitat offsets must also be considered for aquatic species at risk, such as the Rocky Mountain Sculpin.<sup>6</sup> Additionally, the Project's activities must also be assessed with a view to avoiding exacerbating the already significant problem of invasive fish and aquatic vegetation species in Alberta's fisheries.

- effects on species at risk:

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<sup>6</sup> See Chapter 3 of the Government of Canada's *Rocky Mountain Sculpin, Eastslope Populations (Cottus sp.) Recovery Strategy* at 3.4.2, online at <<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/rocky-mountain-sculpin-eastslope-populations/chapter-3.html>>.

The Project may have impacts on several species at risk, either directly or through its contribution to cumulative impacts to the South Saskatchewan River Basin resulting from Irrigating Alberta Inc.'s broader irrigation expansion and modernization program. A non-exhaustive list of the species at risk which may be impacted includes:

- Burrowing Owl (*Athene cunicularia*):
  - SARA federal status: Endangered
  - *Wildlife Act* provincial status: At Risk
  - Burrowing Owl habitat includes open grasslands, agricultural fields and scrubland in southeastern Alberta.<sup>7</sup> Nest sites have been found and monitored within the Eastern Irrigation District.<sup>8</sup> Loss and degradation of suitable nesting and foraging habitat is the single most threat to the survival and recovery of the Burrowing Owl, including through the conversion of native grassland to agricultural crop fields.<sup>9</sup>
  
- Tiny Cryptantha (*Cryptantha minima*):
  - *Species at Risk Act* (“SARA”) federal status: Threatened
  - Tiny Cryptantha is an annual plant species associated with river systems, mainly the South Saskatchewan River valley in eastern Alberta. It is also found in the vicinity of the lower Bow and upper Oldman Rivers.<sup>10</sup> The Tiny Cryptantha exists on coulee slopes that could be impacted by flooding for reservoir construction or expansion. It could also be impacted by conversion of native grasslands.
  
- Thick-billed (McCown's) Longspur (*Rhynchophases mccownii*):
  - SARA federal status: Threatened
  - *Wildlife Act* provincial status: May Be at Risk.
  - This bird species breeds in grassland habitats in southeastern Alberta. The species is associated with native and non-native grasslands and is negatively associated with human-modified habitats such as crops, hayfields and road.<sup>11</sup>

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<sup>7</sup> Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Burrowing Owl Athene cunicularia in Canada*, (Ottawa: 2017) at 11.

<sup>8</sup> Alberta Sustainable Resource Development and Alberta Conservation Association, *Status of the burrowing owl (Athene cunicularia) in Alberta, Update 2005*, (Edmonton: 2005), at 7-10.

<sup>9</sup> *Ibid* at 12-13.

<sup>10</sup> Environment Canada, *Amended Recovery Strategy for the Tiny Cryptantha (Cryptantha minima) in Canada*, (Ottawa: 2012) at 2-3.

<sup>11</sup> Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the McCown's Longspur Rhynchophases mccownii*, (Ottawa: Environment Canada, 2016) at 7-9.

- Greater Short-horned Lizard (*Phrynosoma hernandesi*):
  - SARA federal status: Endangered
  - *Wildlife Act* provincial status: At Risk
  - This species is found at four disjunct areas in southeast Alberta including the South Saskatchewan River valley and the Chin Coulee/Forty Mile Coulee Complex.<sup>12</sup> Construction of dams and irrigation infrastructure, and conversion of native habitat to crop production are listed as threats to the species.<sup>13</sup>
  
- Great Plains Toad (*Anaxyrus cognatus*):
  - SARA federal status: Special Concern
  - *Wildlife Act* provincial status: Sensitive
  - This species occurs on native prairie habitat and has been found in the Suffield area and in the Tilley-Lake Newell-Vauxhall-Taber area.<sup>14</sup> In Canada, the species is exclusively associated with grasslands in the southern Prairie Provinces.<sup>15</sup> The species may be impacted by habitat fragmentation from cropland and irrigation.<sup>16</sup> The relatively large tracts of intact native grasslands in Alberta serve as reservoirs for the population.<sup>17</sup>
  
- Northern Leopard Frog (*Lithobates pipiens*):
  - SARA federal status: Special Concern
  - *Wildlife Act* provincial status: At Risk
  - Within Alberta, the prairie/western boreal population of Northern Leopard Frog is primarily associated with major river drainages and areas of intact native prairie in the southeastern portion of the province, including the lower reaches of the Bow River and Oldman River, and the South Saskatchewan River.<sup>18</sup> Conversion of wetlands in native prairie to cultivation and contamination of wetlands by

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<sup>12</sup> Environment Canada, *Recovery Strategy for the Greater Short-horned Lizard (Phrynosoma hernandesi) in Canada*, (Ottawa: 2015) at 4.

<sup>13</sup> *Ibid* at 7.

<sup>14</sup> Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Great Plains Toad Anaxyrus cognatus in Canada*, (Ottawa: 2010) at 8.

<sup>15</sup> *Ibid* at 9.

<sup>16</sup> *Ibid* at 31-32.

<sup>17</sup> *Ibid* at 32.

<sup>18</sup> Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Update Status Report on the Northern Leopard Frog, Lithobates pipiens, Rocky Mountain Population, Western Boreal/Prairie Populations and Eastern Populations in Canada*, (Ottawa: 2009) at 12-13.

agricultural herbicides and pesticides are threats to the Northern Leopard Frog.<sup>19</sup>

- Lake Sturgeon (*Acipenser fulvescens*):
  - SARA federal status: not listed (under consideration for addition)
  - COSEWIC status: Endangered
  - *Wildlife Act*, provincial status: At Risk
  - Lake Sturgeon are found in the South Saskatchewan River in Alberta and upstream as far as the Oldman Dam on the Oldman River and the Bassano Dam on the Bow River.<sup>20</sup> Reductions in stream flow related to dam operation, and from water extraction, are among the biggest challenges to increasing Lake Sturgeon numbers in Alberta.<sup>21</sup> The impact of water extraction for irrigation is a significant effect on Lake Sturgeon in the South Saskatchewan river system.<sup>22</sup>

A more comprehensive list of potentially impacted species is included as Appendix 1 to this request. A complete project description and impact assessment, including field survey by qualified biologists, are required to identify all the species at risk which could be adversely impacted by the Project.

- effects on migratory birds;

As discussed, the Project may impact important permanent and temporary wetland habitats and habitat for many waterfowl and migratory bird species, including the Thick-billed (McCown's) Longspur, American White Pelican, Prairie Falcon, and Ferruginous Hawk. The Project may also impact native grasslands, which are similarly important habitats for Alberta's migratory bird species. Furthermore, the expansion of the reservoir, as part of the broader Alberta irrigation expansion and modernization program, would contribute cumulatively to the expansion of total irrigated lands in Alberta into these important habitats throughout southern Alberta, and could have adverse effects on the overall security of the South Saskatchewan River Basin in which these habitats exist.

- changes to the environment on federal lands:

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<sup>19</sup> *Ibid* at 32, 36-37.

<sup>20</sup> Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Lake Sturgeon Acipenser fulvescens Western Hudson Bay populations, Saskatchewan-Nelson River populations, Southern Hudson Bay-James Bay populations, Great Lakes-Upper St. Lawrence populations, in Canada*, (Ottawa: 2017) at 15; Alberta Lake Sturgeon Recovery Team, *Alberta Lake Sturgeon Recovery Plan, 2011-2016*, (Edmonton: Alberta Environment and Sustainable Resource Development, 2011) at 11 [Alberta Recovery Plan].

<sup>21</sup> Alberta Recovery Plan, *supra* note 20 at 36-37.

<sup>22</sup> *Ibid* at 37-38.



Federal lands, including reserve lands and Canadian Forces Base Suffield, may experience downstream effects from Project activities. These potential impacts include possible waterflow impacts on the riparian corridors within the Canadian Forces Base Suffield National Wildlife Area (“NWA”), which could in turn create impacts on species at risk in the NWA.<sup>23</sup>

- changes to the environment that occur in a province or territory other than the one where the Project is taking place:

The Project may reduce instream flows in the Bow and South Saskatchewan Rivers through increased diversions from the rivers and reduced return flows to the Red Deer River. The Project also has the potential to impact water quality in the impacted water systems. The impacted rivers flow beyond Alberta into Saskatchewan. The potential impacts from the Project in Alberta therefore also continue downstream into Saskatchewan. The Project would also contribute to the broader Alberta irrigation expansion and modernization program, which likewise has significant potential impacts on instream flow levels in the Bow, Oldman, Red Deer, and South Saskatchewan Rivers. The interconnected nature of these river systems and subbasins within the South Saskatchewan River Basin therefore similarly have the potential for adverse effects of an interprovincial nature.

Because of reduction of instream flows and potential impacts on water quality the Project could affect Alberta and Canada’s obligations under the Agreements on Apportionment between Alberta, Saskatchewan, and Canada. Under the [Agreement between Alberta and Saskatchewan](#), Alberta is obligated to permit a quantity of water equal to one half of the natural flow of a number of watercourses, including the South Saskatchewan River, to flow into Saskatchewan. The agreement is managed and monitored by the Prairie Provinces Water Board, which includes senior officials from the Federal Departments of Environment and Climate Change, and Agriculture and Agri-Food.

The *Approved Water Management Plan for the South Saskatchewan River Basin (Alberta)* (“SSRB Water Management Plan”) found that the lower reaches of the Red Deer, Bow and Oldman rivers as well as the South Saskatchewan mainstem were at least moderately impacted, some heavily impacted and a few degraded by water diversions in these rivers.<sup>24</sup> Accordingly, in 2007, the Government of Alberta issued the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* closing the Bow, Oldman and South Saskatchewan subbasins to new surface water allocations and reserving all unallocated water for:

1. use by a First Nation;

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<sup>23</sup> See the Government of Canada’s online description of the Canadian Forces Base Suffield National Wildlife Area: <https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations/canadian-forces-base-suffield.html>.

<sup>24</sup> Alberta Environment, *Approved Water Management Plan for the South Saskatchewan River Basin (Alberta)*, (Edmonton: 2006) at 4, 7 [SSRB Water Management Plan].



2. a water conservation objective;
3. storage, if it is for the protection of the aquatic environment and for improving the availability of water to existing licence holders;
4. outstanding water licence applications at the time of the order.<sup>25</sup>

The *SSRB Water Management Plan* also recommended a water conservation objective (“WCO”) for these sub-basins of 45 per cent of the natural flow rate, or the existing instream objective increased by 10 per cent, whichever is greater at any moment in time.<sup>26</sup> Recent information from Alberta Environment and Parks and Environment and Climate Change Canada for the Oldman and Bow sub-basins indicate that historically the WCO is seldom met 100 per cent of the time in any given year.<sup>27</sup> In many years, the WCO is met less than 50 per cent of the year, particularly in the summer months. Recorded and calculated flows at various points on the Bow, Oldman and South Saskatchewan Rivers in 2021 indicate that actual flows are well below natural flows due to the diversions for irrigation and other uses, and WCOs, where specified, are often not met.<sup>28</sup>

The Project will not increase the Irrigation District gross allocations under existing licences. However, the irrigation districts have historically used about 66 per cent of their gross allocation.<sup>29</sup> The publicly available Project description does not specify whether the Project will result in the Irrigation District increasing its actual diversions in total or at certain points of the year to fill the additional reservoir capacity. Further, the publicly available Project description does not indicate whether all of the additional area to be irrigated will actually be irrigated based on efficiency and conservation efforts, or whether some additional area to be irrigated will depend on increased diversions.

Furthermore, monitoring pursuant to Alberta’s *Water Quality Management Framework* in recent years has found significant exceedances for water quality triggers for chloride, nitrate, total nitrogen, ph, sulphate, specific conductivity, total dissolved solids and/or *E. coli* at various monitoring sites.<sup>30</sup> Canal

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<sup>25</sup> *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order*, AR 171/2007, ss 2, 4, 6, 8.

<sup>26</sup> *SSRB Water Management Plan*, *supra* note 24 at 8.

<sup>27</sup> Appendix 2 to this document: Cheryl Bradley, “Irrigation Expansion Project: Water Conservation Objectives (WCO) and Instream Objectives (IO) for Potentially Impacted River Reaches”, (Lethbridge: October 2021).

