ALBERTA NATIVE TROUT SCIENCE WORKSHOP & GATHERING II 2025

FEBRUARY 26-28TH

FUNDING:

Alberta
Office of the Chief Scientist

Fisheries and Oceans Canada | Pêches et Océans Canada
Canada Nature Fund For Aquatic Species At Risk

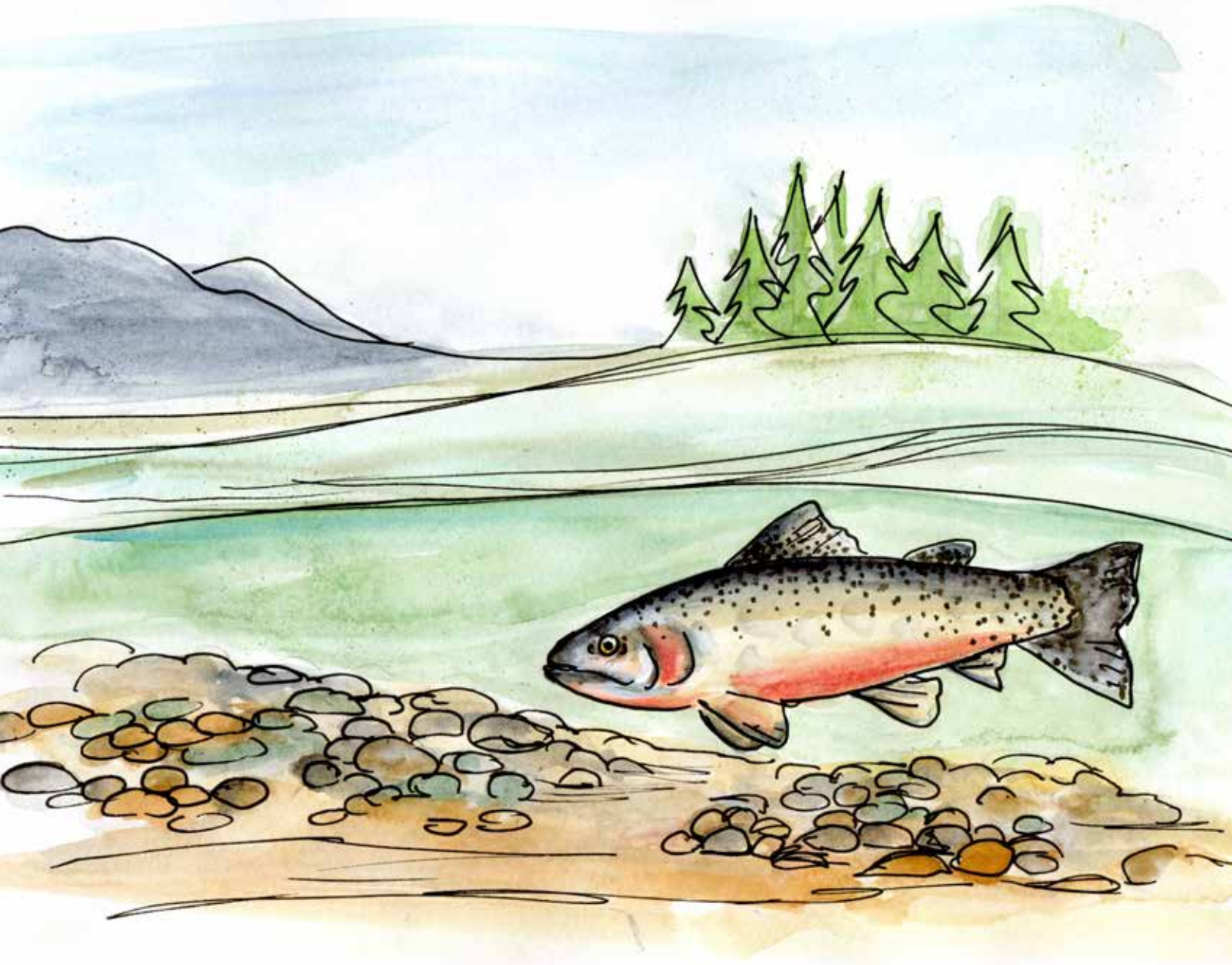
Forest Resource Improvement Association of Alberta (FRIAA)

Alberta Native Trout Collaborative

COWS & FISH
Riparian Management Society

American Fisheries Society
AFS Mid-Canada Chapter

fRI Research
Informing Land & Resource Management



AGENDA

Wednesday, February 26th, 2025

Wednesday, February 26th, 2025		
11:45-12:15 pm	**Pipe Ceremony** **Optional for attendees**	Roddy and Dusty Twin (SRFN)
11:30-12:30 pm	**Registration**	Willow Ballroom
12:30-1:00 pm	Opening statements, **land acknowledgement** and location orientation Pipe ceremony here	Willow Ballroom Ben Kissinger (fRI Research) Elder Eldon Weasel Child (Blackfoot Confederacy)
1:00-1:20 pm	Current Status of Native Trout in Alberta and Provincial Responsibilities	Mike Rodtka (ACA)
1:20-1:30 pm	A collaborative approach to native trout recovery	Nicole Pilgrim (EPA)
1:30-5:00 pm	**Research Presentations**	Willow Ballroom
Theme #1: Climate Change (Mod: Dr. Ben Kissinger)		
1:30-2:05 pm	Keynote: Understanding adaptive potential of cold-water fishes in a warming world	Neil Mochnacz (DFO)
2:05-2:10 pm	A collaborative approach to modeling stream temperature along Alberta's Eastern Slopes	Claire Allore and Sam Chevalier (fRI Research)
2:10-2:25 pm	**Break**	
Theme #2: Cumulative Effects (Mod: Michael Sullivan)		
2:25-3:00 pm	Keynote: Salmonid Stressor Response Electronic Library	TBD
3:00-3:15 pm	An assessment of environmental pressures on the movement of Athabasca Rainbow Trout (*Oncorhynchus mykiss*) in the Upper Athabasca drainage	Tyana Rudolfsen (DFO)
3:15-3:30 pm	Landscape-scale distribution models support bull trout recovery planning in Banff National Park	Mark Taylor (PC)
3:30-3:45 pm	Multifaceted influences on Bull trout populations: Implications for conservation and management	Mark Poesch (UAlberta)
3:45-4:00 pm	Evaluating cumulative impacts of land use in a "busy" Alberta headwaters basin; Exemplar of a wicked watershed assessment challenge	Kathleen Beamish (UAlberta)
4:00-4:05 pm	Cumulative effects modelling to support native trout recovery planning in Alberta	Jessica Reilly (EPA)
4:05-4:10 pm	Assessing Potential Competition Among Native and Non-Native Lotic Salmonids with Stable Isotope Analysis	Parker Makkreel (UofC)
Theme #3: Forestry and Fish (Mod: Jill Cameron)		

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Wednesday, February 26th, 2025

4:10-4:45 pm	Keynote: 20 years of insights (and surprises) on forest disturbance impacts in Rocky Mountain watersheds	Uldis Silins (UAlberta)
4:45-5:00 pm	Comparative effects of forest harvest strategies on summer stream temperature in groundwater dominated headwaters of southwest Alberta	Jeremy Fitzpatrick (UAlberta)
5:00-5:10 pm	Closing Ceremony	Roddy and Dusty Twin (SRFN)
6:30-9:00 pm	American Fisheries Society Mid-Canada Chapter Social Optional and open to family and friends	Toolshed brewing, 801 30 Street Northeast, Calgary

AGENDA Thursday, February 27th, 2025

Thursday, February 27th, 2025		
7:45- 8:15 am	**Pipe Ceremony** **Optional for attendees**	TBD/Roddy and Dusty (SRFN)
8:30-8:45 am	Opening statements and opening ceremony	Ben Kissinger (fRI Research) Willow Ballroom
Theme #3: Forestry and Fish Continued (Mod: Jill Cameron)		
8:45-9:00 am	Forest harvest effects low flows in Alberta's south-west Rocky Mountain region	Eamon Turner (UAlberta)
9:00-9:05 am	Evaluation of Alberta's native trout habitat quality using high-resolution LiDAR and stable isotopes of invertebrates	Léna Mazuryk (ULaval)
9:05-9:10 am	Effects of resource road stream crossings on stream temperature in the East Slopes of the Southern Rocky Mountains, Alberta – study design and initial results	Ryan Macdonald (MacHydro)
Theme #4: Genetics (Mod: Jess Reilly)		
9:10- 9:45 am	Keynote	Fred Allendorf
9:45-10:00 am	Epigenomics as a tool for salmonid conservation and supplementation	Clare Venney (UAlberta)
10:00-10:15 am	Assessment of Alberta's westslope cutthroat trout landscape genetics with implications for species management	Jaanus Suurväli (UofC)
10:15-10:30 am	Bull trout (*Salvelinus confluentus*) population structure and extent of hybridization with brook trout (*S. fontinalis*) across Alberta's Eastern Slopes	Emily Franks (UofC)
10:30-10:35 am	History of *Oncorhynchus* Stocking in the Athabasca River Drainage	Mike Blackburn (EPA)
10:35-10:40 am	The state of genomic tools for Alberta Native Trout population genetics and conservation	James Bull (EPA)
10:40-10:45 am	Morphological Diversity of Two Phylogeographic Lineages of Arctic Grayling (*Thymallus arcticus*) in Alberta	Jessica Reilly(EPA)
10:45-11:00 am	**Break**	Dining room
Theme #5: Translocations & Stocking (Mod: Nicole Pilgrim)		
11:00-11:15 am	Using Trojan sex chromosomes (YY) to control problematic Brook Trout populations in New Mexico, USA	Michael Ruhl**virtual (NMDGF)
11:15-11:30 am	Success of two fertilization methods for long distance transport of aquatic Species-at-Risk	Fonya Irvine (AJM)
11:30-11:45 am	An experimental test of bull trout conservation translocations	Steve Vamosi (UofC)

AGENDA Thursday, February 27th, 2025

11:45-11:50 am	Restoration stocking for Westslope Cutthroat Trout : UPDATE 2024	Brian Meagher (EPA)
11:50-12:50pm	**Lunch & Videos**	Dining room
Theme #6 – Habitat Remediation (Mod: Lesley Peterson)		
12:50-1:25 pm	Keynote: What is low-tech process-based restoration and why should Albertans consider doing more of it?	Stephen Bennett (USU)
1:25-1:40 pm	Results of Riparian Health Monitoring and Restoration Efforts in Grazed Landscapes – Lessons To Benefit Native Trout Habitat in Alberta	Norine Ambrose (Cows and Fish)
1:40-1:55 pm	Assessing disturbance impacts on riparian vegetation using drone-acquired data	Leanna Stackhouse**virtual (UBC)
1:55-2:10 pm	FAST - DFO's **F**ish p**A**ssage a**S**sessment **T**ool	Court Berryman (DFO)
2:10-2:15 pm	Using Post-Assisted Log Structures (PALS) to Restore Stream Complexity	Angela Ten (FCC)
2:15-2:20 pm	Can We Restore the Trout to Trout Creek?	Elliot Lindsay (FCC)
2:20-2:35 pm	**Break**	
2:35-5:00 pm	Concurrent Breakout Sessions	Exact Room locations TBD
	Session #1 – Simplifying the difficulties of understanding and managing cumulative effects on fishes	Michael Sullivan (EPA)
	Session #2 – Introduction to Natural Law	Richard Woodman (SRFN)
	Session #3 – Improved Mapping and Characterizing of Riverine Landscape in Alberta- a three presentation series	Lee Benda (Terrainworks)
	Session #4 – Working in and near listed trout critical habitat: Perspectives from DFO and the Alberta forestry sector since March 2021	Lynn Dupuis (DFO)
6:00-7:20 pm	**Dinner & Drinks**	Dining room
7:20-7:30 pm	Mid-Canada Chapter of the American Fisheries Society	Ben Kissinger (fRI Research)
7:30-8:00 pm	Banquet presentation	Lorne Fitch
9:00 pm	Drinks and Mingling	

