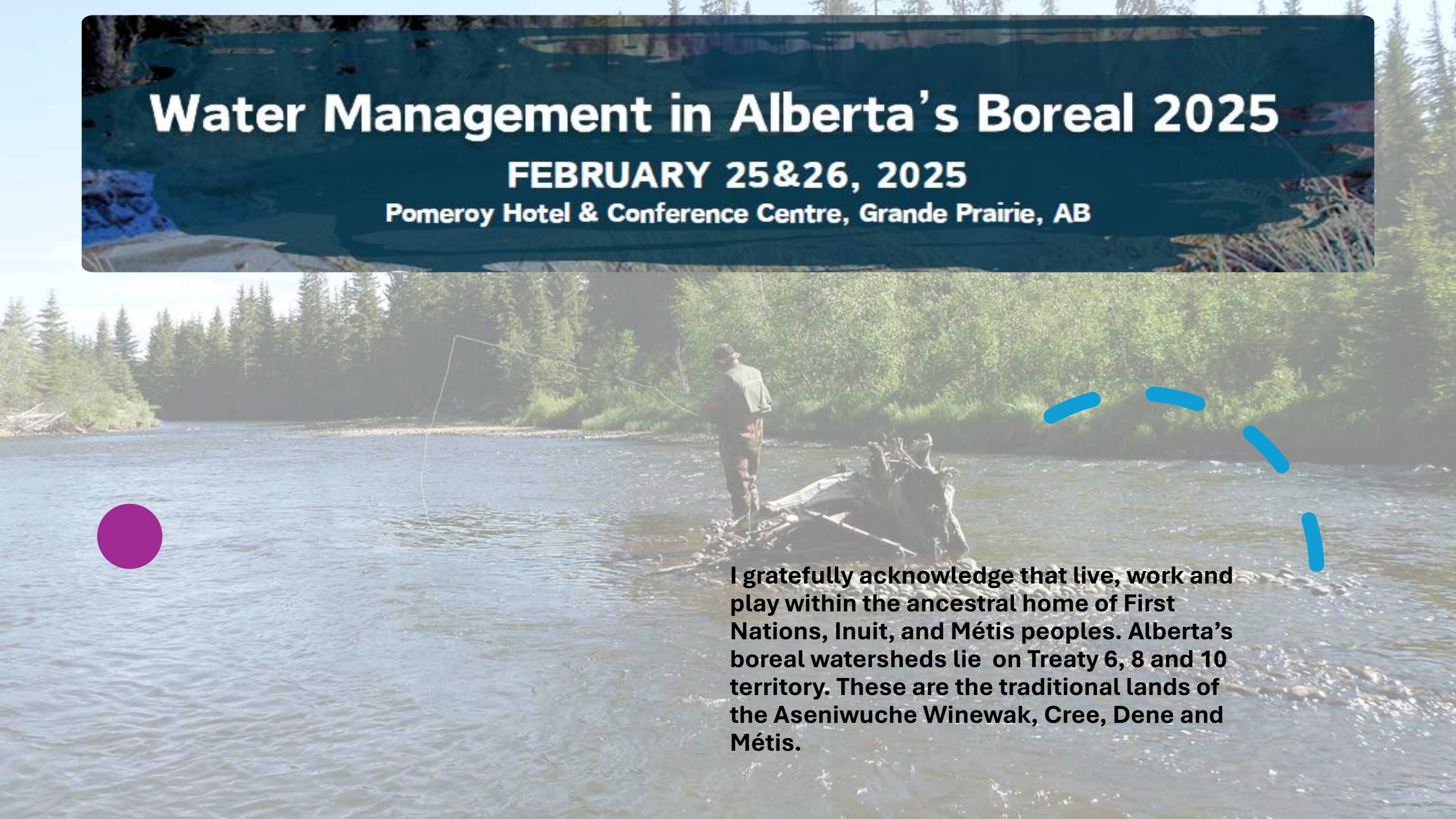
Water Management in Alberta's Boreal 2025

FEBRUARY 25&26, 2025

Pomeroy Hotel & Conference Centre, Grande Prairie, AB



I gratefully acknowledge that live, work and play within the ancestral home of First Nations, Inuit, and Métis peoples. Alberta's boreal watersheds lie on Treaty 6, 8 and 10 territory. These are the traditional lands of the Aseniwuche Winewak, Cree, Dene and Métis.

ALBERTA WILDLFE FEDERATION

MISSION

To uphold Albertans heritage rights and means of hunting, shooting, fishing, and outdoor pursuits, while promoting the conservation of fish, wildlife, and natural habitats.