<sup>28</sup> Appendix 3 to this document: Cheryl Bradley, “Yearly Graph of Flows in Potentially Affected River Reaches for 2021 (April – October)”, (Lethbridge: October 2021).

<sup>29</sup> Government of Alberta, *South Saskatchewan Regional Plan, 2014-2024*, (Edmonton: February 2017) at 26.

<sup>30</sup> Government of Alberta, *South Saskatchewan Region Surface Water Quality Management Framework for the Mainstem Bow, Milk, Oldman and South Saskatchewan Rivers (Alberta)*, (Edmonton: 2014) at 27-35 [“*Water Quality Management Framework*”]; Nadine Taube and Jason Kerr, *2018-2019 Status of Surface Water Quality, South Saskatchewan Region, Alberta for April 2018 – March 2019*, (Edmonton: Alberta Environment and Parks, 2020) at 16; Cecilia Chung, J. Patrick Laceby and Jason G. Kerr, *2019-2020 Status of Surface Water Quality, South*

conversion to pipelines, new pipeline construction, reservoir expansion and construction, reservoir operation, changes to instream flows and the expansion of irrigated lands all have the potential to adversely affect water quality in the impacted water systems.

- changes to the environment that occur outside of Canada;

The Project may cause an increase in Canada's Greenhouse Gas (GHG) emissions, in a manner inconsistent with Canada's international and domestic commitments to reduce GHG emissions. To ensure that this concern for the Project's potential adverse effects is taken into account, the Interested Parties submit that a designation order under the *Impact Assessment Act* is warranted.

A growing body of scientific literature is revealing that irrigation agriculture can be a major emitter of GHGs from changes to soil biology and from reservoirs, and can therefore contribute to global climate change. Cultivation of native grasslands results in significant release of GHGs. The Project therefore creates a risk of such an increase in GHG emissions and in Canada's contribution to global climate change. The Project, in its role as part of the broader Alberta irrigation expansion and modernization program, would also contribute to the expansion of irrigated lands, and to the changes in soil biology, crop mixes, fertilizer use, livestock production, use of fossil fuels and reservoir levels across the South Saskatchewan River Basin.

Considering the national and global scope of these potential climate change implications and Canada's international and domestic commitments to reduce GHG emissions, the Project thus engages federal jurisdiction and necessitates a designation order under the *Impact Assessment Act* to ensure that the Project's GHG emissions are properly considered.

- changes to the environment that could affect the Indigenous peoples of Canada:

The *Principles* state that undisturbed grassland areas of Alberta are rich in cultural resources including archeological resources, paleontological resources, historic sites and Indigenous traditional use sites. Historically, the conversion of natural grasslands to agricultural lands destroyed important cultural sites for the Indigenous peoples. Specifically, water management infrastructure such as reservoirs, landscaping, riprapping, dredging and channeling, can complicate and constrain both access to and evaluation of archaeological sites.

Therefore, expanded reservoir construction and the subsequent conversion of native grassland to irrigated lands have the potential to impact important Indigenous archaeological and cultural sites. Considered in the colonial context of cumulative impacts on archaeological and cultural resources including the near

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*Saskatchewan Region, Alberta for April 2019 – March 2020*, (Edmonton: Alberta Environment and Parks, 2021) at 17.

extinction of the plains bison due to overhunting, the conversion of native grasslands to agricultural lands, and the cumulative impacts of agriculture, petroleum development, mining and other land uses, the incremental impact of further irrigation development must be seriously scrutinized.

The Project's impacts on instream flow could also cause impacts on Indigenous water rights. This is especially so since the South Saskatchewan River Basin is fully or nearly fully allocated, and there will be likely water shortages in some watercourses. Alberta uses a legislated "first in time, first in right" prior allocation system for determining priorities for water use. If there is not sufficient water for all users, only the users with the most senior water licences will have a right to withdraw water. Although it is clear that First Nations have asserted and continue to assert water rights, these rights generally are not reflected in water licences. The Interested Parties hold that it would violate the spirit and substance of reconciliation to permit this Project to proceed without examination of potential impact on Indigenous water rights and interests.

Therefore, in the spirit of Canada's commitment to reconciliation with Indigenous peoples, the Interested Parties submit that the Minister should designate the Project under the *Impact Assessment Act* to ensure the Project properly considers the impact on these archaeological and cultural resources.

- o changes occurring to the health, social or economic conditions of the Indigenous peoples of Canada:

The potential impacts on the cultural and ecological resources of Indigenous peoples as described above have ramifications for the social and economic well-being of Indigenous peoples. The integrity of Indigenous cultural and ecological resources are critical components of Indigenous peoples' societal structure, identity, and economic vitality. Considering the detrimental impact of colonial land-use and cultural genocide on Indigenous peoples' socioeconomic health, the Project must be assessed through the lens of reconciliation and in recognition of the immutable link between the cultural and ecological resources of the land and the well-being of Indigenous peoples.

5. Does the project have the potential to cause adverse effects that are directly related or incidental to a federal authority either (i) making a decision that would permit the carrying out, in whole or in part, of the project or (ii) providing financial assistance for the purpose of enabling the project to be carried out, in whole or in part?

Answer: Yes. As discussed above, the Canada Infrastructure Bank has decided to provide significant financial support to the Alberta irrigation expansion and modernization program for the purpose of enabling the Project, among others, to be carried out. The Snake Lake Reservoir Expansion project, and its potential adverse effects, is entirely funded through the Alberta irrigation expansion and modernization program. The potential adverse effects of the Project, described throughout this request, would thus be

directly or incidentally related to a federal authority, namely the Canada Infrastructure Bank, providing financial assistance for the purpose of enabling the Project to be carried out.

6. Does the project have the potential to cause adverse impacts on the section 35 rights of the Indigenous peoples of Canada?

Answer: Yes. As described above, Indigenous peoples may suffer adverse effects to cultural and ecological resources and water rights as a result of the Project. Insofar as Indigenous peoples' access to cultural, archaeological, and ecological resources within the Project footprint or in areas which may be impacted by the Project or the broader expansion and modernization program are protected under s. 35 Aboriginal or Treaty rights, they could potentially suffer the adverse effects of the Project and of the broader expansion and modernization program to which the Project would contribute.

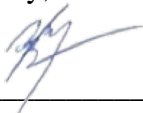
### **Conclusion**

For the above reasons, the Interested Parties submit that the Project: is near or in an environmentally or otherwise sensitive location; has the potential to cause adverse effects that are of concern to us and fall within federal jurisdiction; has the potential to cause adverse effects that are directly related or incidental to a federal authority providing financial assistance for the purpose of enabling the project to be carried out in whole or in part; and have the potential to cause adverse impacts on the section 35 rights of the Indigenous peoples of Canada.

The Interested Parties therefore request that the Minister designate the Snake Lake Reservoir Expansion project under section 9(1) of the *Impact Assessment Act*.

We make this request without prejudice to the Interested Parties' position that the broader Alberta irrigation expansion and modernization program should be considered as one single project. The Interested Parties invite the Minister to exercise his discretion to join the physical activities which comprise the broader Alberta program in any designation and assessment the Minister may deem necessary. The Interested Parties also submit that, for the purposes of impact assessment, it would be most prudent to consider all the broader Alberta program's physical activities and their cumulative effects together as much as possible.

Sincerely,



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Zachary Biech  
Barrister & Solicitor, Ecojustice

## Appendix 1: Species at Risk Potentially Affected by the Proposed Irrigation Expansion Project

The following are species (n=29) listed under the federal *Species At Risk Act, Schedule 1* and under the provincial *Wildlife Act, Wildlife Regulation, Schedule 6* whose ranges overlap wholly or in part with irrigation districts in southern Alberta and for whom threats identified in status reports include loss, fragmentation and degradation of native prairie habitats by cultivation and other agricultural activities, pesticide use and/or water management including dams and diversions.

### Mammals

#### **American Badger (*Taxidea taxus*)**

SARA federal status: Special Concern

American Badger occurs in grasslands with soils that can be burrowed into without collapsing and abundant prey. Cultivated fields are largely avoided although field edges may be used. Decline in habitat and road-kill are the main threats.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the American Badger Taxidea taxus in Canada* (Ottawa: 2013)

### Birds

#### **Baird's Sparrow (*Ammodramus bairdii*)**

SARA federal status: Special Concern

This bird species mainly breeds in large patches of mixed grass prairie with sparse shrubs, moderate grass heights, and some litter. Tame pasture provides less productive habitat. Major threats to Baird's Sparrow survival are habitat loss and degradation due primarily to conversion of native grassland to cropland and alteration of grazing practices and fire regimes. Use of pesticides to control grasshoppers reduces reproductive success.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC assessment and status report on the Baird's Sparrow Ammodramus bairdii in Canada*, (Ottawa: 2012).

Environment and Climate Change Canada, *Management Plan for the Baird's Sparrow (Ammodramus bairdii) in Canada [Proposed]* (Ottawa: 2021)

#### **Bank Swallow (*Riparia riparia*)**

SARA federal status: Threatened

Vertical banks in sand-silt substrates, including riverbanks, aggregate pits and road cuts provide breeding habitat for Bank Swallow. Nearby habitats such as grasslands, meadows and pastures are used for aerial foraging. Threats identified as contributing to species decline include loss of breeding and foraging habitat through activities such as erosion control projects, flood control (dams) and conversion of pastureland to cropland. Widespread pesticide use may cause decreases in the abundance or diversity of flying insects.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC assessment and status report on the Bank Swallow Riparia riparia in Canada*, (Ottawa: 2013).

#### **Barn Swallow (*Hirundo rustica*)**

SARA federal status: Threatened

Cliffs and rock overhangs were preferred nesting sites before colonization. Human-made structures, including barns and bridges, are now preferred nest sites. Threats include declining populations of insect prey, increasing frequency of severe temperature fluctuations during spring migration and the breeding season, and loss of suitable nesting sites.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC assessment and status report on the Barn Swallow Hirundo rustica in Canada*, (Ottawa: 2021).

### **Bobolink (*Dolichonyx oryzivorus*)**

SARA federal status: Threatened

Bobolink habitat includes wet prairie, hayfields, pastures, abandoned fields with tall grasses, and no-till cropland. Nest sites were originally in tall-grass prairie. Bobolink have been found nesting on the Antelope Creek Ranch within the Eastern Irrigation District. Main threats are incidental mortality from agricultural operations, habitat loss caused by conversion of forage crops to row crops, habitat fragmentation and pesticide use.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC assessment and status report on the Bobolink Dolichonyx oryzivorus in Canada*, (Ottawa: 2010).

### **Burrowing Owl (*Athene cunicularia*):**

SARA federal status: Endangered

*Wildlife Act* provincial status: Endangered

Burrowing Owl habitat includes open grasslands, agricultural fields and scrubland in southeastern Alberta. Nest sites have been found and monitored within the Eastern Irrigation District. Loss and degradation of suitable nesting and foraging habitat is the single most threat to the survival and recovery of the burrowing owl, including through the conversion of native grassland to agricultural crop fields.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Burrowing Owl Athene cunicularia in Canada*, (Ottawa: 2017)

Alberta Sustainable Resource Development and Alberta Conservation Association, *Status of the burrowing owl (Athene cunicularia) in Alberta, Update 2005*, (Edmonton: 2005)

### **Chestnut-collared Longspur (*Calcarius ornatus*)**

SARA federal status: Threatened

This bird species breeds in native grassland habitats in southeastern Alberta. The primary threat to the species is degradation and fragmentation of native grassland especially through conversion to annual cropland.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC assessment and status report on the Chestnut-collared Longspur Calcarius ornatus in Canada*. Committee on the Status of Endangered Wildlife in Canada. (Ottawa: Environment Canada, 2019)

Environment and Climate Change Canada. *Amended Recovery Strategy for the Chestnut-collared Longspur (Calcarius ornatus) in Canada*. Species at Risk Act Recovery Strategy Series. (Ottawa: 2018)

### **Common Nighthawk (*Chordeiles minor*)**

SARA federal status: Threatened

Common Nighthawk is an aerial insectivore that feeds on a wide variety of insects at dusk or dawn and nests directly on the ground in a wide range of open habitats during mid-June to late August. Threats may be related to widespread declines in insects caused by the extensive use of pesticides as well a habitat loss and modification from intensive agriculture.



Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Common Nighthawk (Chordeiles minor) in Canada* (Ottawa: 2019)

**Ferruginous Hawk (*Buteo regalis*)**

SARA federal status: Threatened

*Wildlife Act* provincial status: Endangered

In Alberta, Ferruginous Hawk occur in prairie landscapes that are predominantly grassland. Richardson's ground squirrel is the hawk's main prey. Reproductive success is partly dependent on access to safe ground or elevated nesting sites. Conversion of native grassland to cropland is a continuing threat.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Ferruginous Hawk Buteo regalis in Canada*, (Ottawa: 2021).

**Horned Grebe (*Podiceps auritus*)**

SARA federal status: Special Concern

Horned Grebe generally breeds in freshwater on small semi-permanent or permanent ponds and occasionally marshes and shallow bays on lake borders. Emerging vegetation provides nest materials, concealment and anchorage, and protection for the young. Threats to the species include loss of wetlands to agriculture and degradation of nesting sites from the accumulation of fertilizers used in agriculture.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC assessment and status report on the Horned Grebe Podiceps auritus, Western population and Magdalen Islands population, in Canada*, (Ottawa, 2009).

**Lark Bunting (*Calamospiza melanocorys*)**

SARA federal status: Threatened

Lark Bunting occur in grasslands, tame pastures, croplands and roadside ditches in southeastern Alberta. Habitat loss and degradation due to agriculture are considered the primary threat along with effects of pesticides.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Lark Bunting Calamospiza melanocorys in Canada*, (Ottawa: 2018).

**Loggerhead Shrike Prairie subspecies (*Lanius ludovicianus excubitorides*)**

SARA federal status: Threatened

Breeding habitat for Loggerhead Shrike in southern Alberta includes grasslands, tame pasture and old fields with scattered tall shrubs and low trees. Habitat loss and degradation are correlated with population declines. Recovery efforts in Alberta include conserving nesting habitat and planting thorny buffaloberry shrubs.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Loggerhead Shrike (Lanius ludovicianus) in Canada*, (Ottawa: 2015).

Environment Canada, *Recovery Strategy for the Loggerhead Shrike Prairie subspecies (Lanius ludovicianus excubitorides) in Canada*, (Ottawa: 2015)

**Long-billed Curlew (*Numenius americanus*)**

SARA federal status: Special Concern

Long-billed Curlew nest in native grassland and use some agricultural areas for feeding and raising young. Cultivation, urban encroachment and fragmentation of native prairie are primary threats to the species.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Long-billed Curlew (Numenius americanus) in Canada*, (Ottawa: 2011).

Environment Canada, *Management Plan for the long-billed Curlew (Numenius americanus) in Canada*, (Ottawa: 2013)

### **Short-eared Owl (*Asio flammeus*)**

SARA federal status: Special Concern

In Alberta Short-eared Owl breeds in open grasslands and tame pastures where there is abundance of small mammals for prey. Threats to survival include loss of native grassland and human activity including mowing and harvesting of hay.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Short-eared Owl (Asio flammeus) in Canada*, (Ottawa: 2022).

### **Sprague's Pipit (*Anthus spragueii*)**

SARA federal status: Threatened

Sprague's Pipit nests in large areas of native grassland in southeastern Alberta. It is rarely found in cultivated lands or areas where native grasses are heavily grazed or have been replaced with introduced forages. Habitat loss and degradation are the primary causes of decline. Use of pesticides to control grasshoppers may be a threat.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Sprague's Pipit (Anthus spragueii) in Canada*, (Ottawa: 2010).

Environment Canada, *Amended Recovery Strategy for Sprague's Pipit (Anthus spragueii) in Canada*, (Ottawa: 2012).

### **Thick-billed (McCown's) Longspur (*Rhynchophanes mccownii*):**

SARA federal status: Threatened

*Wildlife Act* provincial status: May Be at Risk.

This bird species breeds in grassland habitats in southeastern Alberta. The Thick-billed Longspur is associated with native and non-native grasslands and is negatively associated with human-modified habitats such as crops, hayfields and roads.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the McCown's Longspur Rhynchophanes mccownii*, (Ottawa: Environment Canada, 2016)

## **Reptiles**

### **Greater Short-horned Lizard (*Phrynosoma hernandesi*):**

SARA federal status: Endangered

*Wildlife Act* provincial status: Endangered

This species is found at four disjunct areas in southeast Alberta including the South Saskatchewan River valley and the Chin Coulee/Forty Mile Coulee Complex. Construction of dams and irrigation infrastructure, and conversion of native habitat to crop production are threats to Greater Short-horned Lizard. In particular, expansion of the Chin reservoir as part of the proposed activities in the St. Mary River Irrigation District may affect the species' known habitat.

Environment Canada, *Recovery Strategy for the Greater Short-horned Lizard (Phrynosoma hernandesi) in Canada*, (Ottawa: 2015)

**Bull Snake (*Pituophis catenifer sayi*)**

SARA federal status: Special Concern

Within Alberta, Bull Snake occurs along the South Saskatchewan River valley downstream of the forks of the Bow and Oldman Rivers including Suffield National Wildlife Area as well as south of Medicine Hat to the US border. The species is associated with sandy grassland habitat close to valley and coulee features such as slump blocks, sinkholes, scarps and rocky outcrops where there are fissures that serve as hibernacula. They also use mammal burrows. Bull Snakes are not found in crop fields or irrigated hay fields.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Bull Snake Pituophis catenifer sayi in Canada*, (Ottawa: 2017)

**Prairie Rattlesnake (*Crotalus viridis*)**

SARA federal status: Special Concern

Prairie Rattlesnake is strongly associated with major river valleys in the prairies including the Bow, Oldman and South Saskatchewan rivers. Hibernacula consist of holes or cracks in south- and east-facing slopes. The species forages in river valley habitats as well as upland grasslands and tame pastures. They can migrate long distances including through cultivated areas. Key threats to survival are large-scale habitat loss from cultivation, road mortality and intentional persecution.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Prairie Rattlesnake Crotalus viridis in Canada*, (Ottawa: 2010)

**Amphibians****Great Plains Toad (*Anaxyrus cognatus*):**

SARA federal status: Special Concern

This species occurs on native prairie habitat and has been found in the Suffield area and in the Tilley-Lake Newell-Vauxhall-Taber area. In Canada, Great Plains Toad is exclusively associated with grasslands in the southern Prairie Provinces. The species may be impacted by habitat fragmentation by cropland and irrigation. The relatively large tracts of intact native grasslands in Alberta serve as reservoirs for the population.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Great Plains Toad Anaxyrus cognatus in Canada*, (Ottawa: 2010)

**Northern Leopard Frog (*Lithobates pipiens*):**

SARA federal status: Special Concern

*Wildlife Act* provincial status: Threatened

Within Alberta, the prairie/western boreal population of Northern Leopard Frog is primarily associated with major river drainages and areas of intact native prairie in the southeastern portion of the province, including the lower reaches of the Bow River and Oldman River, and the South Saskatchewan River. Conversion of wetlands in native prairie to cultivation and contamination of wetlands by agricultural herbicides and other pesticides are threats to the Northern Leopard Frog.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Update Status Report on the Northern Leopard Frog, Lithobates pipiens, Rocky Mountain Population, Western Boreal/Prairie Populations and Eastern Populations in Canada*, (Ottawa: 2009), at 12-13.

## Fish

### **Bull Trout (*Salvelinus confluentus*), Saskatchewan-Nelson Rivers populations**

SARA federal status: Threatened

*Wildlife Act* provincial status: Threatened

Bull trout populations in the Bow, Oldman, Waterton, Belly and St. Mary rivers historically extended into the prairies but were fragmented by construction of on-stream dams with the result that viable populations now tend to occupy only foothills and mountain reaches upstream of dams where fish have access to spawning and rearing habitat. Annually Bull Trout congregate below the Oldman Dam that has no fish passage. Some are captured and then released above the dam and some enter the unscreened main diversion canal of the Lethbridge Northern Irrigation District and are lost to the population. Mortality of Bull Trout in the St. Mary, Belly and Waterton river drainages is also attributed to entrainment in irrigation canals or blockage of upstream movement.

Alberta Sustainable Resource Development and Alberta Conservation Association. *Status of the Bull Trout (Salvelinus confluentus) in Alberta: Update 2009*, Wildlife Status Report No. 39, (Edmonton: 2009).

### **Lake Sturgeon (*Acipenser fulvescens*):**

SARA federal status: not listed (under consideration for addition)

COSEWIC status: Endangered

*Wildlife Act*, provincial status: Threatened

Lake Sturgeon are found in the South Saskatchewan River in Alberta and upstream as far as the Oldman Dam on the Oldman River and the Bassano Dam on the Bow River. Reductions in stream flow related to dam operation, and from water extraction, are among the biggest challenges to increasing Lake Sturgeon numbers in Alberta. The impact of water extraction for irrigation is a significant effect on Lake Sturgeon in the South Saskatchewan River system.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Lake Sturgeon Acipenser fulvescens Western Hudson Bay populations, Saskatchewan-Nelson River populations, Southern Hudson Bay-James Bay populations, Great Lakes-Upper St. Lawrence populations, in Canada*, (Ottawa: 2017)

Alberta Lake Sturgeon Recovery Team, *Alberta Lake Sturgeon Recovery Plan, 2011-2016*, (Edmonton: Alberta Environment and Sustainable Resource Development, 2011)

### **Rocky Mountain Sculpin (*Cottus* sp.):**

SARA federal status: Threatened

*Wildlife Act*, provincial status: Threatened

Within Alberta, the Rocky Mountain Sculpin distribution is limited to the St. Mary River system above the St. Mary Reservoir, and the upper Milk and North Milk rivers. The species may have been extirpated from the lower St. Mary River by the construction of the St. Mary Reservoir. Changes within the Leavitt Irrigation District that impact the St. Mary River above the Reservoir could impact the critical habitat.

Fisheries and Oceans Canada, *Recovery Strategy for the Rocky Mountain Sculpin (Cottus sp.), Eastslope Populations, in Canada*, (Ottawa: 2012)

## Invertebrates

### **Bert's Predaceous Diving Beetle (*Sanfilippodytes berate*)**

SARA federal status: Endangered

Habitat for this invertebrate is limited to springs and seepage areas in the Oldman River valley including near Fort MacLeod on the banks of the Oldman River at high water mark and in Head Smashed in Buffalo Jump. Threats to survival are livestock trampling of springs habitats and altered water levels because of withdrawals and impoundments for irrigation agriculture and other developments as well as droughts.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Bert's Predaceous Diving Beetle (Sanfilippodytes bertae) in Canada*, (Ottawa: 2010)

Environment and Climate Change Canada, *Recovery Strategy for the Bert's Predaceous Diving Beetle (Sanfilippodytes bertae) in Canada*, (Ottawa: 2017)

### **Verna's Flower Moth (*Schinia verna*)**

SARA federal status: Endangered

This species is endemic to the Canadian prairies. Only a few occurrences have been recorded in Alberta including near Jenner on the Red Deer River and Medicine Hat on the South Saskatchewan River. Verna's Flower Moth inhabits sparsely vegetated native grassland where stands of their host plant, pussytoes (*Antennaria*) are common. Loss and fragmentation of prairie grassland as a result of agricultural development are the primary threats.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on the Verna's Flower Moth (Schinia verna) in Canada*, (Ottawa: 2017)

## Plants

### **Dwarf Woolly-heads (*Psilocarphus brevissimus*), Prairie population**

SARA federal status: Special Concern

The prairie population of this annual species occurs in ephemeral wetlands and margins of sloughs. Threats to Dwarf Woolly-heads include habitat destruction associated with agricultural and industrial development. Occurrences have been documented within the Eastern Irrigation District including in the vicinity of Snake Lake Reservoir.

Committee on the Status of Endangered Wildlife in Canada, *COSEWIC Assessment and Status Report on Dwarf Woolly-heads (Psilocarphus brevissimus) in Canada*, (Ottawa: 2006)

### **Slender Mouse-ear-cress (*Halimolobos virgata*)**

SARA federal status: Threatened

In Alberta Slender Mouse-ear-cress occurs in a few very localized areas including along Matzhiwin Creek within the Eastern Irrigation District. It inhabits vernal moist upland sites in flat to gently undulating grassland with sandy to loamy soils. Habitat loss due to cultivation is a threat.