AGENDA

Friday, February 28th, 2025

Friday, February 28th, 2025		
7:45- 8:15 am	**Pipe Ceremony** **Optional for attendees**	TBD/ Roddy and Dusty Twin (SRFN)
8:30-8:45am	Opening statements and opening ceremony	Ben Kissinger (fRI Research) Willow Ballroom
Theme #6: Habitat Remediation (Mod: Amy Berlando)		
8:45-9:05 am	New Provincial Watercourse Crossing Guidebook	Bruce Nielsen (AWCCC)
9:05 – 9:20 am	Mitigating Stream Crossing Barriers: 20 Years of Habitat Restoration and Fish Passage in Alberta's Watersheds	Ngaio Baril (Poseidon)
9:20-9:35 am	Inventory and mapping of OHV stream crossings in Alberta's foothills, a scalable approach	Kally Groat (Poseidon)
9:35-9:40 am	Information into Action: synthesizing available data and Traditional Knowledge into recommendations for Arctic grayling recovery	Kate Marouelli (fRI Research)
9:40-10:00 am	Break	Dining room
Theme #7: Fish Population Status & Monitoring Approaches (Mod: Mark Taylor)		
10:00-10:35 am	Keynote: "How many trout are in the river?" Rethinking the logic of riverine population abundance assessments	Joe Thorley (Poisson Consulting)
10:35-10:50 am	Status Assessment of Bull Trout in Canada with an Emphasis on Alberta Designatable Units	John Post (UofC)
10:50-11:05 am	Collaborative initiatives for enhancing headwater health of the Athabasca Watershed	Mitch Wincentaylo (AWC)
11:05-11:20 am	Temporal patterns in species richness and occupancy in Alberta Eastern Slopes: a novel modelling approach	Angus Lothien (UofC)
11:20-11:35 am	Status and trends of the upper Fording River Westslope Cutthroat Trout population	Bronwyn Lewis (EVR)
11:35-11:40 am	Exploring Mercury Accumulation and Macroinvertebrate Responses in Beaver-Modified Ponds and Canals	Emma Gregoire (UofC)
11:40-11:45 am	Population dynamics of Lake Trout in Cold Lake during 2007 to 2023Mit	Steven Griffeth (EPA)
11:45-11:55 am	DFO closing remarks	Allison McPhee (DFO)
11:55-12:00 pm	Thank you to organizing committee	Andrew Paul (EPA)
12:00 pm	**Closing ceremony followed by Lunch On Your Own**	

* Virtual

ABSTRACTS

WEDNESDAY FEBRUARY 26TH, 2025

***Presenters are** Underlined
Abstracts are listed in sequential order based on presentation queue.

A collaborative approach to native trout recovery

Author: Nicole Pilgrim[1]

Affiliation: [1] Alberta Environment and Protected Areas, Government of Alberta, Edmonton, AB

There is a lot of complexity and uncertainty surrounding recovering native trout in Alberta. The Native Trout Collaborative (NTC) is a group of government, non-profit and non-government organizations that have come together to tackle this issue. The key strategies the NTC uses is to 1) bring together groups with various expertise and experience to tackle specific threats, 2) incorporate cumulative effects modelling and other biological, social, and economic considerations and 3) run facilitated workshops annually to discuss basin priorities and specific recovery actions in local watersheds. The NTC incorporates the principles of adaptive management through a yearly cycle of review of actions and planning next steps.

Invited Speaker: Understanding adaptive potential of cold-water fishes in a warming world

Author: Neil J. Mochnacz[1]

Affiliation: [1]Fisheries and Oceans Canada, 501 University Crescent, Winnipeg, Manitoba, Canada, MB

Observed rates of climate warming are outpacing historical trends, exerting stress on cold-water fishes across North America. Successful management of fish populations and their habitat in a warmer future requires understanding the interplay between species optimal habitat ranges and physiological limits. Our lab uses a conservation physiology approach to identify factors that influence the distribution and persistence of cold-water stream fishes in western Canada. I will use Bull Trout as a case study to illustrate how we integrate field and laboratory data to test predictions of how variations in temperature interact with ecological context to influence metabolic performance, fitness, and distribution. Results demonstrate that although Bull Trout occupy a narrow ecological niche, some populations have greater adaptive potential than previously thought. In a laboratory population originating from Smith-Dorrien Creek, we observed an upper thermal tolerance of 12°C for juvenile life stages, which aligns with thresholds observed in the wild. However, metabolic rate and growth results suggest that this population can perform well at temperatures above 12°C for short periods, even though gene expression results suggest this is a thermally stressful environment. This finding aligns with the energetics-performance framework, which posits that this Bull Trout population possesses the capacity to make forays into warmer more productive habitats to feed and then retreat to colder more energetically profitable habitats, where growth efficiency is much higher. A deeper understanding of metabolic flexibility and energetic optima provides insight into the adaptive capacity of fish to a warming climate.

A collaborative approach to modeling stream temperature along Alberta's Eastern Slopes

Authors: Benjamin C. Kissinger[1,2], Ryan MacDonald[3], Claire Allore[1], Sam Chevalier[1], Devin Cairns[3], Lisa Schaubel[4] & Neil J. Mochnacz[5]

Affiliations: [1]fRI Research, 1176 Switzer Dr, Hinton, AB

[2] University of Calgary, 2500 University Dr NW, Calgary, AB

[3]MacDonald Hydrology Consulting Ltd., 4262 Hilltop Cres. Cranbrook, BC

[4]Alberta Environment and Protected Areas, Forestry Building 9920-108 Street, Edmonton, AB

[5]Fisheries and Oceans Canada, 501 University Crescent, Winnipeg, MB

Water temperature is a crucial factor influencing the distribution of fish, particularly for species such as salmonids that thrive in cold, low-productivity environments. In Alberta, three salmonids—Athabasca Rainbow Trout, Bull Trout (Saskatchewan-Nelson), and Westslope Cutthroat Trout—are federally recognized as species at risk. The potential rise in summer water temperatures, caused by factors like riparian habitat loss, climate change, and changes in water supply, could threaten habitat availability for these cold-water species. To better understand where cold-water habitat exists for these species, we are modeling stream temperatures across Alberta's Eastern Slopes region using spatial statistical stream network models. A stream temperature monitoring network was developed through a collaborative effort by 1) collating existing data and 2) collecting new data. These data were then used to model mean August temperatures in areas without data using covariates such as elevation and landscape types. To date this collaborative approach has collated data from over 15 organizations representing indigenous, industry, not-for-profit, and government organizations. Up to ~1,400 unique locations have been sampled with some datasets spanning 30 years. Data continues to arrive,

improving and increasing spatial coverage and model fit. The outputs from this work will aid in selection of locations for species recovery efforts, identifying critical cold-water habitat, and better understanding watershed's thermal sensitivity to climate and landscape change.

Cumulative Effects

Invited Speaker: Salmonid stressor response electronic library

Authors: Paxton Calhoun[1], Aimee Fullerton[2] & Morgan Bond[2]

Affiliations: [1]Saltwater, Inc. 733 N Street, Anchorage, AK

[2]Northwest Fisheries Science Center, 2725 Montlake Blvd E, Seattle, WA

The Salmonid Stressor Response e-library is a centralized resource designed to improve transparency and efficiency in salmonid life cycle modeling. Originally developed by Canadian partners, the e-library has been taken over and expanded by NOAA's Northwest Fisheries Science Center. This centralized, electronic repository is designed to provide researchers, modelers, and resource managers with access to quantitative stressor-response relationships across different species, life stages, and environmental factors. Funded through 2027, the e-library aims to bridge the gap between research and application by providing easily accessible, curated data for researchers and modelers. A collaborative team, including data science students, is focused on maximizing the usability of the platform and ensuring researchers can efficiently incorporate its content into life cycle models. This presentation will provide an overview of the e-library's objectives, its development process, and its potential applications for salmonid recovery and ecosystem-based management. By centralizing stressor-response data, the e-library will empower researchers to make data-driven decisions that support salmonid conservation across a diverse systems.

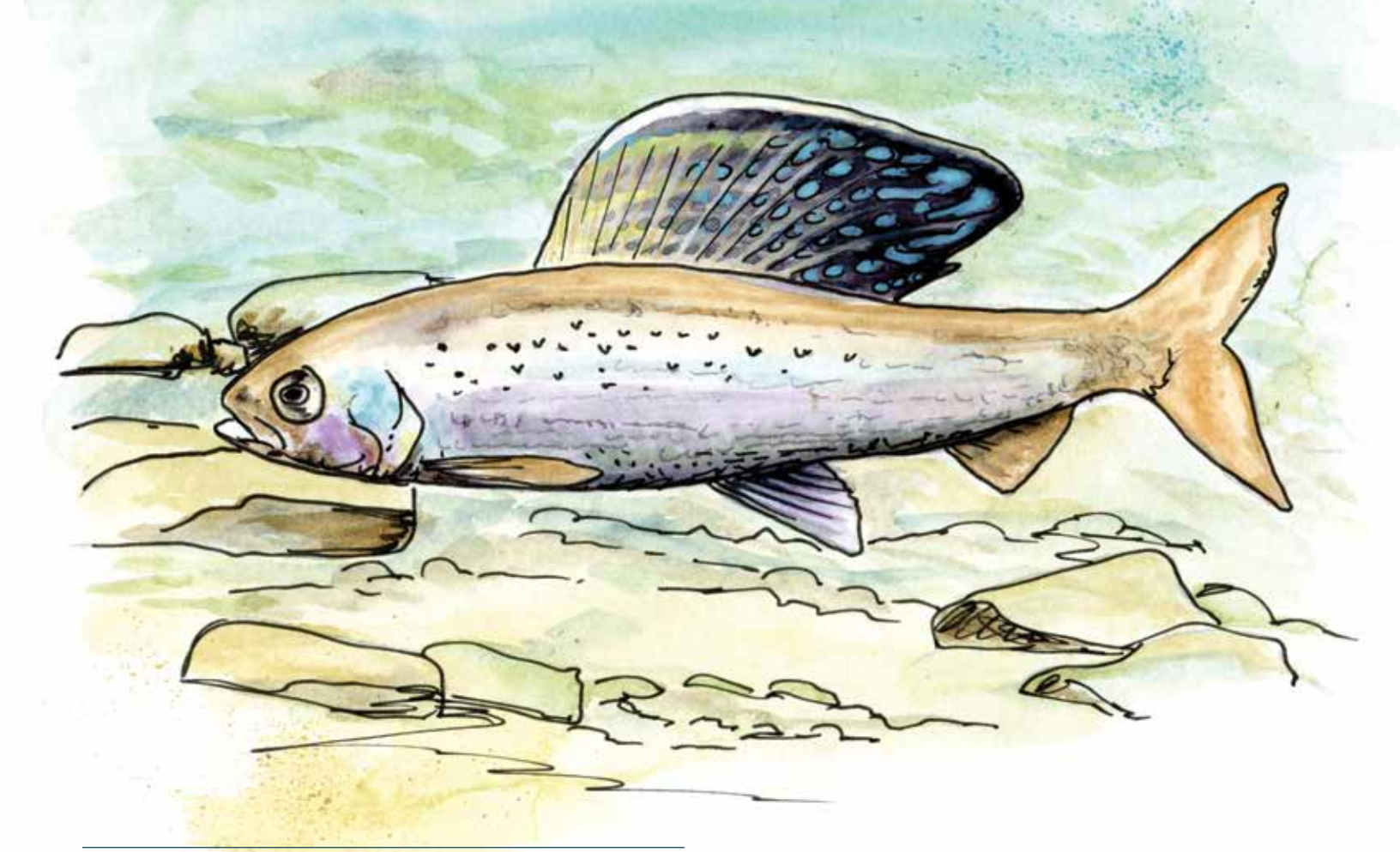
An assessment of environmental pressures on the movement of Athabasca Rainbow Trout (Oncorhynchus mykiss) in the Upper Athabasca drainage