- First club meeting in 1908
- First province-wide organizational meeting in 1928
- 15 thousand members
- Over 60 affiliated clubs
- 50 thousand acres of habitat conserved through the Alberta Habitat Fund

Who I am

- Born in Alberta
- Resident of the Peace River Region since 1978
- Passion for the outdoors
- Conservation advocate
- Informed citizen on issues related to fisheries, water management and land use planning
- Alberta Wildlife Federation Provincial Fish Chair
- Chair of the Minister’s Advisory Council on Fisheries
- Not a fisheries biologist or scientist

A Tale of Two Fish

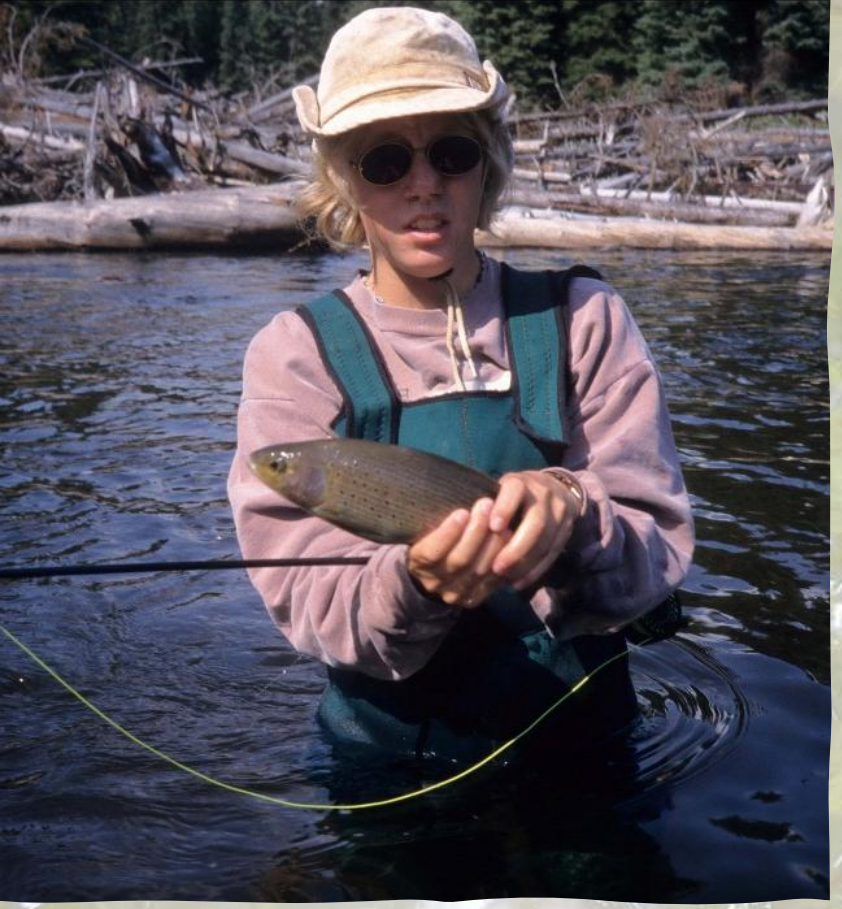
“A Generational Story”