Environment Canada, *Recovery Strategy for the Slender Mouse-ear-cress (Halimolobos virgata) in Canada*, (Ottawa: 2012)

### **Tiny Cryptantha (*Cryptantha minima*):**

SARA federal status: Threatened

*Wildlife Act*, provincial status: Endangered

Tiny Cryptantha is an annual plant species associated with river systems, mainly the South Saskatchewan River valley in eastern Alberta. It is also found in the vicinity of the lower Bow and lower Oldman rivers. Tiny Cryptantha exists on sandy uplands and valley breaks and slopes that could be impacted by flooding for reservoir construction or expansion. It could also be impacted by the conversion of native grasslands.

Environment Canada, *Amended Recovery Strategy for the Tiny Cryptantha (Cryptantha minima) in Canada*, (Ottawa: 2012)



## Appendix 2: Cheryl Bradley, “Irrigation Expansion Project: Water Conservation Objectives (WCO) and Instream Objectives (IO) for Potentially Impacted River Reaches”

### Irrigation Expansion Project Water Conservation Objectives (WCO) and Instream Objectives (IO) for Potentially Impacted River Reaches October 2021

Definitions for WCO and IO, excerpted from the *Approved Water Management Plan South Saskatchewan River Basin (2006)* (Glossary), are:

**Water Conservation Objective (WCO)** – As defined in Alberta’s *Water Act*, a Water Conservation Objective is the amount and quality of water necessary for the protection of a natural water body or its aquatic environment. It may also include water necessary to maintain a rate of flow or water level requirements.

From the *Water Act*: “*Water Conservation Objective*” means the amount and quality of water established by the Director under Part 2, based on information available to the Director, to be necessary for the

- i) Protection of a natural water body or its aquatic environment, or any part of it;
- ii) Protection of tourism, recreational, transportation or waste assimilation uses of water; or
- iii) Management of fish or wildlife and may include water necessary for the rate of flow of water or water level requirements.

A licence may be issued by the Director to the Government of Alberta for the purpose of implementing a Water Conservation Objective.

**Instream Objectives** – Regulated flows that should remain in the river via dam operations or as a restriction on licences. Below dams, Instream Objectives are in place throughout the SSRB, although some offer only limited protection of the aquatic environment. Instream Objectives have usually been set in response to fish habitat instream needs (the Fish Rule Curve) and/or water quality.

Recommended WCOs in the *Approved Water Management Plan South Saskatchewan River Basin (2006)* for the Bow, Oldman and South Saskatchewan River Sub-basins (p. 8) are described as follows:

“The recommended WCOs will serve as an administrative tool that will foster opportunities to increase flows. These opportunities could include holdbacks from transfers, voluntary actions by licence holders, cancellations and purchases of transfers. These WCOs will serve on an interim basis until monitoring, research and public consultation identify a long-term WCO.

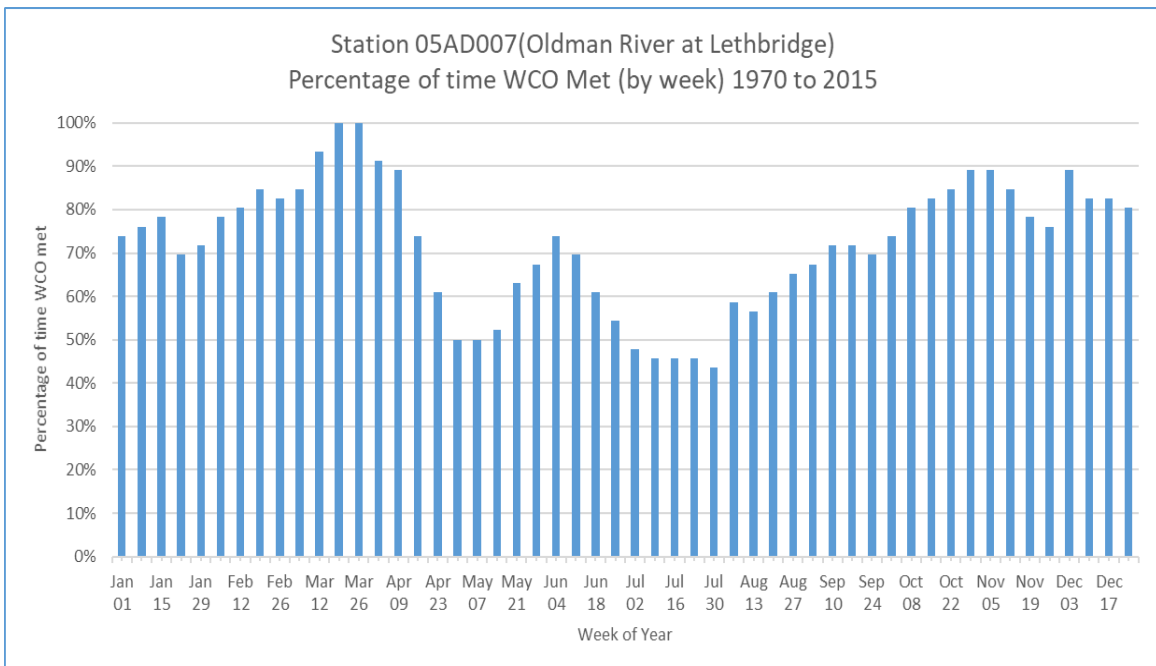
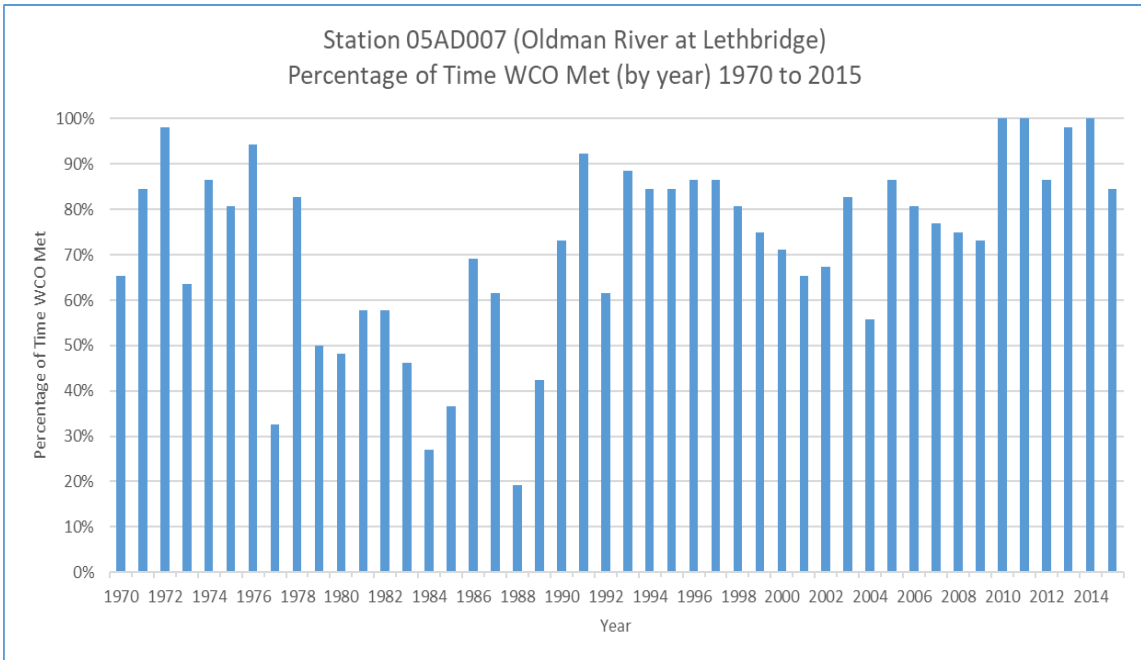
The recommended WCOs are either 45% of the natural rate of flow, or the existing instream objective increased by 10%, whichever is the greater at any point in time.”

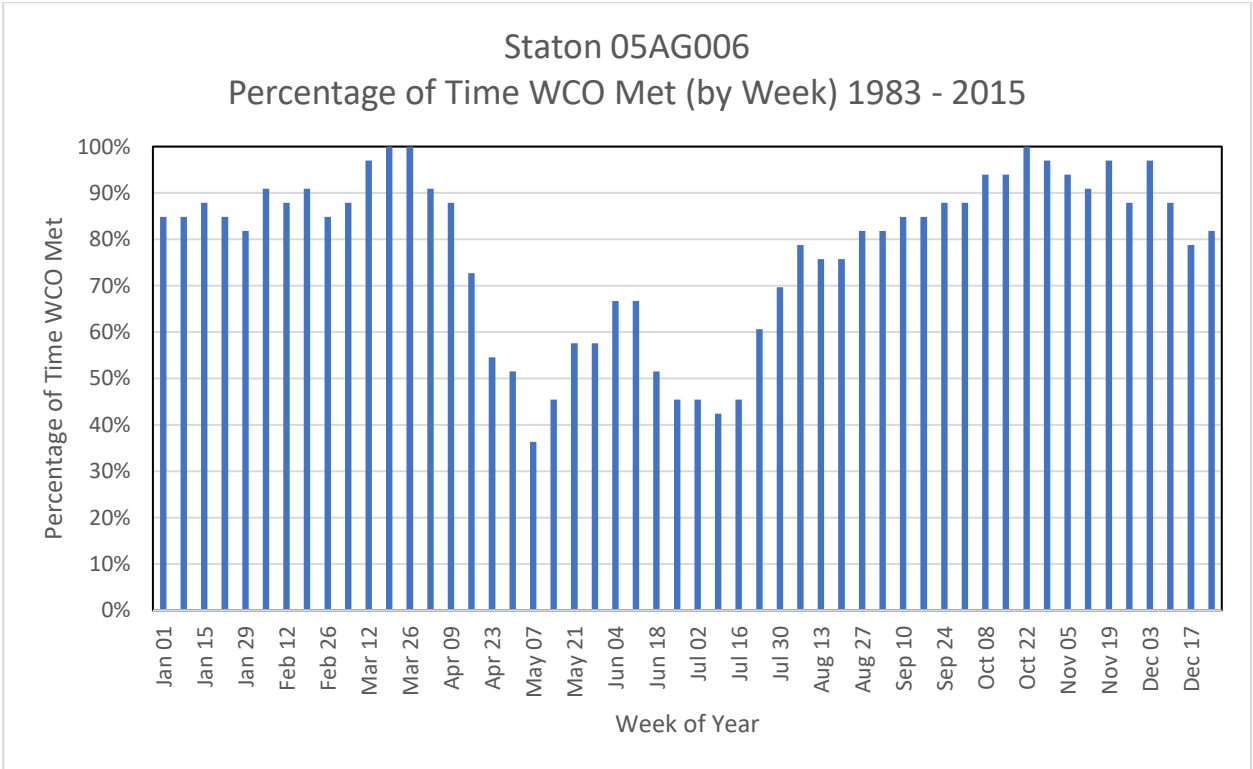
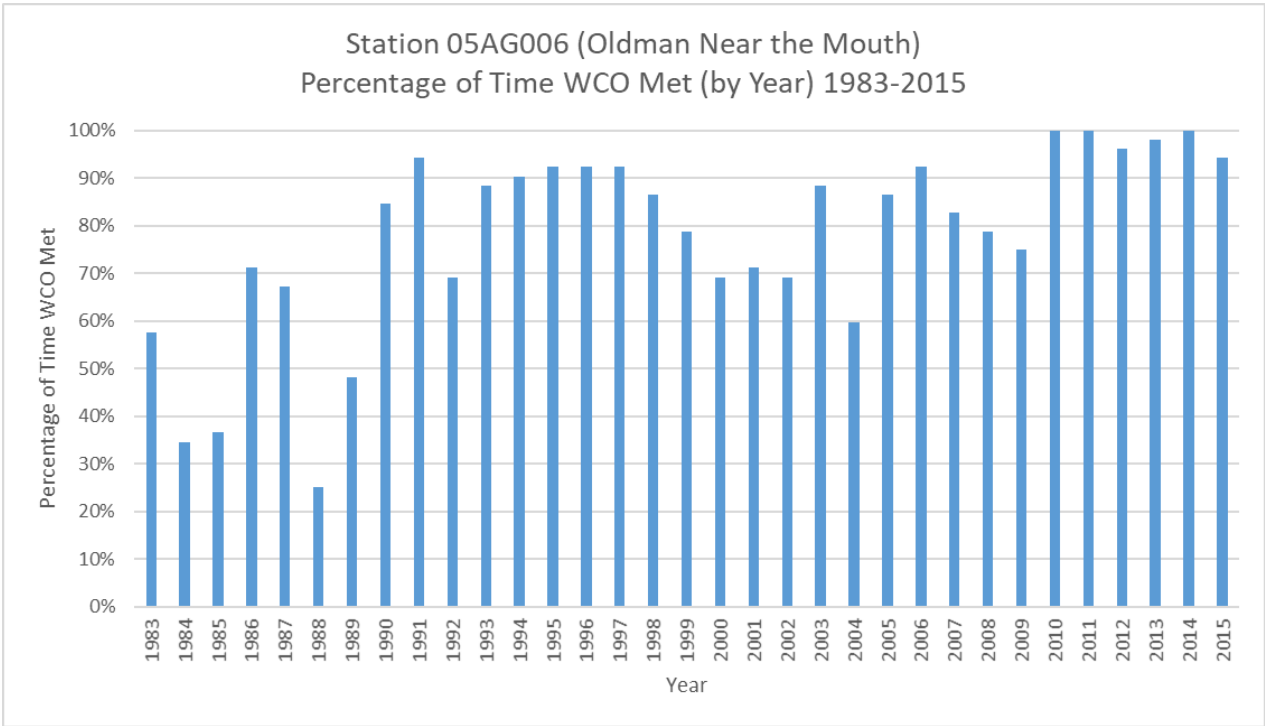
WCOs are considerably less than Instream Flow Needs (IFN) determined for protection of the aquatic environment in [Instream Flow Needs Determinations for the South Saskatchewan River Basin, Alberta, Canada \(2003\)](#). When the IFN values are compared to the actual river flows under current allocations and commitments, the conclusion is that in the Bow, Oldman, St. Mary, Belly and Waterton Rivers, the IFN values are generally much greater than existing flows, and restoring flows to IFN values would be impossible with the present degree of allocation. In these rivers, the aquatic environment is believed to be in a state of long term declining health.