Authors: Tyana A. Rudolfsen[1], Steven Duerksen[1], Matthew Teillet[1] & Lee F. Gutowsky[2]

Affiliations: [1]DFO, Summerside Centre, 1028 parsons Rd SW, Edmonton, AB

[2]DFO, Freshwater Institute, 501 University Crescent, Winnipeg, MB

*The Athabasca Rainbow Trout (*Oncorhynchus mykiss*) is an endangered stenothermal trout, native to eastern Alberta. Despite the species' critical status, substantial knowledge gaps remain in our understanding of its ecology and response to increasing cumulative effects in the region. To address these concerns, we are taking a multi-faceted research approach that includes: (1) acoustically tracking Athabasca Rainbow Trout and introduced Brook Trout (*Salvelinus fontinalis*) in disturbed versus undisturbed streams to compare species movement and interspecific competition, and (2) passive integrated transponder (PIT) tracking Athabasca Rainbow Trout in relation to long culverts that could be barriers to movement. This work is intended to fill knowledge gaps that inform directed management, recovery strategies, and deepen our understanding of the environmental pressures affecting Alberta's native salmonids.*



Landscape-scale distribution models support bull trout recovery planning in Banff National Park

Authors: Mark K. Taylor[1], Daniel P. Struthers[1], Hedin Nelson-Chorney[1] & Neil J. Mochnacz[2]

Affiliations: [1]Parks Canada Agency, Banff National Park, Banff, AB

[2]Fisheries and Oceans Canada, Winnipeg, MB

Recovery planning for cold water trout requires a quantitative understanding of potential stressors and effect modifiers to prescribe recovery actions that could effectively increase the distribution of native species. Multispecies occupancy models quantified the distribution of bull trout and non-native brook trout using electrofishing data from 376 stream sites across the Banff Field Unit (BFU) in Alberta, Canada. Combined with spatial stream temperature modelling, this space-for-time approach links bull trout occurrences and covariates estimating the effects of historic brook trout stocking, climate change, and flow regulation.

Occupancy estimates for adult bull and brook trout across BFU are 0.84 (0.68-0.93) and 0.31 (0.11-0.62), respectively. Occupancy estimates for juvenile bull and brook trout are 0.68 (0.48-0.83) and 0.14 (0.06-0.32), respectively. The odds of adult bull trout occupying a site is 0.22 times lower in the presence of adult brook trout. The odds of juvenile bull trout occupying a site is 0.48 times lower in the presence of juvenile brook trout. Occupancy estimates for all species and life-stages are correlated with August mean stream temperature and the highest probabilities occur at 9 °C for both adults and juvenile bull trout; whereas, the likelihood of brook trout presence peaked at the highest temperatures in BFU (14-16 °C). Finally, the odds of adult and juvenile bull trout occurrence in the flow-regulated Spray River are 2.1 and 1.8 times lower, compared to the free-flowing watersheds.

This study demonstrates how landscape-scale models can be used to generate temperature thresholds that assist practitioners in planning successful bull trout recovery. These results also support developing watershed management priorities by projecting gains in bull trout occupancy that could be achieved by removing brook trout and quantifying the association between flow regulation and reduced bull trout occurrence. Ongoing monitoring will provide validation of recovery actions to demonstrate Parks Canada's commitment to species at risk management.

Multifaceted influences on Bull trout populations: Implications for conservation and management

Authors: Sebastian Theis [1,2], Cordelius L. Hultberg [1], Jacqueline L. Pallard [1] & Mark S. Poesch [1]

Affiliation: [1] University of Alberta, Department of Renewable Resources, 751 General Services Building, Edmonton, AB

[2] University of Toronto, Department of Ecology and Evolutionary Biology, 25 Willcocks St, Toronto, ON

Freshwater biodiversity and ecosystem health face severe threats from habitat loss, climate change, pollution, overharvesting, and invasive species. Bull trout are listed as Threatened in Canada and competition with non-native salmonids like Brook and Brown trout are considered a major threat. Emergency action plans have been

developed to aid in the reversal of Bull trout in Alberta. Despite these protection efforts, competition scenarios with non-natives persist. Our study highlights the multifaceted influences shaping Bull trout populations in the Saskatchewan-Nelson River watershed. We examined the effects of temperature, food availability, and competition, on Bull trout population trends, with Bull trout caught during summer stream electrofishing surveys. Our study suggests that competition primarily influences Bull trout dynamics rather than temperature, with summer stream temperatures in the study region (7-12 °C) being within the preferred temperature range for Bull trout. Notably, Brook trout had a significant impact on Bull trout abundance, with the presence of Brown trout alleviating some pressure on Bull trout through potentially competitive interactions with Brook trout. Food availability, indicated by macroinvertebrate abundance, significantly enhanced Bull trout condition by around 10%. The presence of prey fish species like Mountain whitefish and sculpin had a slight negative impact, likely due to competition with non-native salmonids in those streams. Our findings underscore the importance of maintaining and protecting coldwater habitats for Bull trout conservation. Strategies should prioritize protecting thermal refuges and enhancing macroinvertebrate populations while managing for competing non-native species since our results suggest that temperature might not be enough by itself to allow Bull trout to persist in competition scenarios.

Evaluating cumulative impacts of land use in a "busy" Alberta headwaters basin; Exemplar of a wicked watershed assessment challenge

Authors: Kathleen Beamish[1], Uldis Silins [1], Eamon Turner [1]& J. Jeremy Fitzpatrick [1]

Affiliation: [1] Department of Renewable Resources, University of Alberta, Edmonton, AB

Assessing cumulative watershed impacts from human development is a key element in Canadian federal and provincial environmental policy and regulatory frameworks; however, approaches to assess cumulative effects remain a pressing challenge. Frameworks for assessing interacting effects of highly diverse land disturbances on water resources remain poorly developed, with variable approaches employed across jurisdictions. The Crowsnest sub-basin in southwest Alberta serves as an exemplar of the challenges in assessing cumulative watershed impacts. Potential pressures on water resources from current and/or historic forestry, agriculture, mining, and municipal (urban and peri-urban) development create a daunting challenge in assessing diverse, interacting pressures on water resources in this region. Here we showcase some initial insights from a new study of cumulative watershed effects based on evaluating contaminant loading from multiple disturbance pressures along the mainstem of the Crowsnest River. We discuss preliminary findings related to nutrient, sediment and metal loading measured at nine sites spanning from the headwaters of the Crowsnest River to the Oldman reservoir. This assessment highlights the efficacy of using the total maximum daily load (TMDL) initiative of the U.S. EPA within a pressure-state-response cumulative watershed effects framework to identify key pressure points in a "busy" mountain river basin.

Cumulative effects modeling to support native trout recovery planning in Alberta

Authors: Jessica Reilly[1] & Lisa Schaubel[1]

Affiliation: [1] Alberta Environment and Protected Areas, Government of Alberta, Edmonton, AB

A comprehensive tactical analysis was conducted to understand the key threats limiting three species of native trout in Alberta: Athabasca rainbow trout (Oncorhynchus mykiss), bull trout (Salvelinus confluentus), and Westslope cutthroat trout (Oncorhynchus lewisi). All three species are listed as Threatened under the Alberta Wildlife Act, and share similar life history attributes, behaviors, and habitat requirements. The analysis employed Alberta's fisheries cumulative effects modeling approach, known as the Joe model, to assess threats and potential effectiveness of recovery actions for native trout populations. The tactical analysis identified four key threats: small stream fragmentation, sedimentation, angling mortality, and competition/hybridization with non-native trout species. Results indicate that mitigating these threats can potentially improve 65% of native trout populations, with the mitigation of habitat-related threats being crucial in many cases. Sympatric trout species often share similar threats, suggesting opportunities for focused recovery efforts. The tactical analysis serves as an initial step in planning recovery actions, providing hypotheses that should be tested to enhance the understanding of threats and how to optimize recovery actions for native trout.

Assessing potential competition among native and non-native lotic salmonids with stable isotope analysis

Authors: Parker Makkreel[1], Ariane Cantin[1], Tim Jardine[2], Neil Mochnacz[3], Cody Knack[4], Adrian Meinke[4] & Benjamin C. Kissinger[1,5]

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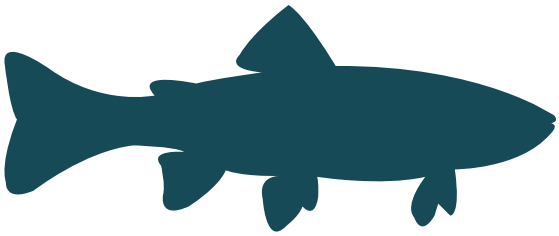
[2]University of Saskatchewan, 44 Campus Drive, Saskatoon, SK

[3]Fisheries and Oceans Canada, 501 University Crescent, Winnipeg, MB

[4]Alberta Environment and Protected Areas, 10320 99 St, Grande Prairie, AB

[5]fRI Research, 1176 Switzer Dr, Hinton, AB

Bull Trout are currently listed as threatened in Alberta and many populations are in decline. These declines have been attributed to many anthropogenic activities such as habitat degradation, fragmentation, and the introduction of non-native salmonids. However, potential competition with introduced salmonids is largely assumed rather than measured. To investigate potential competition among salmonids, we used Stable Isotope Analysis (SIA), as there is a predictable isotopic correlation between a consumer and what they consume, allowing estimates of dietary overlap. Carbon and Nitrogen stable isotope ratios were used to determine the origin of carbon in food webs (terrestrial inputs vs.



aquatic production) and identify trophic position, respectively. We focused on Bull Trout in the Muskeg River watershed of Alberta, as over the past 30 years non-native Rainbow Trout and Brook Trout have been repeatedly stocked in this watershed. Caudal fin clips were collected by Alberta Environment and Protected Areas in the summer of 2022, along with prey (aquatic invertebrates collected throughout the Muskeg and terrestrial invertebrate isotope ratios from the literature). A total of 18 sites were categorized based on dominance, 1) Bull Trout dominant, 2) Brook Trout dominant, 3) Rainbow Trout dominant, 4) Bull Trout/Brook Trout sympatric, and 5) All species even. We compared carbon origins between categories to observe whether Bull Trout shift the proportion of terrestrial or aquatic in the presence of non-native species. Isotopic niche width was modelled to determine the amount of overlap among species and whether Bull Trout shift their niche in the presence of non-native species. Insights from this work will help better quantify impacts to Bull Trout in areas where these species are in sympatry.

Forestry and Fish

Invited Speaker: 20 years of insights (and surprises) on forest disturbance impacts in Rocky Mountain watersheds.

Author: Uldis Silins[1]

Affiliations:[1]Department of Renewable Resources, University of Alberta, Edmonton, AB

The conceptual simplicity of processes regulating water cycling can lead to a suite of "common knowledge" perceptions on how watersheds respond to different types of disturbances. However, broadly differing disturbances such as wildfires or logging can affect different hydrologic processes resulting in broadly differing impacts. Furthermore, these impacts differ strongly across hydro-climatic-geologic regions.

Here we outline a broad overview of 20+ years of watershed research on watershed impacts from logging and wildfire by the Southern Rockies Watershed Project team in Alberta's south-west Rocky Mountain region. This research highlights both broadly similar and strongly differing watershed responses to each of these disturbance domains. In particular, we discuss key watershed responses in Alberta's Rocky Mountain or upper foothills region that are quite different from what might be expected based on common knowledge or responses observed in other regions.