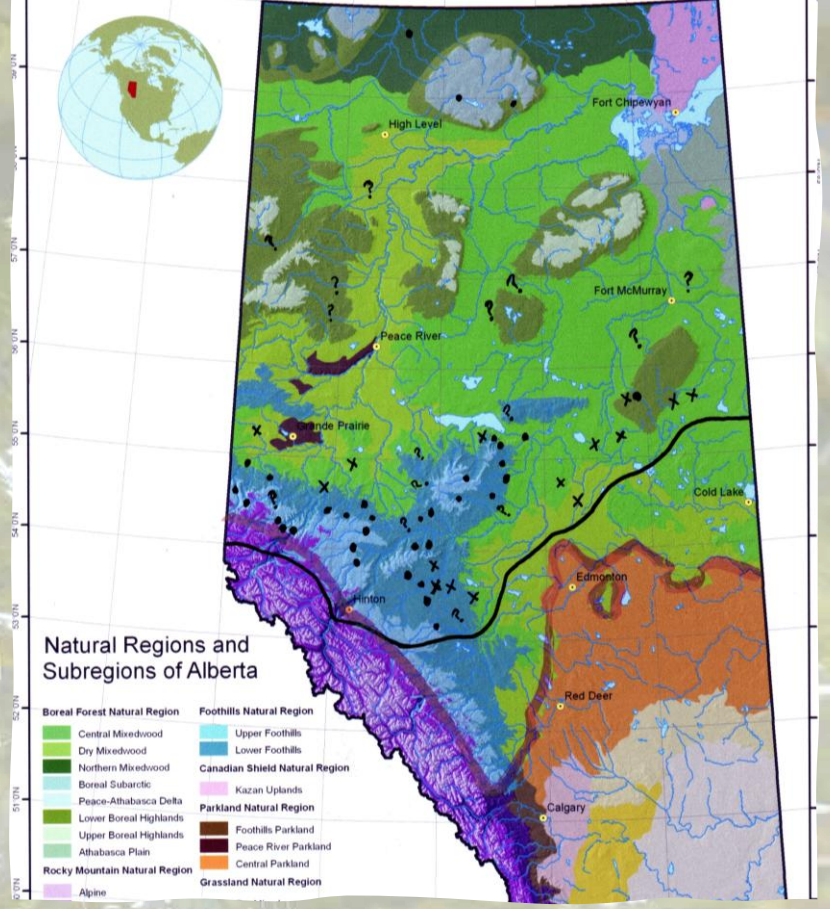
Darryl R Smith BSc. DDS

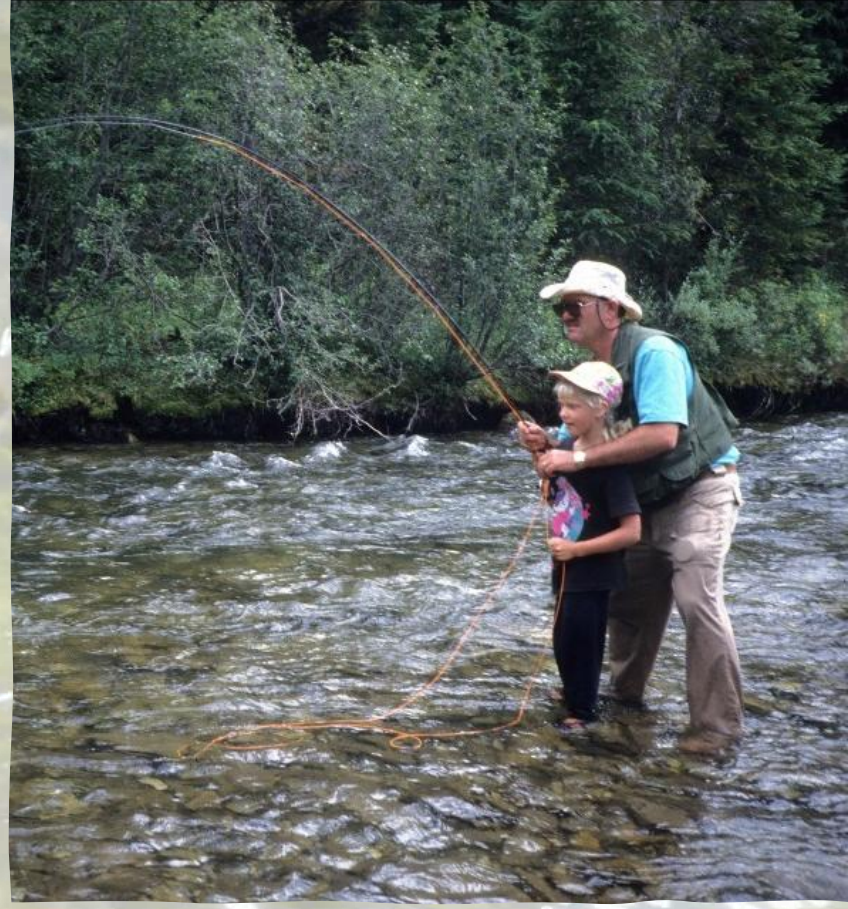
February 25, 26, 2025

"A river or stream is a cycle of energy from sun to plants to insects to fish. It is a continuum broken only by humans.“ Aldo Leopold

The need to embrace local knowledge and observation within our management and planning paradigms







Pursuing arctic grayling in the boreal watersheds has been a generational passion for our family

What have we observed?