### Oldman River Mainstem Reaches from the Oldman Reservoir to the Mouth

“Each reach has an IO that is the greater of either the 80% habitat fish rule curve (80 FRC) or the water quality (temperature and oxygen) protection IO flows.” (SSRB WMP p. 45).

The WCO therefore would be the greater of 45% of natural flow or 80 FRC and water quality protection base flow plus 10%.

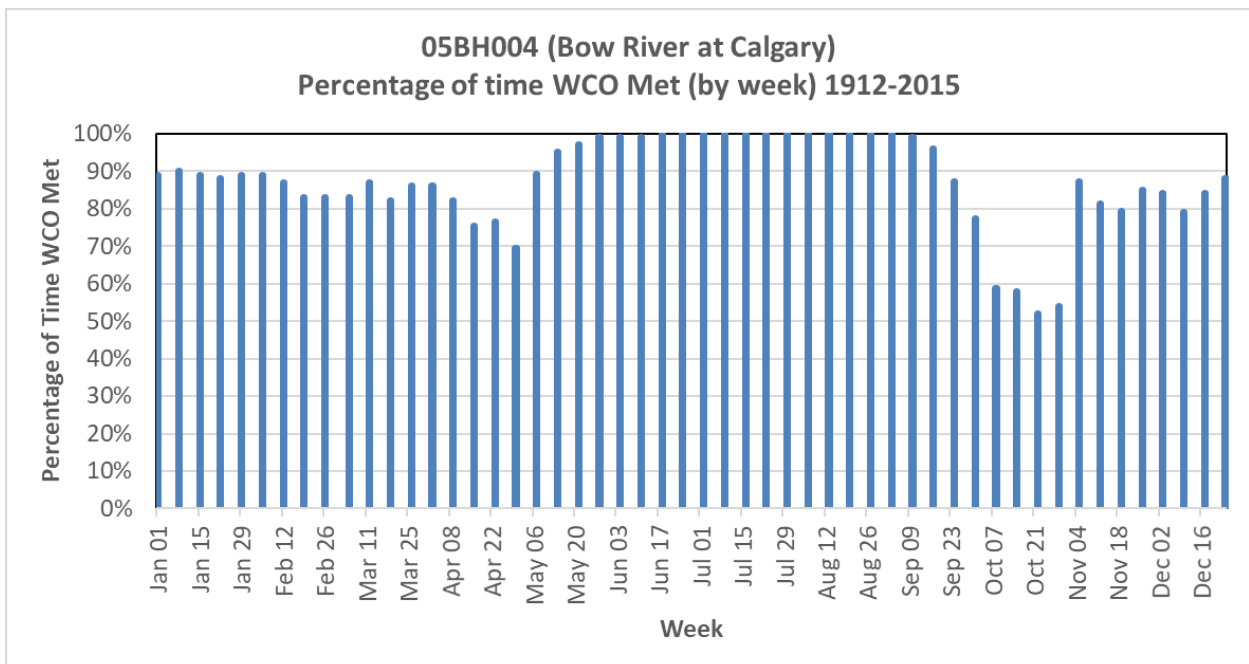
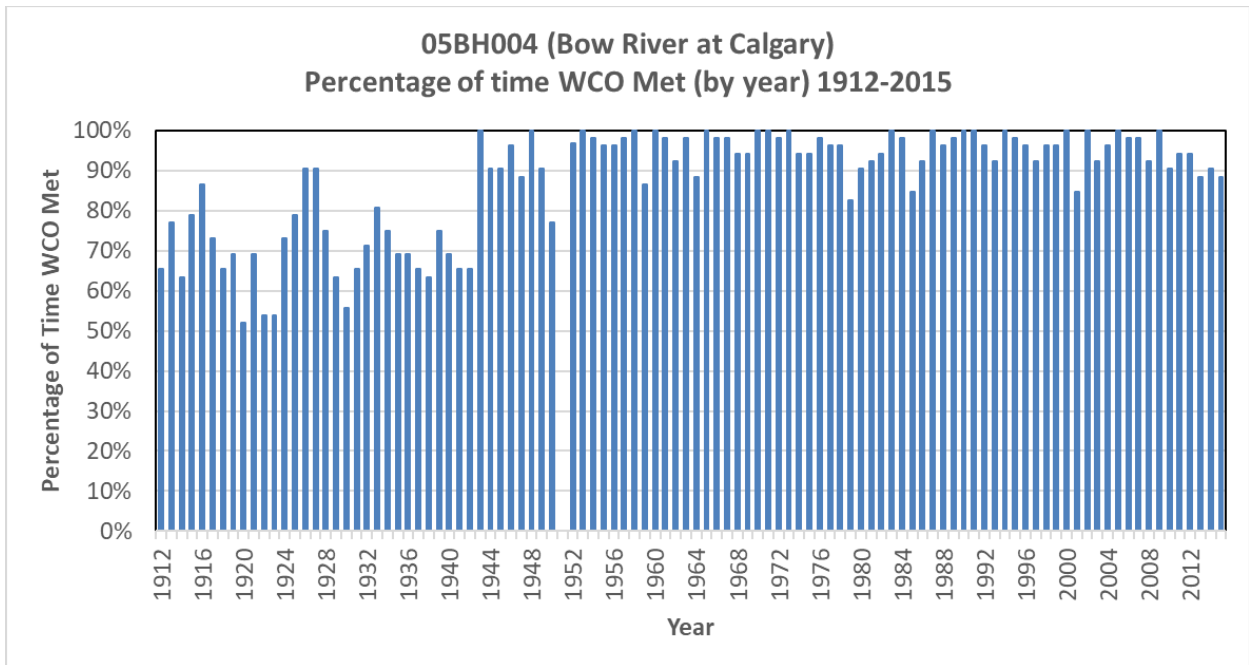


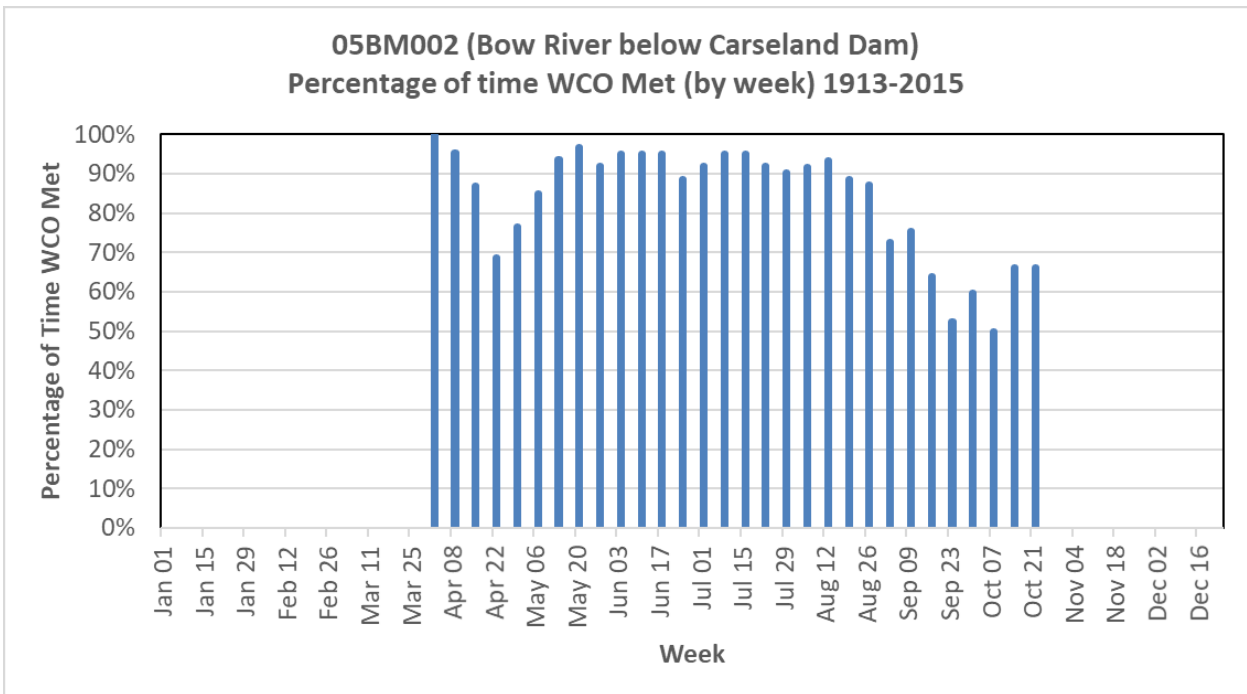
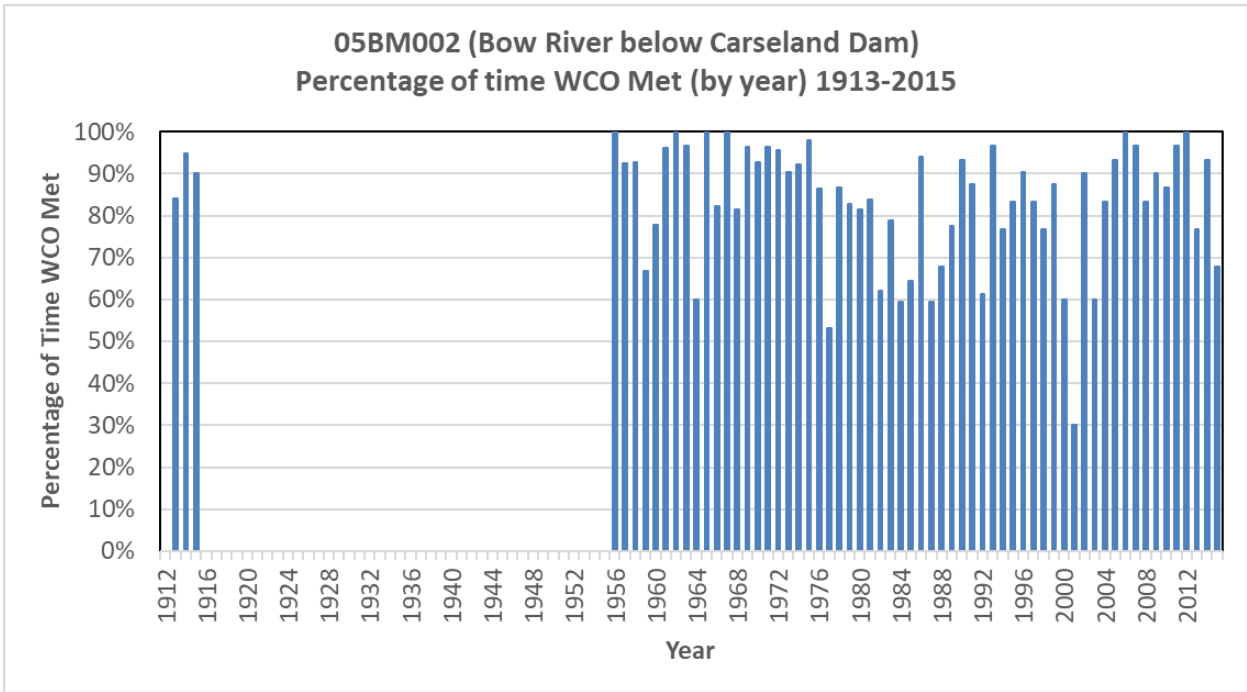


**Bow River Mainstem Reaches from Ghost Reservoir to Bassano Dam**

“Each reach has an IO which is based on a relationship known as the 80% habitat fish rule curve. The IOs in these reaches are based on habitat only and do not include water quality (temperature and dissolved oxygen) protection parameters.” (SSRB WMP p. 45)

The WCO therefore would be the greater of 45% of natural flow or 80 FRC and water quality protection base flow plus 10%.