Comparative effects of forest harvest strategies on summer stream temperature in groundwater dominated headwaters of southwest Alberta

Authors: J. Jeremy Fitzpatrick[1] & Uldis Silins[1]

Affiliations:[1]Department of Renewable Resources, University of Alberta, Edmonton, AB

Stream temperatures regulate habitat use by native trout species. Stream temperatures are determined by energy flux processes that vary across seasons and interact with different watershed conditions. Groundwater inputs can play an important role in moderating summer stream temperatures when high temperatures create thermal stress for cold water species. Research on forest harvest effects to stream temperatures has focused largely on the consequences of riparian shade. However, where stream temperatures are primarily controlled by groundwater inputs, forest harvest effects on stream shade may not constitute primary impacts of harvest disturbance on stream thermal regimes. We examine the effects of an experimental forest harvest on summer stream temperatures using a Before-After Control-Impact (BACI) design in groundwater dominated headwater catchments of the Oldman River basin, Alberta. Ten years of pre-disturbance data and 7 years of post-disturbance data capture hydroclimatic variability before and after forest harvest occurring in 2015. We compare catchment scale stream temperature metrics (e.g., mean daily stream temperature) before and after imposition of two different forest harvest strategies: clear-cut and strip-cut. Results of this study will contribute to understanding the resilience of summer stream temperatures to forest harvest in catchments where stream temperatures are principally groundwater controlled.

Forest harvest effects low flows in Alberta's south-west Rocky Mountain region

Authors: Eamon Turner[1], Uldis Silins[1], J. Jeremy Fitzpatrick[1] & Kathleen Beamish[1]

Affiliation: [1]Department of Renewable Resources, University of Alberta, Edmonton, AB

Studies on forest disturbance effects to hydrology often focus on changes to flow production (water yield) or effects on peak flows or potential of downstream flooding. However, comparatively little research has focused on how forest disturbance may affect low flows during droughts or the lower end of the seasonal flow regime where the lowest seasonal flows may represent ecological "bottlenecks" for aquatic organisms including fish. Here, seven years of pre-, and post-harvesting streamflow data were used in a powerful BACI (Before-After: Control-Impact) study to characterize harvest disturbance impacts to the full flow regime (highest to lowest flows) in two sub-catchments of Star Ck. after clear-cut and strip-shelterwood harvesting. Results show that while neither of these harvest approaches produced meaningful changes to peak snowmelt runoff or stormflows, the magnitude of the lowest 25% of seasonal flows increased by 50-80%. This suggests that forest harvest effects on snowpacks and net precipitation likely increased groundwater recharge in these watersheds where groundwater upwelling constitutes a key source of regional streamflow.

Evaluation of Alberta's native trout habitat quality using high-resolution LiDAR and stable isotopes of invertebrates

Authors: Léna Mazuryk[1], Alexis Achim[1], Benjamin Kissinger[2] & Timothy D. Jardine[3]

Affiliations: [1]Wood and Forest Sciences Department, University Laval, 2325, rue de l'Université, Québec, QC

[2]fRI Research, 1176 Switzer Drive, Hinton, AB

[3]School of Environment and Sustainability, Toxicology Center, University of Saskatchewan, 44 Campus Drive, Saskatoon, SK

Native trout populations in Alberta's Eastern Slopes are facing increasing pressure from human activities that alter their habitats and threaten their long-term survival. These impacts have resulted in the listing of three trout species under the Canadian Species at Risk Act, bull trout Salvelinus confluentus, *Athabasca rainbow trout (*Oncorhynchus mykiss*) and westslope cutthroat trout (*Oncorhynchus clarkii lewisi*). This project aims to study how various natural (wildfires) and anthropogenic (logging and OHV roads) activities impact native trout habitats in this region. While past research has often focused on fish populations and water quality, this study will use macroinvertebrates as bio-indicators of native trout habitat health. These organisms are highly sensitive to environmental changes and exhibit strong site fidelity, making them effective for assessing ecosystem conditions in delineated areas. Stable isotope analysis will help track changes in food sources and food web relationships by distinguishing between terrestrial and aquatic inputs. High-resolution LiDAR will map riparian zones, stream morphology, and the extent of these disturbances, while field data on temperature, turbidity, sedimentation, and dissolved oxygen will be collected to evaluate their influence on habitat quality. By combining these methods, this project aims to explore an alternative approach to habitat assessment for native trout. This research seeks to understand how disturbances shape habitat conditions and food web interactions, leading to new directions for the protection of healthy trout ecosystems in Alberta's Eastern Slopes.*

Effects of resource road stream crossings on stream temperature in the East Slopes of the Southern Rocky Mountains, Alberta – study design and initial results

Authors: R.D. Moore[1], Spencer Spanier[1], Ryan J. MacDonald[1], Niko Wicharuk[1] & Benjamin Kissinger[2]

Affiliations:[1] MacDonald Hydrology Consultants Ltd., 4262 Hilltop Cres. Cranbrook, BC

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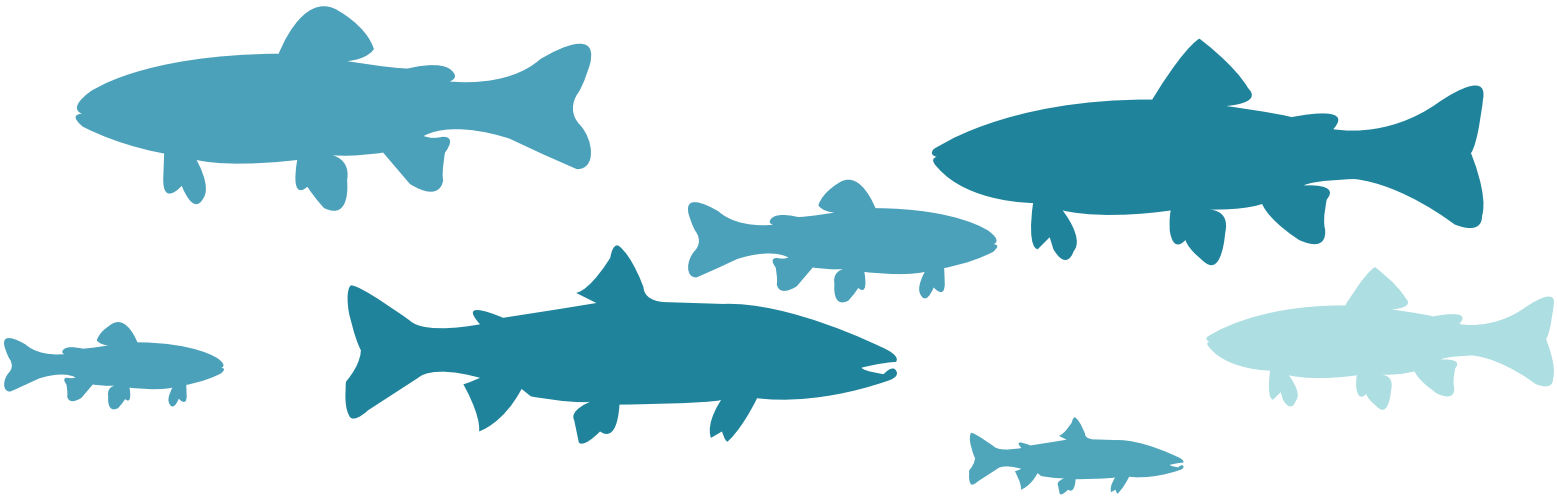
The objective of this study is to quantify and develop a model to predict the warming of streams as they flow through resource road rights of way and the propagation of that warming downstream of the right of way. A field study was conducted in summer 2024 focused on 20 stream crossings in the upper Oldman and Crowsnest watersheds. At each road crossing, five temperature loggers were installed: one each at the upper and lower boundaries of the right of way, one upstream of the upstream logger, and two downstream of the downstream temperature logger. The distance between loggers was the stream distance within the right of way, which ranged from 35 to 75 m. During each site visit, stream discharge was measured at the upstream and downstream ends of the study reach, and temperature and electrical conductivity profiles were measured. Hemispherical photographs and channel dimensions were taken at intervals along each stream to quantify differences in shading along and among each study reaches. Warming varied through time at each station as a function of varying weather and stream discharge. The maximum within-right-of-way warming observed among stations varied up to about 4 °C and was inversely related to stream discharge.



ABSTRACTS

THURSDAY FEBRUARY 27TH, 2025

***Presenters are** Underlined
Abstracts are listed in sequential order based on presentation queue.

Genetics

Epigenomics as a tool for salmonid conservation and supplementation

Author: Clare Venney[1]

Affiliation:[1]Department of Biological Sciences, University of Alberta, 116 St & 85 Ave, Edmonton, AB

*Salmonid species are in decline across much of their native range, with these declines exacerbated by climate change and human activity. This has prompted considerable investment into salmonid conservation, supplementation, and reintroduction efforts. However, captive-reared salmonids often have lower fitness and reproductive success in the wild compared to wild conspecifics. The period of captivity is often brief and insufficient to cause widespread genetic changes, though gene expression is often altered by the captive environment. Epigenomic mechanisms, such as DNA methylation, affect gene expression and trait variation, and may serve as a mechanism behind the persistent, negative effects of captive rearing. Here I will discuss perspectives on the use of epigenomics to improve captive rearing efforts, including some planned projects in westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) and Great Lakes cisco (*Coregonus artedi*). Epigenomic data provides an additional layer of complexity for understanding the effects of captive rearing on salmonids, though it also offers new research avenues and tools for salmonid conservation. Further research on epigenomics also opens the door to the development of nonlethal biomarkers, age determination through epigenomic clocks, and insight into how salmonids respond to captive environments and contemporary environmental threats.*

Assessment of Alberta's westslope cutthroat trout landscape genetics with implications for species management

Authors: Jaanus Suurväli[1], Benjamin C. Kissinger[2,3], Stephen J. Amish[4], Brian Meagher[5], Jennifer Earle[6] & Colin J. Garroway[1]

Affiliations: [1] Department of Biological Sciences, University of Manitoba, Winnipeg, MB

[2] Department of Biological Sciences, University of Calgary, Calgary, AB

[3] fRI Research, Water and Fish Program, Hinton, AB

[4] Conservation Genomics Group, Division of Biological Sciences, University of Montana, Missoula, Montana, USA

[5] Fish and Wildlife Stewardship Branch, Alberta Environment and Protected Areas, Blairmore, AB

[6] Fish and Wildlife Stewardship Branch, Alberta Environment and Protected Areas, Cochrane, AB

One of the primary threats to the threatened native Westslope Cutthroat Trout in Alberta is hybridization with introduced Rainbow Trout. The province, with its collaborators, has completed the momentous task of mapping the locations of hybrids and nonhybrids on the landscape. Here we report our results from the logical follow-up: determining the genetic structure of 'pure' westslope cutthroat trout in order to better manage the existing populations. We find that all westslope cutthroat trout in Alberta can be broadly divided into three main groups. The first two are found in much of the species range in Bow and Oldman watersheds. Fish

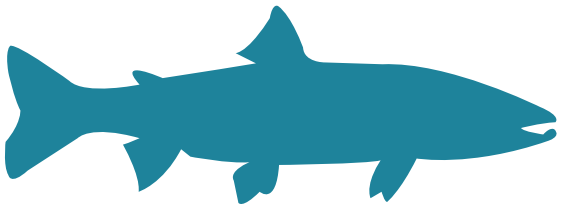
from Marvel Lake are genetically different from both, and together with the Job Lake stock constitute a third lineage that has now also established itself in the West Castle River and several areas of the Bow watershed. On a finer scale, there are over 20 populations, some more closely related to each other than others. Most are separated from both Rainbow Trout and from each other by significant migration barriers, usually waterfalls. Below the barriers in Upper Oldman is a mixing area in which most fish carry different amounts of at least three genetic ancestries that are each much more common in a different headwater population. However, physical barriers are not the only factor determining population structure, as Livingstone River alone has at least 3 populations not separated by any permanent barriers (Deep Creek, Ridge Creek, and Upper Livingstone). Finally, we note that while most of the small populations are genetically fairly homogenous and have a low effective population size, they have persisted regardless. With management strategies informed by the newly determined fine-scale population structure, it should be possible to ensure that their existence continues.