- Decreasing range
- Decreasing abundance
- Extirpation from much of historical range
- Continual expansion of the human footprint
- Fish community change

- The cause are multi-factorial
- The decline began decades ago
- Recreational angling regulations have been primary tool used to address the decline

<u>The decline continues!</u>

Sportfishing Regulations for Arctic Grayling

1949: 15 arctic grayling, 8 inch minimum size (20 cm), winter closures

1960: 10 arctic grayling

1970: 5 arctic grayling , some stream or seasonal closures

1980: 5 arctic grayling

1989: 5 arctic grayling over 30 cm, winter closures, Little Smoky River designated as catch and release only

1998: 2 arctic grayling over 35 cm, Dismal Creek 0 arctic grayling as well other streams in ES 3, spring, fall and winter closures

2001: 2 arctic grayling over 35 cm, 0 arctic grayling some streams, spring, fall and winter closures

2005: 2 artic grayling over 35 cm, 0 arctic grayling Upper Pembina River, spring, fall, and winter closures

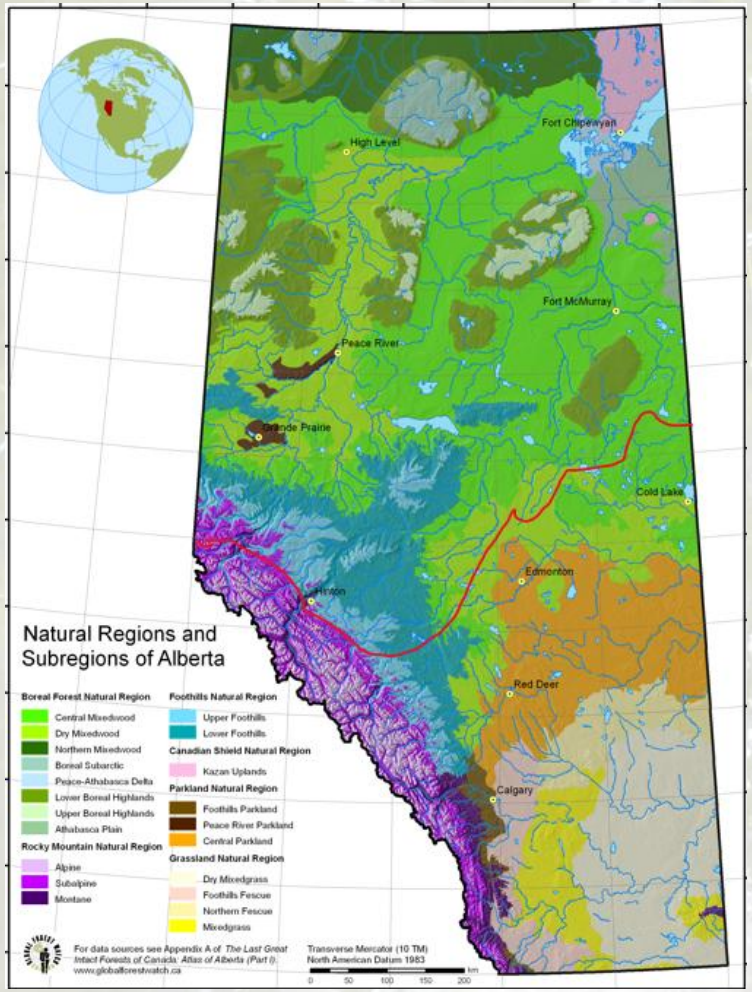
2010: 2 arctic grayling over 35 cm, spring, fall and winter closures, 7 streams in NE Alberta limit reduced to 0 plus others in ES 3 and ES 4

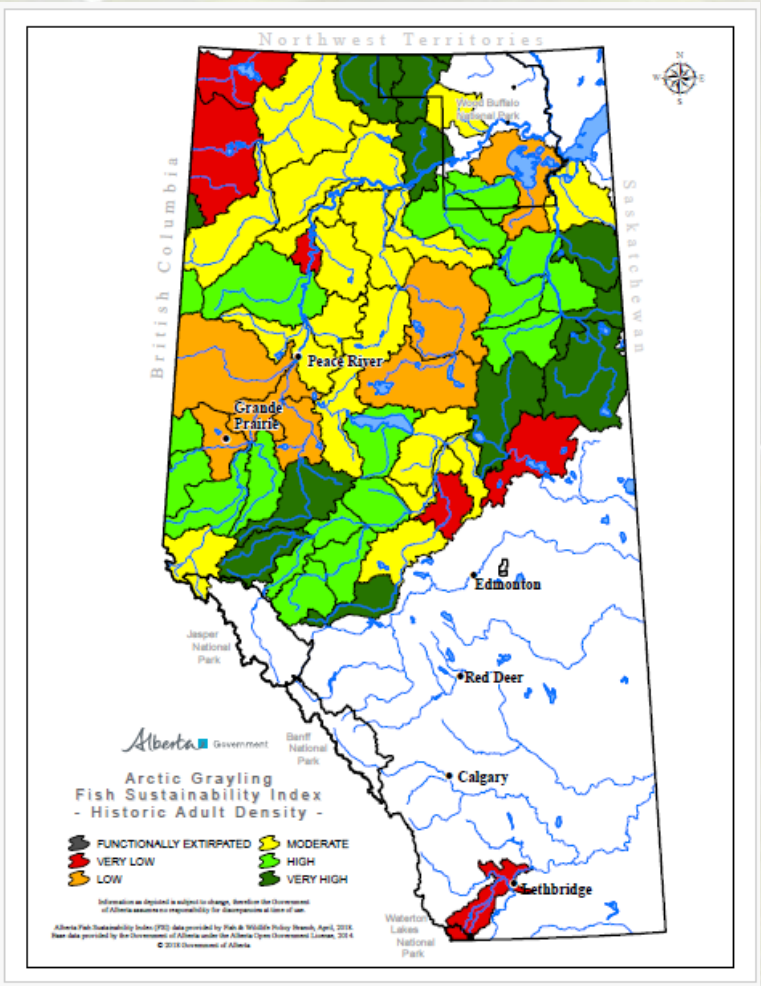
2015: 0 arctic grayling province wide, spring, fall and winter closures