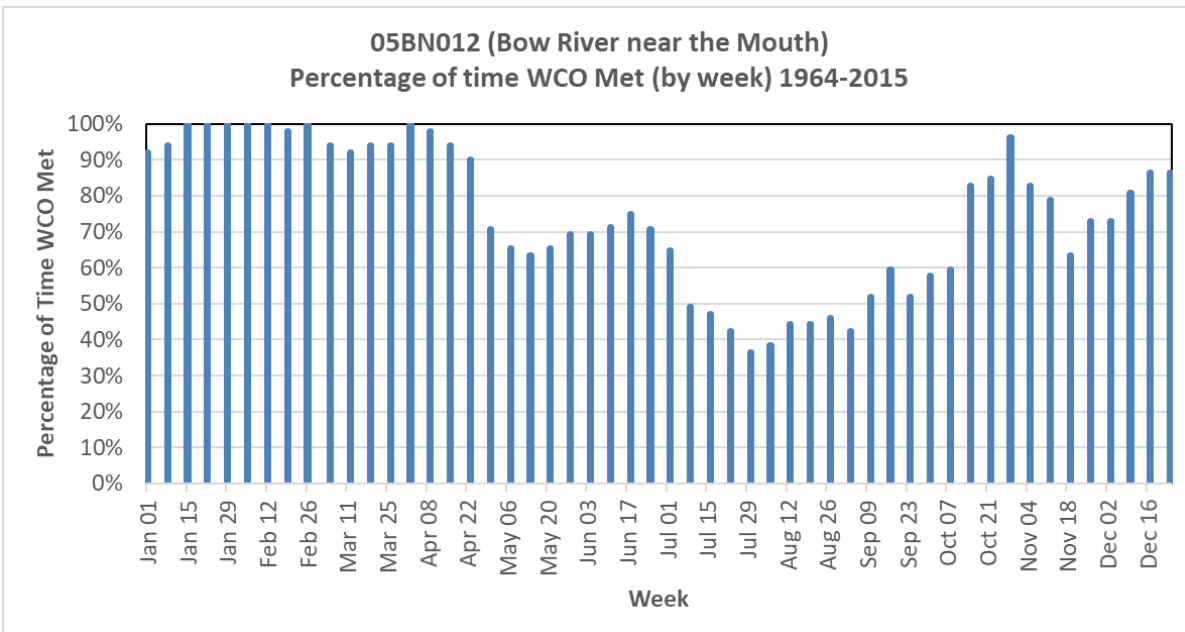
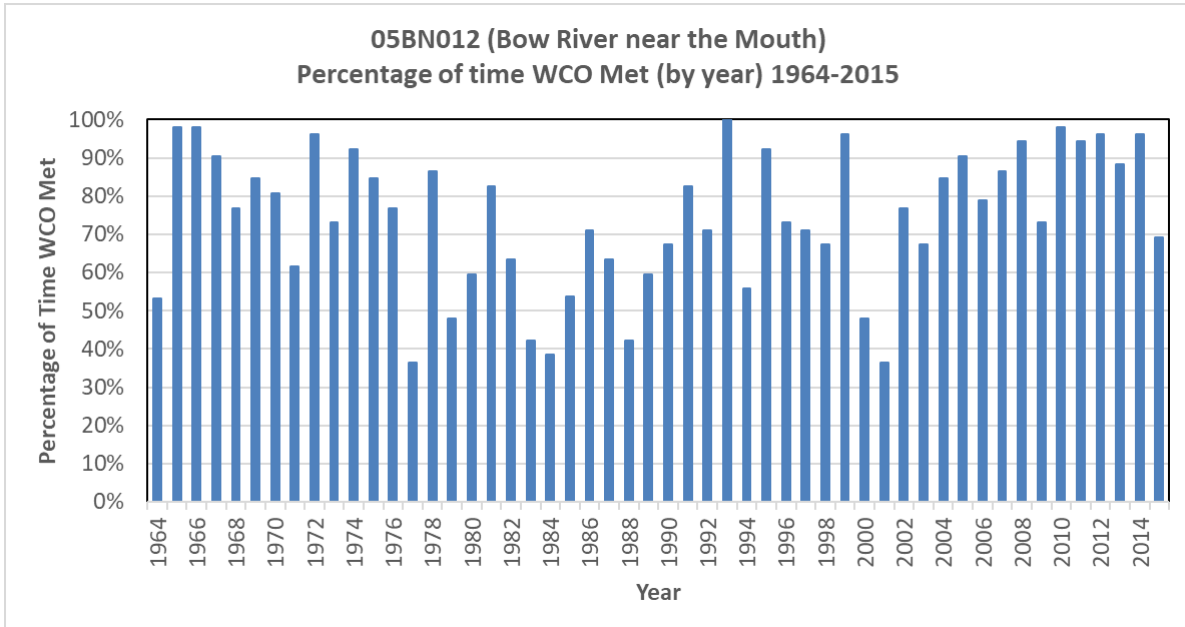


### Bow River below Bassano Dam

“The reach below Bassano to the mouth of the river has three IO values:

- 39.6 m<sup>3</sup>/s (1,400 ft<sup>3</sup>/sec) for all licences except the Eastern Irrigation District (EID);
- 2.83 m<sup>3</sup>/s (100 ft<sup>3</sup>/sec) for EID’s 1963 licence (1903 priority);
- 11.3 m<sup>3</sup>/s (400 ft<sup>3</sup>/sec) for EID’s 1998 licence.” (SSRB WMP p. 45)

The WCO therefore would be the greater of 45% of the natural flow or 11.3 m<sup>3</sup>/s plus 10%.

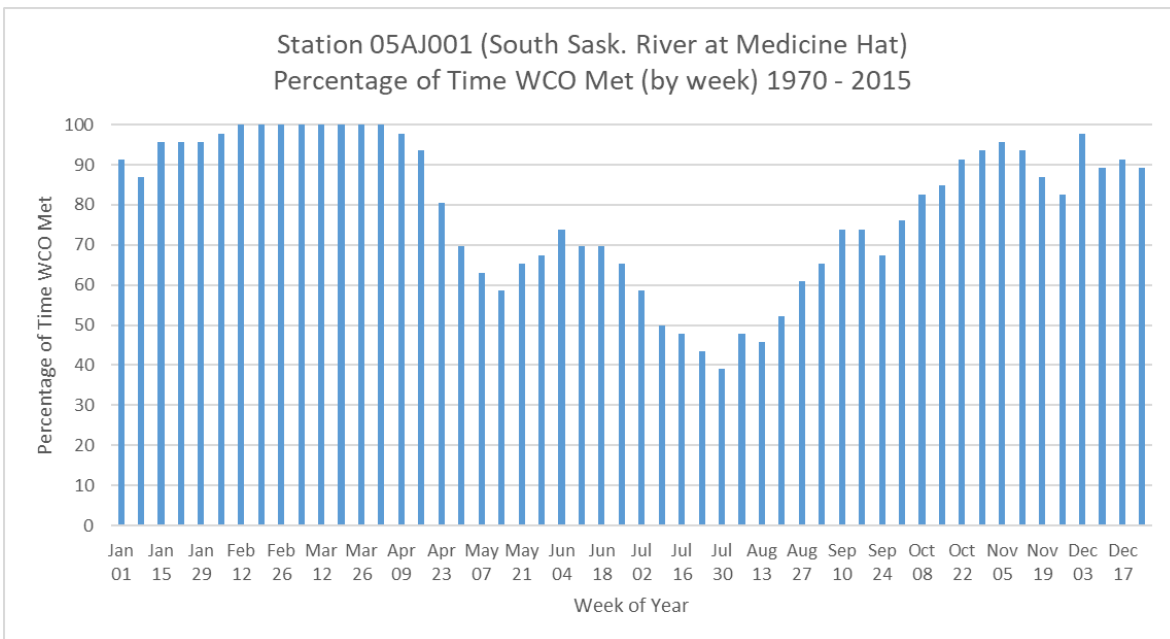
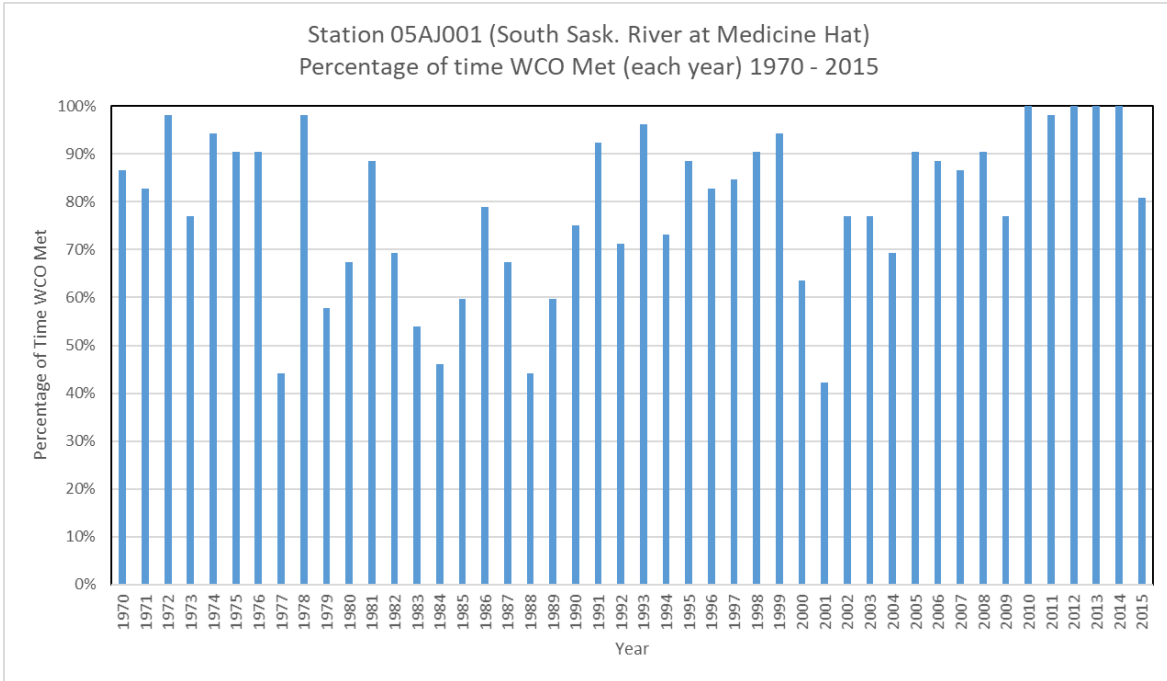




### South Saskatchewan River

“From the confluence of the Bow and Oldman rivers to the Saskatchewan border, an IO of 42.5 m<sup>3</sup>/s (1,500 ft<sup>3</sup>/sec) is attached to licences.” (SSRB WMP p. 45)

The WCO would therefore be the greater of 45% of natural flow or 46.75 m<sup>3</sup>/sec (42.5 m<sup>3</sup>/sec plus 10%).