Bull trout (Salvelinus confluentus) population structure and extent of hybridization with brook trout (S. fontinalis) across Alberta's Eastern Slopes

Authors: Emily Franks[1]

Affiliation: [1] Department of Biological Sciences, University of Calgary, 2500 University Dr NW, Calgary, AB

*Genomic analyses are fundamental in advancing our understanding of species conservation. Bull trout (*Salvelinus confluentus*), a charr native to northwestern North America, face population declines and require protection to ensure their survival. In my thesis, I used genetic loci known as Single Nucleotide Polymorphisms (SNPs) to investigate the genetic status of bull trout across Alberta. My two main objectives were to: 1) assess the extent of hybridization between bull trout and brook trout (*S. fontinalis*), and 2) examine the genetic structure and diversity of bull trout across Alberta's Eastern Slopes. Our results indicate that while hybridization outcomes vary by site, post-F1 hybridization was low, suggesting a loss of demographic output to F1 hybrids is likely the greatest impact from hybridization. From assessing genetic structure, clear differentiation of bull trout was also observed between the two bull trout Designatable Units, the Western Arctic and Saskatchewan-Nelson, suggesting the presence of two distinct populations in north and south Alberta. Additionally, within-watershed diversity was also observed, indicating that a high amount of local diversity contributes to bull trout, exhibiting hierarchical metapopulation structure. These findings suggest that management actions should be implemented at local scales to protect local adaptations and genetic integrity of bull trout.*



History of Oncorhynchus Stocking in the Athabasca River Drainage

Authors: Aimee Gibson[1], Jessica Reilly[1]& Mike Blackburn[1]

Affiliation: [1] Alberta Environment and Protected Areas, Government of Alberta, Edmonton, AB

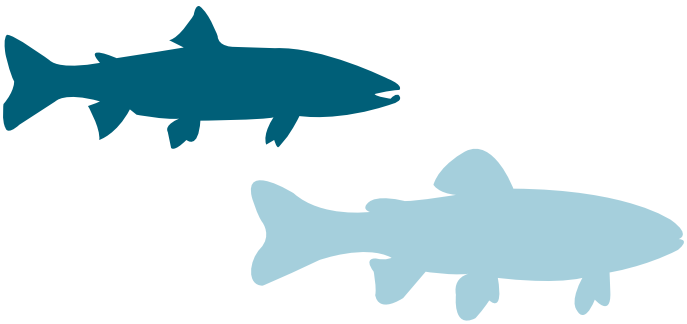
Athabasca rainbow trout (Oncorhynchus mykiss) likely colonized the upper Athabasca River drainage approximately 12,000 years ago by post-glacial headwater exchanges between the Fraser and Athabasca rivers (Taylor et al, 2007), and are classified as a distinct Designatable Unit of rainbow trout (COSEWIC, 2014). To improve our ability to assess hybridization and develop effective mitigation measures, a clear understanding of the genetic characteristics of both Athabasca rainbow trout and the species and strains they may have interbred is required to develop advanced genomic tools. Stocking records are a key piece of evidence in identifying the source of trout eggs and the potential geographic origin of trout stocked into the upper Athabasca River drainage. A thorough review of federal and provincial historical records was conducted to synthesize available information on past stocking events to refine our understanding of where and which species and strains of non-native trout were stocked within the upper Athabasca River drainage. This review uncovered 38 additional stocking locations that were not previously recorded in existing Provincial and Jasper National Park records, for a total of 132 additional stocking events. Rainbow trout have been the most prolifically stocked (99% of all fish stocked), followed by cutthroat trout (1%). Golden trout were only stocked a single time into one waterbody, with no evidence of establishment of a self-sustaining population. Considering the sources of trout eggs, rainbow trout stocked into the upper Athabasca River drainage fall into four broad categories of geographic origin: (1) Coastal (2) Inland (Fraser and/or Columbia basins), (3) Inland x Coastal crosses, and (4) Unknown. There is strong evidence that both Yellowstone and westslope cutthroat trout subspecies were stocked into the Upper Athabasca River drainage. It is also possible, although unconfirmed, that coastal cutthroat trout may have also been used in Jasper National Park. Despite some records being inaccessible or missing, the review provides important insights into stocking history, helping to identify pure and hybridized populations of Athabasca rainbow trout.

The state of genomic tools for Alberta Native Trout population genetics and conservation

Authors: James K Bull[1] & Jessica R Reilly[1]

Affiiations:[1] Alberta Environment and Protected Areas, Government of Alberta, Cochrane, AB

Threats to Alberta Native Trout are diverse and include a range of ecological (e.g., habitat alteration and destruction, competition from invasive species) and genetic (e.g., hybridization with non-native trout, genetic consequences of small population sizes) factors. Modern genomic tools allow the investigation of the impacts of these factors on populations and species, and in some cases, e.g. – hybridization, are the only effective means to do so. In this presentation, we provide information on a series of



species-specific single nucleotide polymorphism (SNP) panels developed for Alberta Native Trout, including the design process, number of markers assayed, and number of samples sequenced to date for each of the three species.

Morphological Diversity of Two Phylogeographic Lineages of Arctic Grayling (Thymallus arcticus) in Alberta

Authors: Jessica R Reilly[1], Laura MacPherson[2], Braeden J Ryan[3], Sara Bumstead[4], Caitlin Gifford[1], Kristy Wakeling[5], Ken Monk[6], James K Bull[1] & Joshua M Miller[3]

Affiliations: [1]Alberta Environment and Protected Areas, Government of Alberta, Cochrane, AB

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[6]Freshwater Conservation Canada, Northern Lights Fly Fishers chapter, Edmonton, AB

*Biodiversity is declining globally, necessitating conservation strategies that protect genetic and phenotypic diversity within species. In North America, Arctic grayling (*Thymallus arcticus*) exhibit significant mitochondrial DNA divergence corresponding to two phylogeographic lineages termed Nahanni and Beringia. However, phenotypic variation has not been widely explored and there has been no direct comparison between the Nahanni and Beringia lineages. This study examined morphological variation between these lineages in Alberta using two approaches. Geometric morphometric techniques were used to describe and quantify differences in body shape between the two lineages and sexes considering 16 two-dimensional landmarks. Twelve meristic characters were also enumerated and compared. Subtle yet significant differences in body shape and three meristic traits (lateral line scales, branched pelvic rays, and pyloric caeca) were identified, with body shape analysis resulting in 95% accuracy in lineage assignment. These results support the potential classification of the lineages as evolutionary significant units worthy of independent protection. Further research on morphological traits, expanded geographic sampling, and genomic analyses is recommended to clarify the adaptive significance of these differences and to inform conservation strategies for Arctic grayling.*

Translocations and Stocking

Using Trojan sex chromosomes (YY) to control problematic Brook Trout populations in New Mexico, USA

Authors: Michael Ruhl[1] & Zachary Klein[2]

Affiliations: [1]New Mexico Department of Game and Fish. 1 Wildlife Way, Santa Fe, New Mexico

[2]New Mexico State University. Fish, Wildlife, and Conservation Ecology Department. 2980 S. Espina St., Las Cruces, New Mexico

Problematic populations of non-native Brook Trout occur across the western United States and Canada with negative effects on native inland trout species. In New Mexico, populations of native Rio Grande Cutthroat Trout and Gila Trout have experienced declines due to the introductions of non-native trout. The state has a long history of native trout restoration, however, tools for implementing recovery actions have been limited to the use of piscicides and mechanical removal of non-native fish. In recent years, the use of fish with Trojan sex chromosomes has emerged as a potential new tool for controlling problemeatic fish populations. In the 2010's the State of Idaho developed a brookstock of Brook Trout with two Y-chromosomes as a new tool to control the species. In 2018 the New Mexico Department of Game and Fish and New Mexico State University partnered to test the use of YY Brook Trout coupled with mechanical removal in three streams. Results to date indicate substantial reductions in Brook Trout populations and a male-skewing of sex ratios. In this presentation we will explore the history genotypic sex manipulation in fish, the theoretical underpinnings of Trojan sex chromosomes to control fish populations, the empirical results of the experiments in New Mexico, and future directions of our work.

Success of two fertilization methods for long distance transport of aquatic Species-at-Risk

Authors: Benjamin C. Kisinger[1,2], Fonya Irvine[3,4], Andrew J. Chapelsky[5] & Neil J. Mochnacz[5]

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[5]Fisheries and Oceans Canada, 501 University Crescent, Winnipeg, MB

The use of captive breeding programs for conserving freshwater fishes, be it for research or reintroduction programs, is becoming more common. Interspecific differences in rearing ecology make applying common rearing techniques difficult for threatened species. This becomes more challenging for species in remote areas when accessing fish for gamete collection. Bull Trout has recently

been listed as threatened in Alberta and is garnering greater consideration for artificial propagation. Currently, no active hatchery programs exist for Bull Trout, and historically, very few attempts have occurred with limited success. The goal of this research was to establish a laboratory population of Bull Trout and compare the effectiveness of two different fertilization methods when transporting gametes or embryos over large distances. Eggs collected from Smith-Dorrien Creek, Alberta, were either fertilized in the field before transport (field) or after transport (green) to Winnipeg, Manitoba by airplane (approximately 1,300 km). Fertilization rates were similar and high for both treatments, and results showed treatments did not differ. Though a significant treatment effect was not observed, the green treatment had 10 % lower survival over the duration of the experiment. For both treatments, the greatest mortality rates were observed at the swim-up stage. Both methods allowed for similar fertilization rates and were able to rear fish to the fry stage. The results suggest that both methods are viable options for transporting Bull Trout gametes or embryos long distances for species recovery and research purposes.

An experimental test of bull trout conservation translocations

Authors: Tara Lepine[1], Jessica Reilly[2], Ben Kissinger[3]& Steven Vamosi[1]

Affiliations: [1] Department of Biological Sciences, University of Calgary, Calgary, AB

[2] Alberta Environment and Protected Areas, Government of Alberta, Edmonton, AB

[3] fRI Research, 1176 Switzer Dr, Hinton AB

Conservation translocations are becoming more common for species recovery in the wild. There is growing interest in their use to supplement or restore bull trout (Salvelinus confluentus) populations in environments where they were once known to have had self-sustaining populations. This project tested the feasibility of translocating fertilized eggs via instream incubation capsules in Smith-Dorrien Creek (Kananaskis, Alberta). This site was chosen because it is known for having an abundance of redd sites and spawning bull trout. The research objectives were to 1) assess if successful rearing of bull trout could be accomplished with incubation capsules and 2) quantify the relationship between bull trout survival and habitat parameters (e.g., temperature, groundwater, substrate) among sites where the incubation capsules were deployed. Field work began for this project in Spring 2023 when temperature loggers were installed at sites in Smith-Dorren Creek, followed by the installation of incubation capsules containing bull trout eggs at the sites in Fall 2023, which were collected in March 2024, along with measuring other environmental factors (e.g., groundwater discharge) for analysis. The results of this study indicate that there are high survival rates for this type of instream incubation approach/technique for bull trout eggs (71.4% ± 4.9% survival). The results also indicate a significant negative impact of number of days below 0°C on the survival of bull trout from egg to alevin. The experiment highlights the potential for this approach, with key recommendations for future attempts; specifically, avoiding freezing across the site.