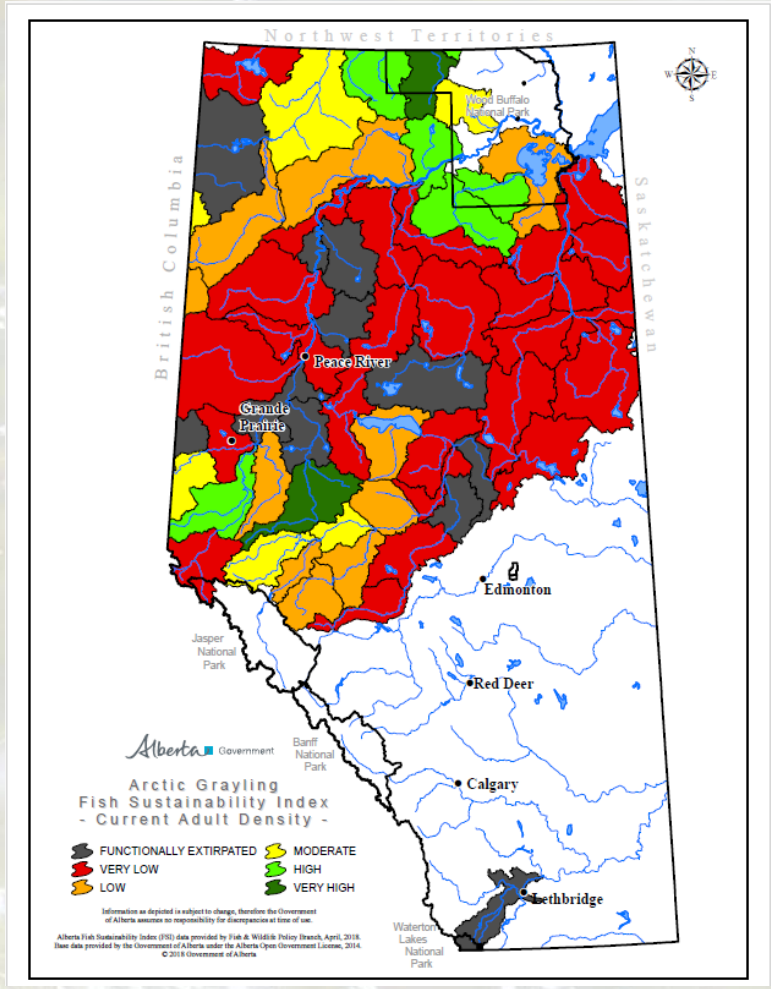
2016: 0 arctic grayling province wide, spring, fall and winter closures, Upper Pembina River closed to fishing

2025: 0 arctic grayling, spring, fall and winter closures, Upper Pembina River remains closed to fishing

Arctic Grayling as an indicator of boreal watershed health and change







Four critical issues impacting arctic grayling habitat in boreal rivers and streams

- Thermal
- Flows
- Oxygen
- Barriers

<u>These are interrelated</u>

- Loss of spawning, rearing, feeding, escape, refuge and overwintering habitat
- Loss of connectivity
- Competition from other fish species

<u>Result:</u> Constantly shrinking habitat base capable of supporting arctic grayling