### Appendix 3: Cheryl Bradley, “Yearly Graph of Flows in Potentially Affected River Reaches for 2021 (April – October)”

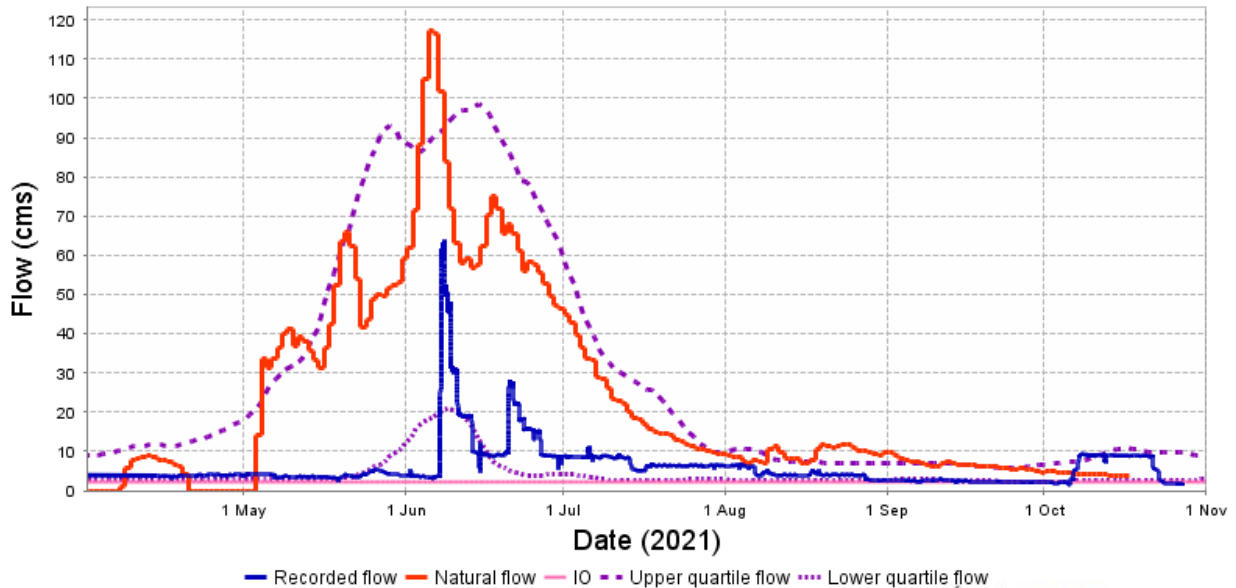
#### Irrigation Expansion Project

#### Yearly Graph of Flows in Potentially Affected River Reaches for 2021 (April – October)

These graphs downloaded from the Alberta River Basins website (rivers.alberta.ca) provide an indication of instream objectives (IO) and water conservation objectives (WCO) compared to natural flows for river reaches in the SSRB potentially impacted by the proposed irrigation expansion. Note that for the most part IOs are flat lines representing a very small percentage of natural flow for most of the irrigation season. Where there are WCOs modeled on the 80% Fish Rule Curve there appear to be attempts to manage onstream infrastructure to approximate them, although not exactly.

These charts are particularly insightful as they represent conditions in a dry year. River reaches where recorded flow is most noticeably lower than natural flow (less than 50%) are the Waterton River below Waterton Dam, the Belly River below the diversion weir, the St. Mary River below the St. Mary Dam, the Oldman River below its confluence with the St. Mary River, the Bow River below Bassano Dam and the South Saskatchewan River at Medicine Hat.

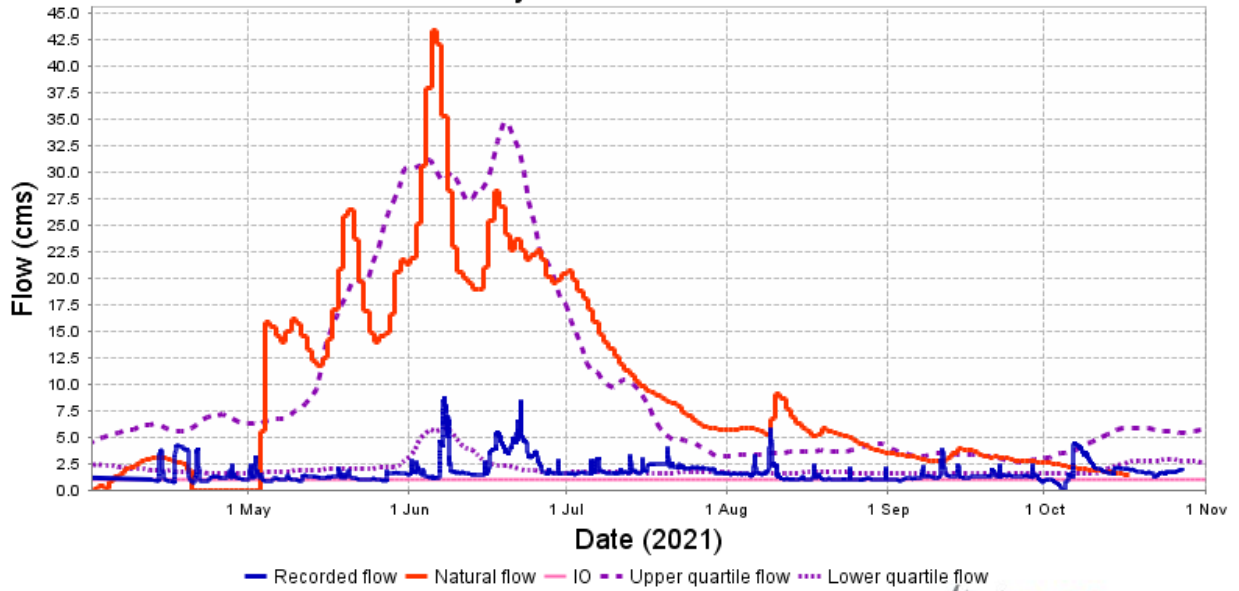
Recorded flow (blue), natural flow (red),  
IFN (green), IO (pink), WCO (brown),  
and normal flow range (purple) for 05AD028  
Waterton River near Glenwood



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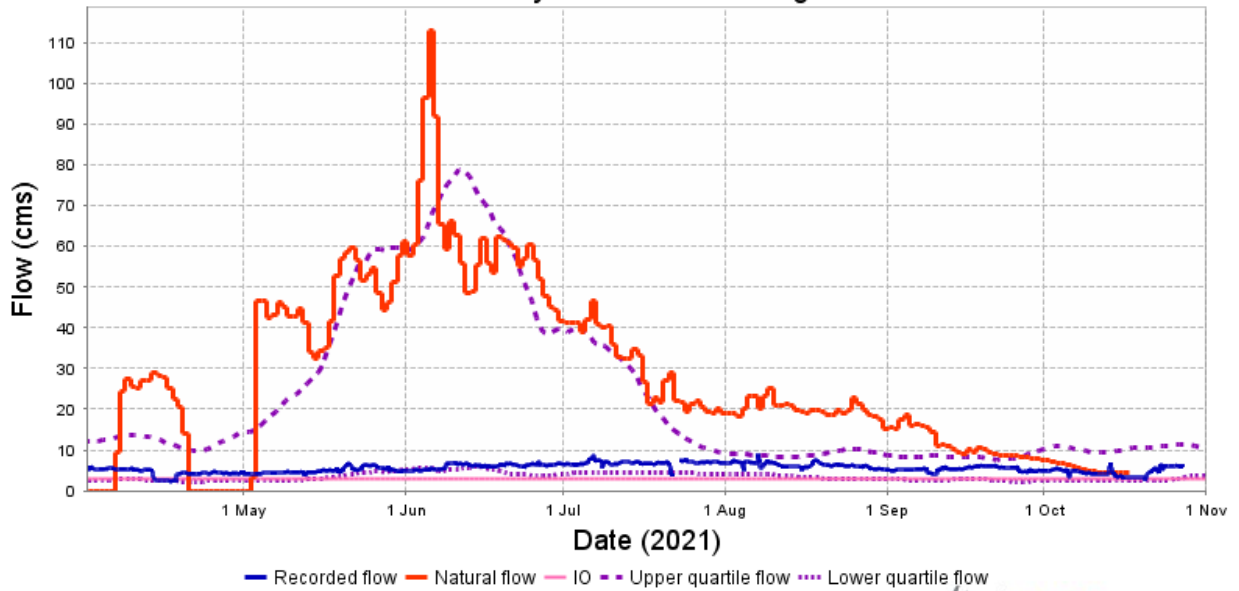
Recorded flow (blue), natural flow (red),  
 IFN (green), IO (pink), WCO (brown),  
 and normal flow range (purple) for 05AD041  
 Belly River near Glenwood



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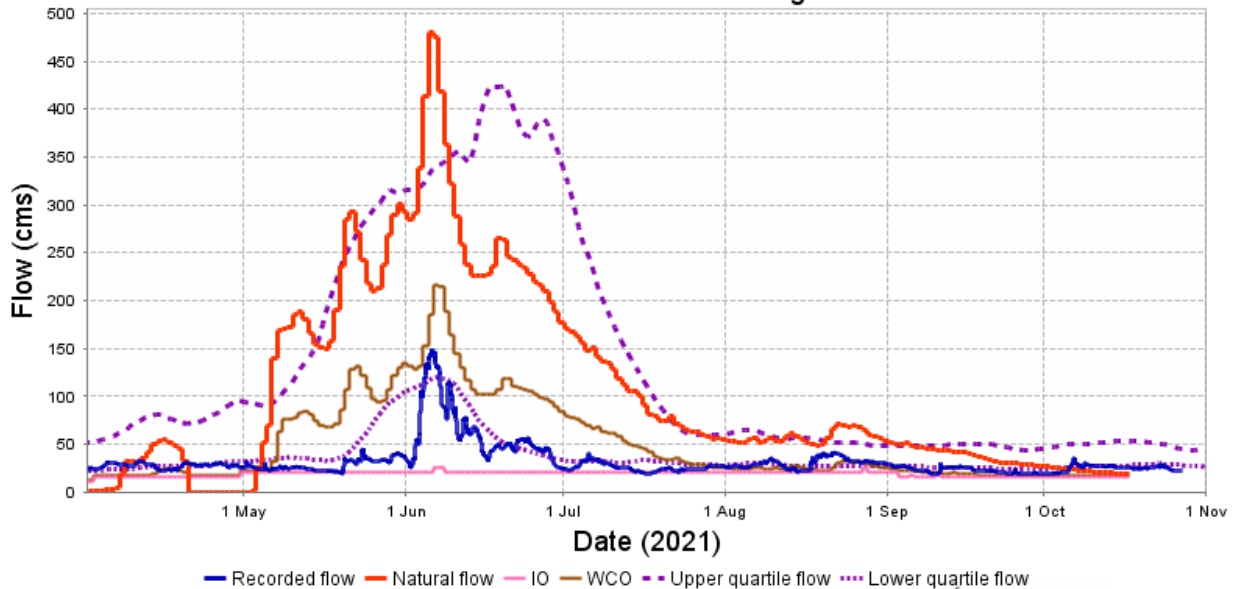
Recorded flow (blue), natural flow (red),  
 IFN (green), IO (pink), WCO (brown),  
 and normal flow range (purple) for 05AE006  
 St. Mary River near Lethbridge