Restoration stocking for Westslope Cutthroat Trout : UPDATE 2024

Author: Brian Meagher[1]

Affiliation: [1]Environment and Protected Areas South Saskatchewan Region, Provincial Building 12501-20 Avenue, Blairemore, AB

Remote Streamside Incubation (RSI) can be used to assist fish restoration efforts in the correct conditions. RSI is essentially a transfer of gametes into recovery habitats at the egg stage, assuring early acclimatization of the offspring to the new environment while eliminating hatchery or imprinting effects. This involves identification of native spawning locations, capture of pre-spawning fish and stripping of gametes from a donor fish population. Fertilized eggs are then placed into streamside incubators to complete the hatching process thereby contributing to existing populations or as part of a range expansion effort.

AEPA identified a suitable watershed and then implemented an RSI program for Westslope Cutthroat Trout. Field efforts were completed in 2019, 2021 and 2022. We are currently assessing survival and distribution throughout this watershed. We are looking forwards to update others on our observations to date and future plans with this initiative.

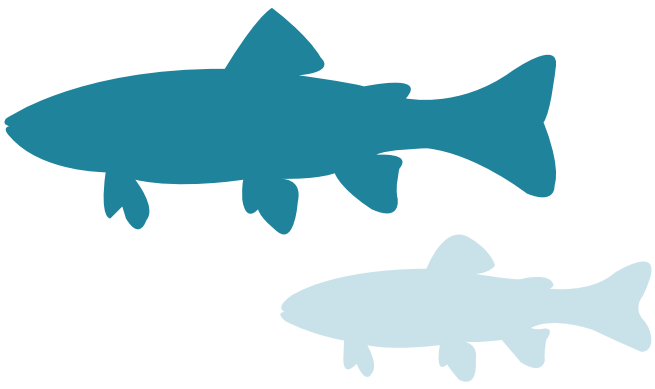
Habitat Remediation

Invited Speaker: What is low-tech process-based restoration and why should Albertans consider doing more of it?

Author: Stephen Bennett[1]

Affiliation:[1]Utah State University and Anabranch Solutions, Logan, Utah

Streams and riparian areas are some of the most imperiled habitats worldwide and in the past restoring these habitats was addressed with an engineering mindset. However, recent advances in river science and decades of stream restoration with mixed results have led to a focus on restoring streams and riparian areas (riverscapes) using approaches that mimic natural structures like log and beaver dams, promote natural processes like erosion,



deposition, wood recruitment, and beaver dam building, and which eventually lead to sustainable and healthy riverscapes. In this talk, I will present case studies and lessons learned from ***low-tech process-based restoration*** *(LTPBR) efforts across the Western United States over the past 15 years that have focused on restoring wet meadow, intermittent, and perennial streams in a wide variety of geomorphic settings. These case-studies focused on using hand-based, low-impact, and cost-effective restoration techniques (e.g., beaver dam analogs, post-assisted log structures, beaver relocation) to arrest headcuts, increase instream fish habitat, promote beaver relocation and expansion, and specifically to increase native fish production. Interest in LTPBR has exploded in recent years with hundreds of projects being implemented over hundreds of riverscape miles in part because they are intuitive, easy to teach, and engage people with diverse backgrounds and skill sets in restoring and caring for local riverscapes – and I hope to convince people LTPBR can be highly effective too.*

Results of riparian health monitoring and restoration efforts in grazed landscapes – lessons to benefit native trout habitat in Alberta

Author: Norine Ambrose[1]

Affiliation: [1]Cows and Fish (Riparian Management Society), Unit 10, 530-8th Street South, Lethbridge, AB

Native trout, like all fish, rely on more than water for habitat. Much of their habitat is influenced by land use and attributes in the terrestrial landscape, particularly riparian health and management. In the Eastern Slopes of Alberta, much of the landscape is multi-land use, with two of the most widespread uses being cattle grazing and recreation, occurring extensively across much of existing and former native trout habitat. Over the past 20 years, Cows and Fish has been working to improve habitat, through restoration and management change at dozens of recreational and grazing sites, often where both land uses occur concurrently. At the same time, we have been monitoring riparian health of these areas, offering management recommendations and observations to benefit native trout. This presentation will highlight lessons learned, focused on application of the four principles of range management, and where some of the most important opportunities exist to benefit trout habitat.

Assessing disturbance impacts on riparian vegetation using drone-acquired data

Authors: Leanna Stackhouse[1], Nicholas C Coops[1] & Ben Kissinger[2]

Affiliations: [1]The University of British Columbia Department of Forest Resources Management, Vancouver BC

[2] fRI Research, 1176 Switzer Dr, Hinton, AB

Forest disturbances, including harvesting, wildfires, and recreational paths can be potentially damaging to fish habitat. In Alberta, these disturbances can post a threat to populations of trout and other key aquatic populations through increasing stream temperatures, sedimentation, and a reduction in provision of nutrient and wood into stream systems. Under a changing climate, the increasing extent and intensity of these disturbance events, in particular forest fires and droughts, will further exacerbate their impacts and as a result sustainable forest management practices of streamside riparian zones are crucial to maintaining the biological integrity of trout-bearing streams.

Novel applications of remote sensing technologies offer extremely high-resolution vegetation and terrain data over large sections of stream reaches, providing previously unavailable detailed mapping of forest and stream attributes. In this study we acquired high density drone-based LiDAR and high spatial resolution thermal imagery of riparian forests undergoing a range of disturbance treatments (harvesting, forest fire, and off-highway vehicle (OHV) tracks) as well as relatively undisturbed forest as a control, all of which are adjacent to trout-bearing streams. We examined a range of remote sensing derived riparian condition attributes including riparian vegetation height, understory, canopy cover, and complexity for significant differences using a Wilcoxon rank sum test. Results suggest that fire is the most damaging to canopy cover and crown volume, while OHV sites are similar in vegetation structure to those of the control sites.

FAST - DFO's Fish pAssage aSsessment Tool

Authors: Court Berryman[1]

Affiliation: [1]Fish and Fish Habitat Protection Program – Integrated Planning, Ontario and Prairie Region, Fisheries and Oceans Canada

FAST is a rapid tool for fish passage assessment and a planning tool for culvert crossings. The intent is to provide a common tool/currency/approach for proponents and regulators alike and may help bring consistency to the fish passage designs and project reviews. The tool utilizes fish swimming performance (SPOT data) and integrates channel and culvert hydraulic calculations to provide a likelihood of fish passage. Getting away from flood frequency analysis, and moving towards natural channel design principles, the tool provides likelihood of passage under a possible range of flow conditions (bankfull, 50% bankfull, 10% bankfull), and culvert dimensions. Outputs can be weighted to flow conditions where passage is of concern/importance. The tool is undergoing field verification leading to ongoing refinement and improvement, and a Canadian Science Advisory Secretariate (CSAS) review in fall of 2025.

Using post-assisted log structures (PALS) to restore stream complexity

Authors: Angela Ten[1] & Lesley Peterson[1]

Affiliation: [1]Freshwater Conservation Canada. B8, 6020 2nd St SE, Calgary, AB

Radiant Creek is a tributary of the Clearwater River in west-central Alberta, and critical habitat for Bull Trout. In one reach of Radiant Creek, consistent grazing activity and large flood events caused the creek to become unnaturally wide, shallow, and straight, disconnected from its floodplain, and become dry in the summer/fall. To address this, in 2021, Freshwater Conservation Canada

installed 10 post-assisted log structures (PALS) to address aquatic and riparian degradation in 300m a reach of Radiant Creek. PALS are a low-tech process-based restoration technique that mimic woody debris accumulation instream, and force both scour and aggradation in the stream to create flow heterogeneity and encourage the formation of meanders. The restoration area was also fenced to protect the stream and riparian area from grazing impacts. This presentation will discuss the use of PALS to restore stream complexity, and provide an overview of changes observed over the past four years, including changes in stream morphology, vegetation, stream length, and number of fish.

Can we restore the trout to trout creek?

Authors: Elliot Lindsay[1] &Lesley Peterson[1]

Affiliation: [1]Freshwater Conservation Canada. B8, 6020 2nd St SE, Calgary, AB

As recently as 2015, Trout Creek was home to hundreds of Westslope Cutthroat Trout. However, the population is hybridized, and the cumulative impacts of historic and current land use activities (i.e. forestry, recreation, grazing) has negatively impacted aquatic and riparian habitat in the watershed, resulting in significant declines in the fish population. Since 2018, Freshwater Conservation Canada has been working with partners to restore degraded habitat, and preserve the remaining trout. This presentation will summarize Freshwater Conservation Canada's rehabilitation activities at Trout Creek to date, including stream realignment, off-highway vehicle trail realignment and rehabilitation, riparian planting, and low-tech process-based restoration. Since the initiation of rehabilitation actions, the Westslope Cutthroat Trout population at Trout Creek has become functionally extirpated; project goals have now shifted to include barrier installation to protect the rehabilitation area from invasion by Brook Trout and Rainbow Trout, and the eventual reintroduction of genetically pure Westslope Cutthroat Trout.

BREAKOUT SESSIONS

Simplifying the difficulties of understanding and managing cumulative effects on fishes

Authors: Michael Sullivan[1]

Affiliation: [1]Fish and Wildlife Stewardship Branch, Alberta Environment and Protected Area, O.S. Longman Bldg., 6909-116 St., Edmonton, AB

The complexity of addressing cumulative effects that vary in space and time, especially for species occupying large ranges, makes the conservation and recovery of populations difficult. In Alberta, declines of all three of its native stream trouts have resulted in them being listed as species-at-risk. In response, we developed a novel, semi-quantitative modelling process framework we term "Joe modelling" where threats are quantified using stressor-response curves with a single common response scale, inputs are determined for each population, and outputs are used to create population-specific recovery action hypotheses to directly inform management. This framework has expanded to integrate fishes' population dynamics into a modelling system called CEMPRA (Cumulative Effects Model for Priority of Recovery Actions), developed collaboratively by individuals at UBC, Simon Fraser U, BC MoE, DFO, and ESSA Technologies. The foundations of both Joe and CEMPRA modelling are stressor-response curves. These are, in fact, the basic building blocks of all ecological relationships. A library of these highly-useful stressor-response curves, specifically for use in fisheries cumulative effects management, is being created and maintained for all our benefit and use. The workshop will introduce participants to the current state and uses of "Joe" fisheries cumulative effects modelling, explore the functionality of "CEMPRA", and demonstrate the wonderful resource represented by the ongoing library of stressor-response curves.

Introduction to Natural Law

Authors: Richard Woodman[1]

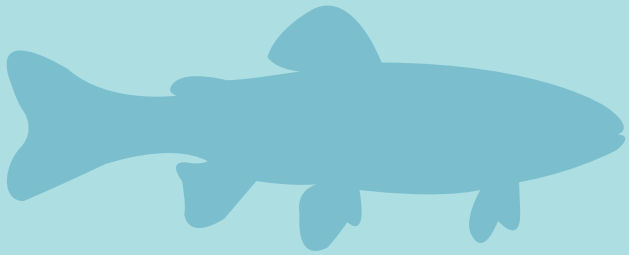
Affiliation: [1]Cultural Director, Swan River First Nation, PO Box 270, Kinuso, AB

Topics: Introduction to Natural Law

A Nehiyaw (Cree) Understanding of Natural Law.