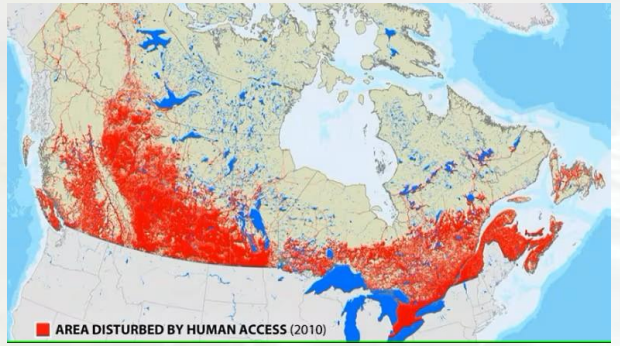
What are the causes?

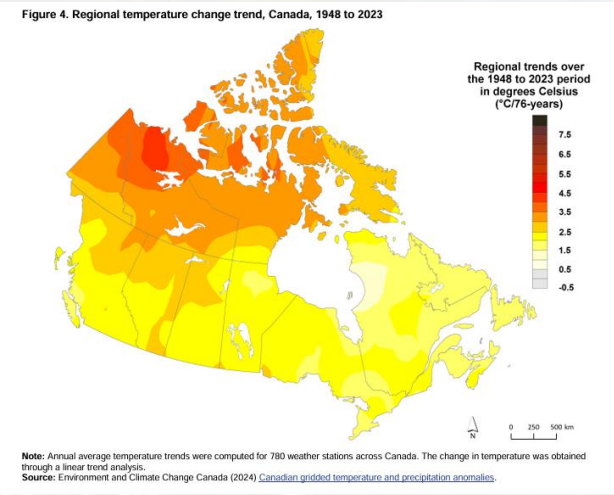
Expanding human footprint on the landscape

Need for resources and land to support an ever-increasing human population locally, provincially, nationally and globally

Weather

- Moved from a nomadic to a metropolis dominated lifestyle
- 81% of Alberta's population live in urban communities
- 82% North American population is urban
- North America is most urbanized region on the globe