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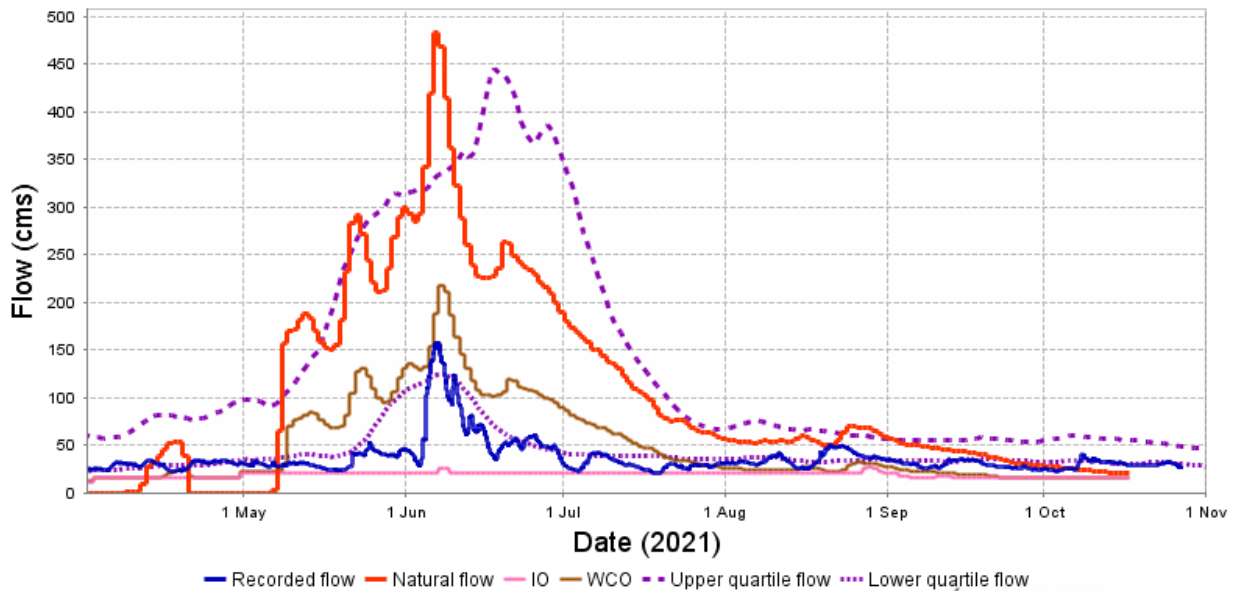
Recorded flow (blue), natural flow (red),  
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 and normal flow range (purple) for 05AD007  
 Oldman River near Lethbridge



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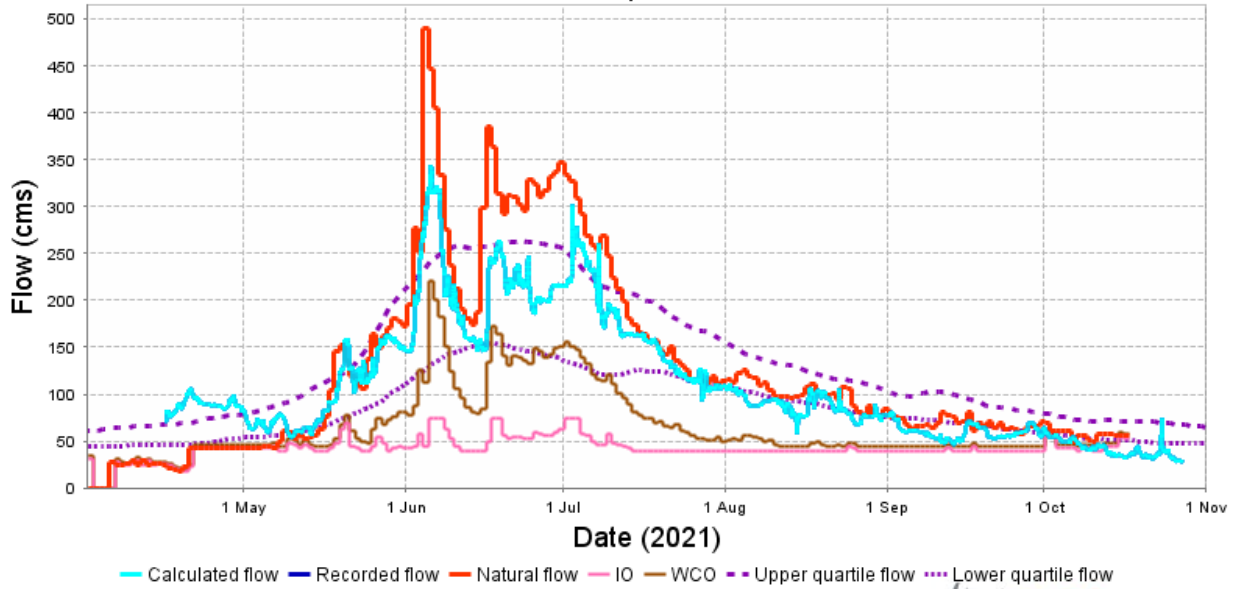
Recorded flow (blue), natural flow (red),  
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 Oldman River near the Mouth



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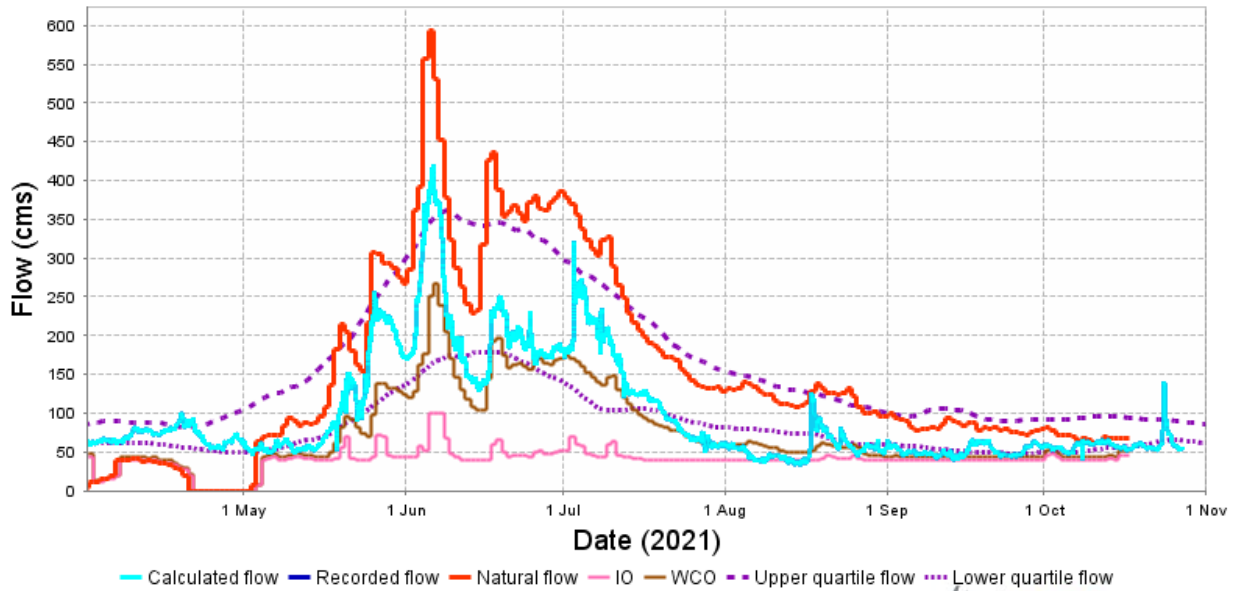
Recorded flow (blue), calculated flow (turquoise), natural flow (red), IFN (green), IO (pink), WCO (brown), and normal recorded flow range (purple) for 05BHU02  
BowR Reach 4 - BearspawRes to ElbowR conf



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Recorded flow (blue), calculated flow (turquoise), natural flow (red), IFN (green), IO (pink), WCO (brown), and normal recorded flow range (purple) for 05BMU04  
BowR Reach 1 - Carseland Weir to Bassano Dam

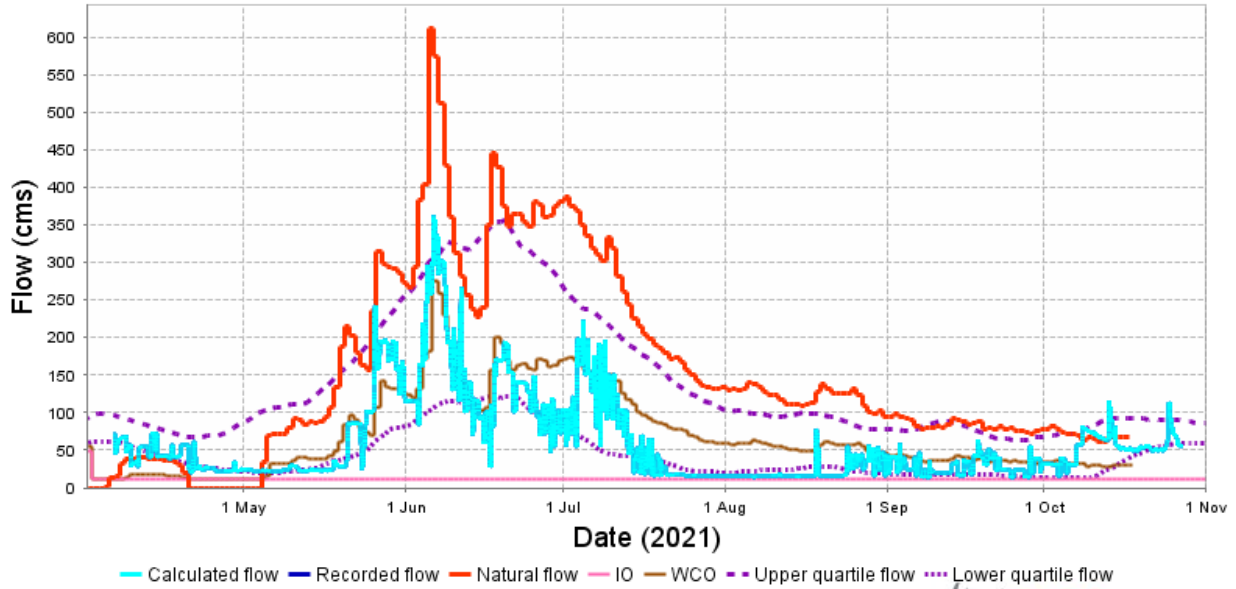


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Recorded flow (blue), calculated flow (turquoise),  
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 and normal recorded flow range (purple) for 05BM004

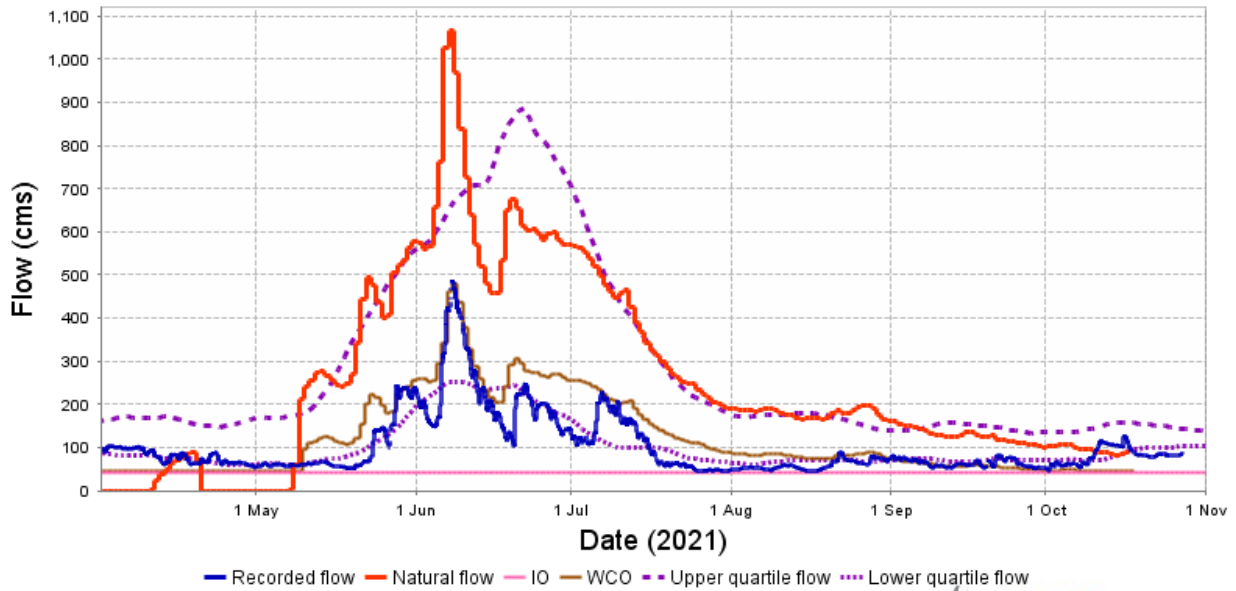
**Bow River below Bassano Dam**



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Recorded flow (blue), natural flow (red),  
 IFN (green), IO (pink), WCO (brown),  
 and normal flow range (purple) for 05AJ001  
**South Saskatchewan River at Medicine Hat**



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