Law of Wahkohtowin – Relationship

Laws of Pastahowin and Ocinewin



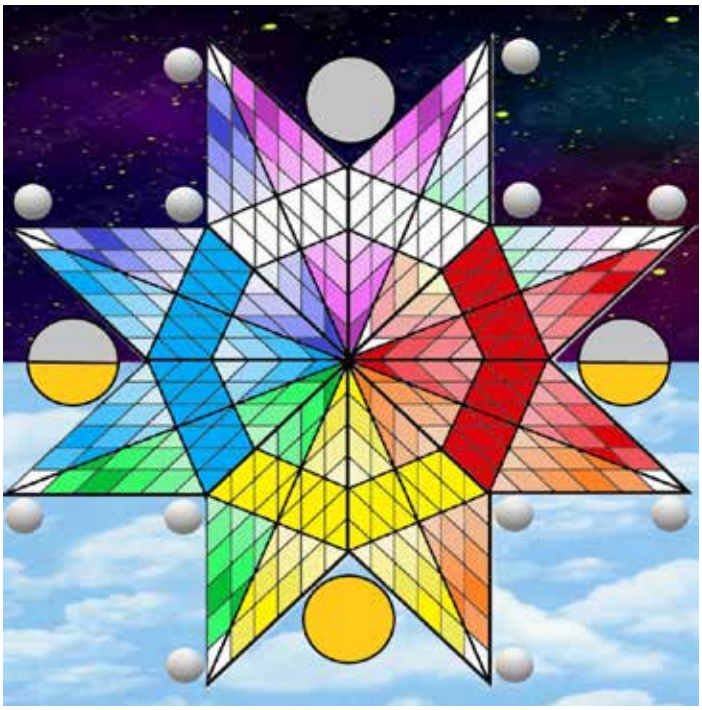


Figure 1. *Example of the star blanket Richard will be using in his breakout session.*

Improved mapping and characterizing of riverine landscape in Alberta

Authors: Lee Benda[1], Daniel Miller[1], Bernard Romey[2], & Kevin Andras[1]

Affiliation: [1]Terrainworks, Mt. Shasta, California

[2]Romey Fish & Aquatic Science, 924 Lone Oak Rd, Longview, WA

This breakout session will be a series of three presentations.

Presentation/Abstract #1: Advent of virtual watersheds

Authors: Lee Benda[1], Daniel Miller[1], & Kevin Andras[1]

Affiliation: [1]Terrainworks, Mt. Shasta, California

Existing digital maps of river networks in many parts of the world, including in Alberta, are incomplete, lack spatial accuracy, and have inadequate analytical capabilities. Consequently, many resource planning, restoration, and conservation strategies at watershed, province, and country scales are being limited. The increasing availability of high-resolution digital elevation data is providing an unprecedented opportunity to improve the mapping of hydrography and other topographic features within watersheds, including in Alberta. The resulting "virtual watershed" is more than a stream layer or hydrography. It is an integrated spatial data package designed to characterize multiple facets of landscapes and human activities over a range of scales. Virtual watersheds have four analytical features: 1) attributed node-based channel data structure; 2) river and landform delineation 3) up-stream-downstream and lotic-lentic-terrestrial connectivity; and 4) land surface discretization using node-to-reach scale flow accumulation. Virtual watersheds, inclusive of complete and accurate hydrography, are being used in the U.S., Canada, and the E. U. to provide spatial information on: channel network topology and geometry including headwaters, fish and other aquatic habitats, floodplains and flooding potential, wetlands and their connectivity, riparian zone functions, landslide and debris flow potential, erosion and other impacts following wildfire, road interactions with fluvial environments, and climate change. Improved mapping and characterizing of riverine landscapes are now coming online in Alberta.

Presentation/Abstract #2: Creating new hydrography and channel classification in Alberta

Authors: Daniel Miller[1], & Kevin Andras[1]

Affiliation: [1]Terrainworks, Mt. Shasta, California

The topology and geometry of the channel network, from the tiniest rivulets to the largest rivers, establish the spatial template for the hydrologic connectivity among lotic, lentic, and terrestrial components of a watershed. To characterize water, sediment, nutrient, organic debris, and energy fluxes through a watershed, we identify and delineate downslope and downstream flow paths. The resulting digital channel network is integral with the digital elevation model (DEM) of a basin and vice versa. Each grid cell node in a DEM is linked by flow paths to specific points in the channel network and each point in the network is linked back to all the cell nodes that drain to it. We build this node-based fluvial-terrestrial data structure within a "virtual watershed" that was described in a previous presentation. The accuracy of the derived flow paths and channel network depend explicitly on the resolution of the DEM. The availability of LiDAR elevation data in Alberta is allowing for the creation of more comprehensive and spatially accurate GIS stream layers. Here we'll look more closely at this data structure and at the algorithms and methods used to construct it. We will also discuss how the data structure supports analyses of watershed features including channel morphology, aquatic habitats, floodplains, wetlands, riparian zones, and erosion potential. We'll also describe a prototype design of an Alberta regulatory channel classification system.

Presentation/Abstract #3: Modeling fish habitats in support of restoration and conservation

Author: [1]Bernard Romey

Affiliation: [1]924 Lone Oak Rd, Longview, WA 98632 Romey Fish & Aquatic Science

Fishery and resource managers require information on endangered trout populations that includes the types, abundances, and conditions of aquatic habitats for assessing environmental threats posed to them from resource developments and climate change. Currently, such information in Alberta is geographically limited. Newly available high resolution LiDAR digital elevation models are being used to create more accurate river networks within virtual watersheds in the Rocky Mountain foothills region. In 2024, data

on the relative densities of Bull Trout and Westslope Cutthroat Trout from 2,964 study reaches were used to develop prototype models of habitat suitability. Relevant physical features of fish occupancy at the scale of 100 m-reaches were selected using statistical random forest classification models. Predictive variables included channel gradient, mean annual flow, and channel confinement that reflected extent of floodplains. These intrinsic geomorphic features were used to predict the most probable locations, quantities, and qualities of stream habitats utilized by each species. Such habitat intrinsic potential (HIP) models can be used by resource and fishery managers to assist in prioritizing conservation or restoration across large geographic areas, particularly in watersheds where detailed information of fish habitats is lacking. While HIP models focus on spatial patterns of habitat quality, end-of-habitat models can identify the upper boundaries of fish populations across landscapes in support of resource management. The prototype models were limited to specific landscapes. Future work could improve on model accuracy and expand on the area of applicability.

Working in and near listed trout critical habitat: Perspectives from DFO and the Alberta forestry sector since March 2021

Authors: Laura Trout[1] & Lynn Dupuis[1]

Affiliation: [1]West Fraser

Fisheries and Oceans Canada, Freshwater Institute, 501 University Crescent, Winnipeg, MB

Since the publication of the Critical Habitat Orders protecting the critical habitat for Rainbow Trout (Athabasca River populations) and Bull Trout (Saskatchewan – Nelson Rivers populations) in March 2021, as well as Westslope Cutthroat Trout in November 2015, there has been a growing need for effective strategies to work in and near these protected areas. This breakout session will bring together perspectives from Fisheries and Oceans Canada (DFO) and the Alberta forestry sector (West Fraser) to discuss the challenges and opportunities in protecting listed Alberta trout critical habitat. Breakout topics to be covered include: • Identifying critical habitat in areas mapped by the bounding box for listed Alberta trout; • Strategies for avoiding and mitigating the destruction of critical habitat; • Collaborative approaches to developing and implementing offsetting projects; This session aims to foster a collaborative dialogue between regulators, industry, stakeholders and Indigenous communities, encouraging the exchange of ideas to develop practical solutions for working in and near critical habitat for listed Alberta trout. The session goal will be to have a list of questions and recommendations for industry and regulators to take back from each breakout topic.

Ceremony Speaker

Lorne Fitch- Professional Biologist

Lorne has been a biologist for over 50 years, working on many issues related to use of land and water. Lorne is a professional biologist, a retired provincial Fish and Wildlife biologist, was one of the co-founders of the stewardship initiative Cows and Fish and a former Adjunct Professor with the University of Calgary. Lethbridge is home, where he pens articles and essays on issues related to Alberta's landscape and critters. This includes Streams of Consequence- Dispatches from the Conservation World. And a recently released book, Travels Up the Creek-A Biologist's Search for a Paddle.

BANQUET

MID-CANADA CHAPTER OF THE AMERICAN FISHERIES SOCIETY

Authors: Benjamin C. Kissinger1,2

Affiliations: 1Mid Canada Chapter of the American Fisheries Society

2fRI Research, 1176 Switzer Dr, Hinton, AB T7V 1V3

The Mid-Canada Chapter (MCC) of the American Fisheries Society was formed to represent fisheries and aquatic scientists working in Alberta, Saskatchewan, Manitoba, Nunavut, and the Northwest Territories. The goals of this society are to foster networking opportunities, travel support to AFS meetings, annual meetings with local scientists and professionals, opportunities for continued education, and contributions to position statements on new regulations/techniques, etc. As of 2022 the society was in a dormant state but was revitalized in 2023 with the intent of revisiting the goals of the society. With the revitalization, the society has re-elected an executive committee, expanded representation (through the creation of regional, communication, and student executive positions), amended the bylaws, updated the website and are supporting the Alberta Native Trout Science Workshop/ Gathering. The revitalized society currently places strong emphasis on initiatives related to early career professionals and students, through networking opportunities, information sharing, job boards and social events. It is our hope to continue building on this momentum to support fisheries initiatives into the future.