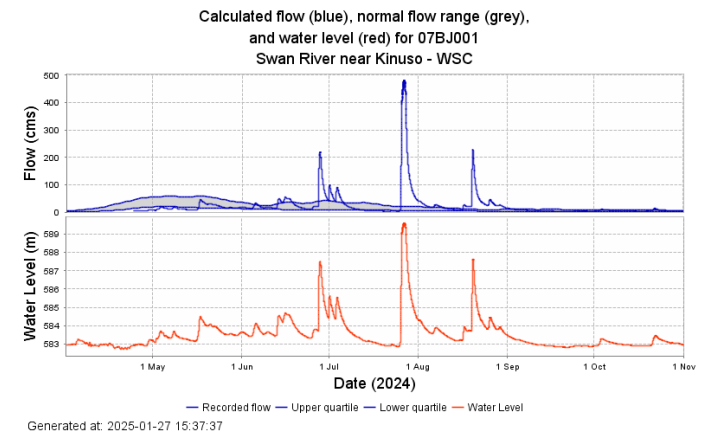
Flows

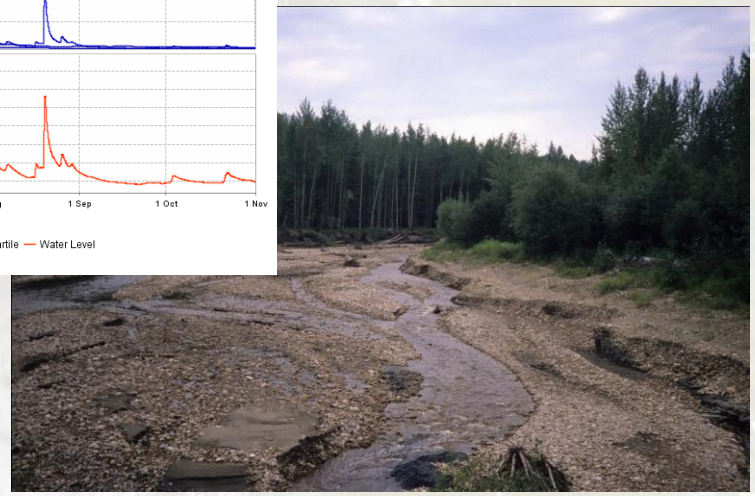
Frequency of high and low flow events

Impact on water turbidity and sedimentation

Impact on stream channel morphology

No flow events





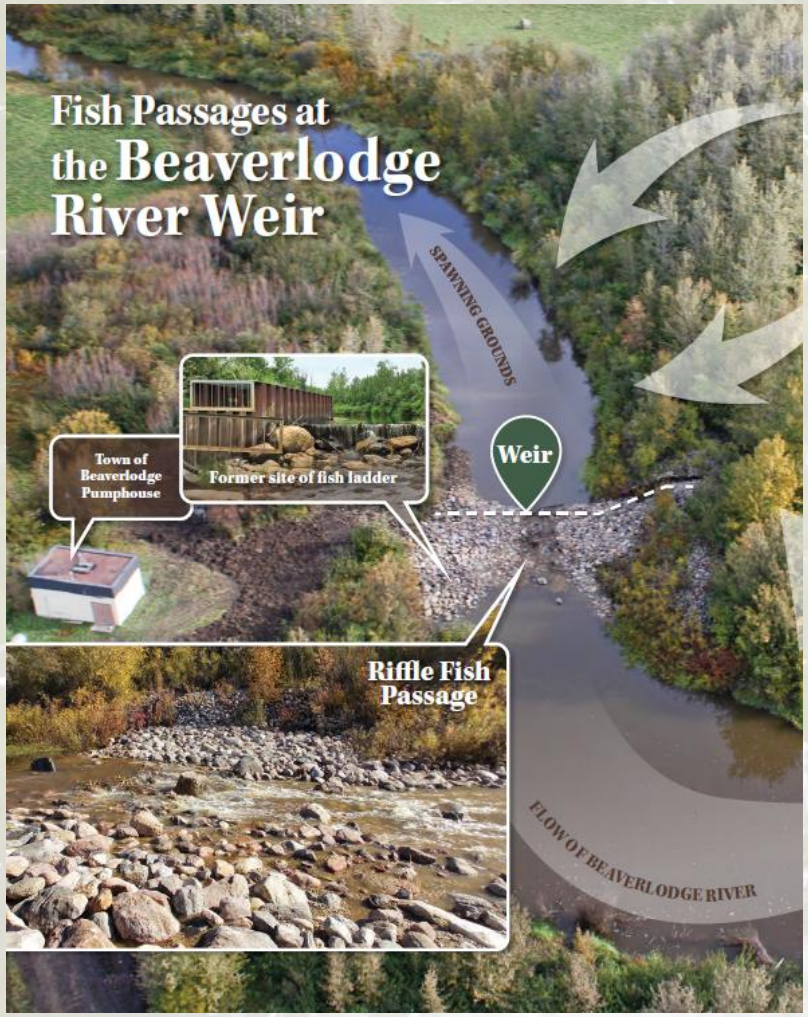
Low and No Flow

- Lack or overwintering or spawning habitat
- Migration disruption
- Lack of thermal buffering capacity
- Anoxia
- Barrier creation by beavers

High Flows

- Changes in stream morphology that lead to braided shallow stream courses and lost pools
- Exposure to sun causing increased water temperatures and evaporation
- Turbidity
- Sedimentation

Barriers



<u>Lost Connectivity</u>

Migration Disruption (spawning, overwintering and repopulation)

<u>Manmade</u>

- Culverts
- Weirs

<u>Natural</u>

- Beaver dams
- Stream course alteration
- Thermal
- Flow

Thermal Impacts on Arctic Grayling

- Lethal above 23° to 25°C
- Stress 17°C and greater
- Optimum 5°C to 14°C
- Spawning 7° to 10°C
- Rearing 10° to 17°C

- Reproduction (spawning and rearing)
- Migration
- Refuge
- Lethal events
- Optimal temperature for other fish species (barrier shift) allowing for their range expansion (competition and predation)
- Thermal refuge limited unless higher elevation, ground water (springs) or peat bog discharge
- Long daylight hours limit nighttime cooling

Oxygen

>3.5 ppm dissolved oxygen

<u>Increasing Anoxic Events</u>

Summer and Winter

Low or No Flows

Thermal

Increasing organics either natural or due to agriculture, industry, or domestic with resulting BOD increase

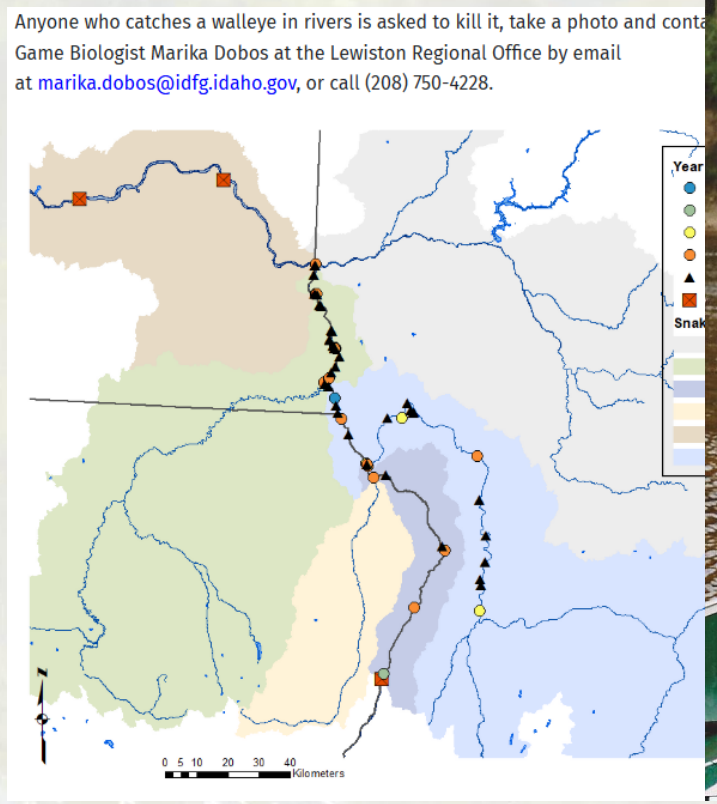
Species Community Shift

As habitat has changed created conditions favorable for other species

Management of species has changed population abundance

Return of beavers and otters

Arrival of walleye and piscivorous birds



The state/future of arctic grayling in the boreal watersheds

- Arctic grayling populations will continue to decline
- Populations at higher elevations or those with flows that are maintained through high groundwater infusion or fed from extensive peat wetland complexes are at less risk
- Landscape level programs will not reverse the decline soon enough for this species but are important for overall ecosystem health
- Programs must focus on streams and their watersheds where strong populations remain
- Needs to be a long-term change in weather patterns that lead to consistent year-round flows, lower water temperatures, clear oxygenated water

Stewardship Initiatives

- Swan River Watershed Initiative
- Alberta Native Trout Collaborative
- Stream Temperature Monitoring fri Research
- Alberta Watercourse Collaborative

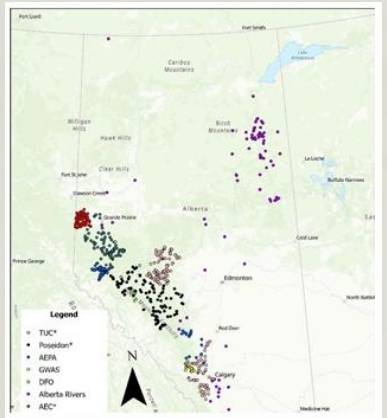


*Figure 2. New water temperature logger locations added to the model in 2023. TUC = Trout Unlimited Canada, AEPA = Alberta Environment and Protected Areas, GWAS = Ghost Watershed Alliance Society, DFO = Fisheries and Oceans Canada, Alberta Rivers = www.rivers.alberta.ca, AEC = Aseniwuche Environmental Corporation, ACA = Alberta Conservation Association. * indicates partners that were subcontracted under grants through FRI Research in summer 2023.*

The Alberta Native Trout Collaborative is a group of partner organizations working to advance native trout recovery in Alberta via cumulative effects analysis, habitat restoration, restoration stocking, land use planning, watershed and fish population assessments, and public education.

ALBERTA NATIVE TROUT COLLABORATIVE

Welcome to Alberta Watercourse Crossing Collaborative

Our purpose is to assist in the recovery of lost, isolated, and damaged fishery habitat from poorly installed and maintained watercourse crossings.

OUR WORK

The Alberta WaterCourse Crossing Collaborative (AWC3) is a not-for-profit society comprised of public members, roadway WCC practitioners, tenured roadway owners, regulators, First Nations and Metis communities, scientists, municipalities, academics, ecologists and others who are responsible for and interested in restoring fish passage and habitat quality to watercourse crossing sites that are fragmented from improper crossing installation and poor maintenance.

Swan River Watershed Initiative

A collaboration between industry, governments, Swan River First Nation, NGO's and the Lesser Slave Watershed Council.

SWAN RIVER Watershed Initiative

Closing

"The river moves from land to water to land, in and out of organisms, reminding us what native peoples have never forgotten: that you cannot separate the land from the water, or the people from the land."

Lynn Culbreath Noel, American historian, from "With a View to the Southwest: Dorothy Morang and the Santa Fe Art Scene" (2014).

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