BANQUET SPEAKER

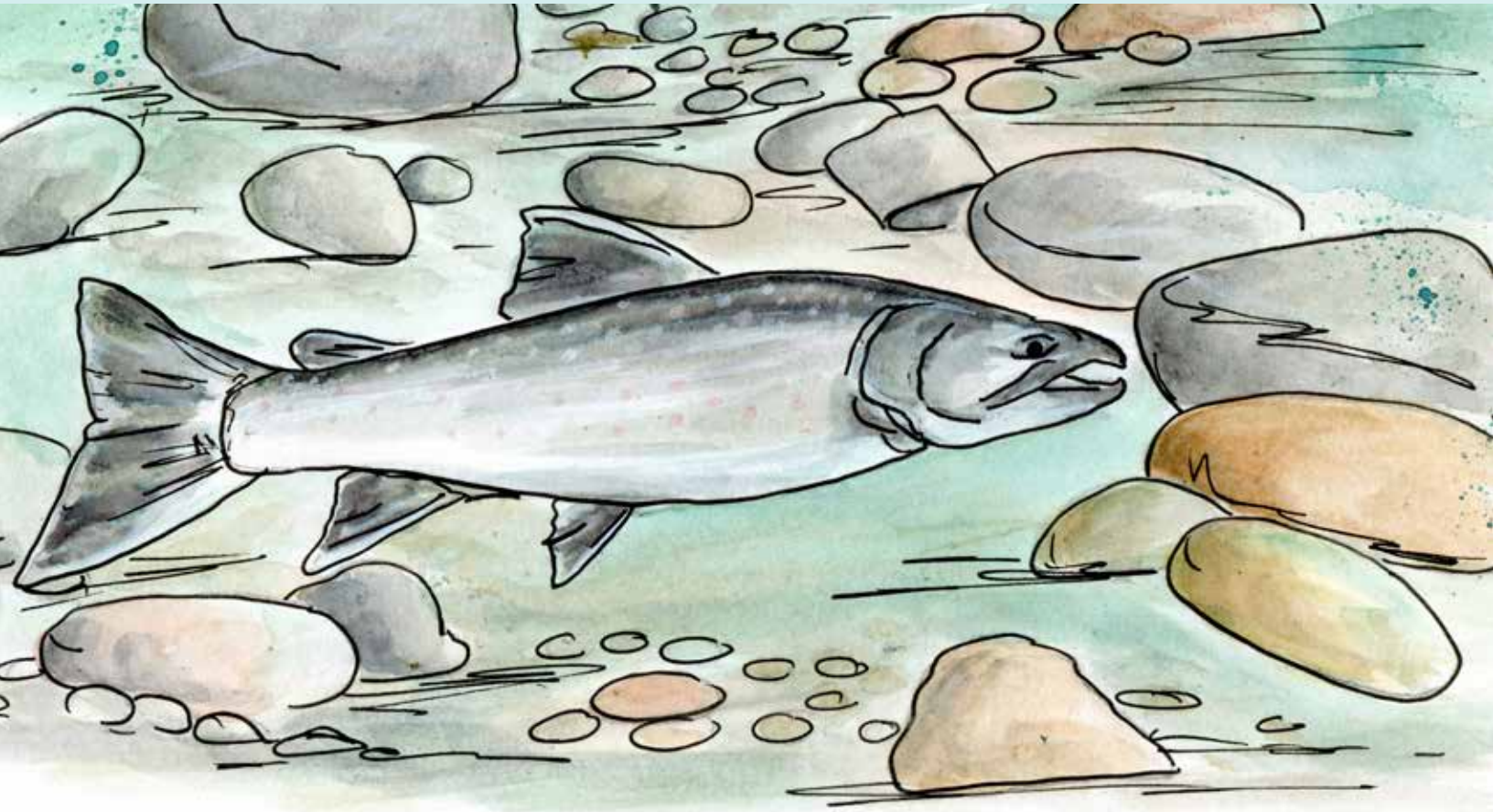
Lorne Fitch- Professional Biologist

Lorne has been a biologist for over 50 years, working on many issues related to use of land and water. Lorne is a professional biologist, a retired provincial Fish and Wildlife biologist, was one of the co-founders of the stewardship initiative Cows and Fish and a former Adjunct Professor with the University of Calgary. Lethbridge is home, where he pens articles and essays on issues related to Alberta's landscape and critters. This includes Streams of Consequence- Dispatches from the Conservation World. And a recently released book, Travels Up the Creek-A Biologist's Search for a Paddle.

ABSTRACTS

FRIDAY FEBRUARY 28TH, 2025

***Presenters are** Underlined
Abstracts are listed in sequential order based on presentation queue.



Habitat Remediation Continued

New Provincial Watercourse Crossing Guidebook

Authors: Bruce Neilson[1]

Affiliation: [1]Alberta Watercourse Crossing Collaborative, 11316 119 St NW, Edmonton, AB

The Alberta Watercourse Crossing Collaborative (AWC3) is a non-for-profit group whose objective is to aid the recovery of fishery habitat that has been lost, isolated, or damaged from poor water-course crossing installation and maintenance. The AWC3 believes that with proper education and awareness about origin of the problem and by providing educational solutions to WCC practi-tioners in the field, this problem will be solved in the quickest way possible.

*The new **Provincial Watercourse Crossing Guidebook** is a two-year long project that was funded in parts by industry (Energy and Forestry) and the Department of Fisheries and Oceans. The Guidebook was planned and compiled in a collaborative manner drawing on the expertise of dozens of subject matter experts and the knowledge and expectations of stakeholders and First Nations communities. The newly completed hard copy manual is Phase I of this project and was completed in the summer of 2024. The manual is now available to the public online and in hard copy by free mail order. Phase II of the Guidebook Project are a set of video shorts that depict best management practices for WCC restoration and how to implement them in the field. The Phase II videos are based on the Guidebook structure and support each major topic. All guidebook material is to the public for download.*

*This presentation will review the structure and content of the New **Provincial Watercourse Crossing Guidebook**, and will also cover the history of the problem, the need for the document, as well as the process used to develop the Guidebook.*

Mitigating stream crossing barriers: 20 years of habitat restoration and fish passage in Alberta's watersheds

Author: Ngaio Baril[1]

Affiliation: [1]QAES, Foothills Stream Crossing Partnership

As the FSCP approaches their 20-year anniversary there is much to celebrate. The multi stakeholder watershed collaborative, which now includes 31 industry partners, has significantly advanced efforts to inventory, monitor and repair stream crossings. Through the development of a robust methodology, FSCP maximizes the environmental benefits of each remediation project and provide the framework to coordinate repairing fish barriers in sequential order to reconnect the maximum amount of habitat.

The results speak for themselves: an online database now houses over 36,000 inspections of 15,000 crossings, and through mitigation at over 800 stream crossings, more than 4,000 kilometers of fish habitat have been restored. Notably, 75% of these crossings have been remediated in habitats critical for species at risk, including Cutthroat trout, Bull trout, Athabasca Rainbow trout, and Arctic grayling in Alberta's headwater streams.

What does it take to mitigate barriers at over 800 stream crossings? This presentation will offer valuable insights by examining the process of remediating a typical hanging culvert, using the example of a replacement with an arch, bridge, or embedded culvert in Alberta's foothills. The session will cover the entire process from planning to post-construction monitoring, from the perspective of a crossing owner. Key topics will include:

- *Project selection and prioritization*
- *Coordination and planning*
- *Permitting (federal, provincial, Critical Habitat, offsetting)*
- *Timelines and project scheduling*
- *Typical costs*
- *Construction techniques (dewatering, fish salvage/isolation, turbidity monitoring, site-specific mitigation strategies)*
- *Post-construction monitoring and final permitting requirements*

By examining these elements, this presentation will provide a deeper understanding of the practical considerations, challenges, and successes involved in mitigating stream crossing barriers to fish movement.

Inventory and mapping of OHV stream crossings in Alberta's foothills, a scalable approach

Author: Kally Groat[1]

Affiliation: [1]Poseidon Environmental Ltd, 110 Poboktan Rd, Hinton, AB

*Off-highway vehicle (OHV) trail watercourse crossings are a significant and understudied source of negative impacts on fish and fish habitat. These crossings increase sedimentation and erosion, which are known to impact stream and fish health, especially sensitive species such as Athabasca Rainbow Trout (*Oncorhynchus mykiss*) and Bull Trout (*Salvelinus confluentus*). Unlike permanent road crossings, OHV trail crossings lack regulatory oversight and maintenance, and so their environmental impacts are cumulative. Recent increases in OHV use in Alberta suggest a growing risk to watershed health. This study focused on the Hinton Forest Management Areas (FMA) in Alberta. An ecologically rich region within Critical Habitat for aquatic Species at Risk.*

In collaboration with industry, government and NGO's, Poseidon developed and tested and OHV trail an watercourse crossing inspection protocol over 2023 and 2024 in which 86 stream crossing inspections were conducted. The inspection protocols were designed to standardize inspection measurements of sediment sources allowing for quantification and prioritization of inspected crossings. This ranked inventory of OHV trail crossings allows for strategic repairs and cumulative effects management on a watershed scale. The data collected contributes to a shared database, Forcorp, supporting long term monitoring and future mitigation projects such as offsetting. Most crossings occurred within critical habitat for Rainbow and Bull Trout, highlighting the need for targeted management and monitoring.

Collaborations has been instrumental in addressing knowledge gaps and aligning conservation efforts. Recommendations from this project emphasize the importance of standardized inspection protocols, long-term monitoring, and shared data systems to enhance the management of OHV trail watercourse crossings. These measures aim to mitigate impacts, improve aquatic habitat conditions, and support recovery efforts for sensitive fish populations.

Information into Action: synthesizing available data and Traditional Knowledge into recommendations for Arctic grayling recovery

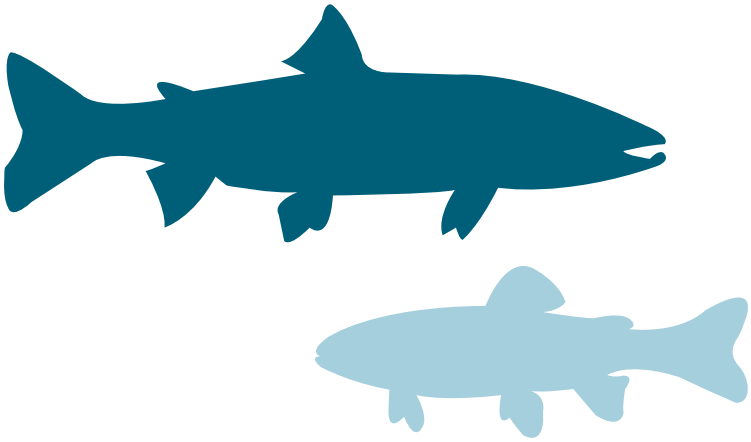
Authors: Kate Marouelli[1], Todd Bailey[2], Kaine Guriox[2] & Benjamin C. Kissinger[1,3]

Affiliations: [1]fRI Research, 1176 Switzer Dr, Hinton, AB

[2]Swan River Band Office, PO Box 270, Kinuso, AB

[3] University of Calgary, 2500 University Dr NW, Calgary AB

*Arctic grayling (*Thymallus arcticus*) are a cold-water species that are known to have complex migration patterns. These complex patterns are due to the need of multiple habitats to complete their life cycle. This makes them susceptible to habitat fragmentation and degradation which can cause fish barriers. According to the Alberta Fish Sustainability Index, Arctic grayling populations have declined by 70% since 1960 provincially. Various factors have aided in this decline including angling pressure, habitat degradation and fragmentation, and increasing water temperatures. The lack of an action plan and limited political consultation with the original stewards of the land has led to increased habitat degradation and fragmentation within the Swan River watershed. Observed decreases in Arctic grayling abundance subsequently resulted in a closure to harvesting of Arctic grayling, ultimately resulting in a loss of a treaty right to members of Swan River First Nation (SRFN). This project was created to assist SRFN in collating existing data and identifying risks to Arctic grayling to aid in*



recovery efforts. To date various surveys have been conducted by the community including a watercourse crossing assessment, eDNA sampling, stream temperature monitoring and an Arctic grayling habitat survey. Initial results from the water course crossing assessment in 2016 indicated that 92% of culvert crossings within the watershed are considered fish barriers. This means only 8% of culvert crossings permit fish passage and allow Arctic grayling to complete their life cycle. The collation of existing data like these and Traditional Knowledge within the community will give a better idea of the next steps for Arctic grayling recovery within the Swan River watershed.

Fish Population & Monitoring Approaches

Invited Speaker: "How many trout are in the river?" Rethinking the logic of riverine population abundance assessments

Author: Joe Thorley[1]

Affiliation: [1]Poisson Consulting Ltd, 4216 Shasheen Rd, Nelson, BC

Obtaining a reliable answer to the question of 'how many trout are in the river?' plays an important role in monitoring threats to fish populations. Although approaches to answering this question are often formulated in terms of statistical procedures, we present the underlying logic and rethink some misconceptions. If a method was 100% efficient at capturing fish and was applied to the entire river, the population abundance would simply be the total number of fish caught. However, typically, the capture efficiency is less than 100% and can be highly variable which necessitates methods to estimate the efficiency. Currently, depletion-removal methods estimate the number of fish based on the rate of decline of the catch under the often-erroneous assumption that the capture efficiency does not change between passes. Mark-recapture makes the more reasonable assumption that marked and unmarked fish have the same probability of recapture. As a method can rarely be applied to the entire river it is also necessary to estimate the number of fish at the unsampled sites. Index sites with high fish densities do not allow the number of fish at the other sites to be estimated and may even be decoupled from changes in the population abundance. At the other extreme totally random site selection introduces unnecessary uncertainty. A stratified approach requires more thought but produces more reliable estimates. Fish densities are often calculated in terms of the number of trout by wetted area but this assumes that doubling the stream width is equivalent to doubling the stream length and means that trout densities change with discharge. Lineal fish densities, in contrast, facilitate comparisons within and among systems while also allowing the effect of stream width to be estimated. We provide examples from the literature and via thought experiments of both logically valid and invalid estimates.

Temporal patterns in species richness and occupancy in Alberta Eastern Slopes: a novel modelling approach

Authors: Angus J, Lothian [1], Benjamin C, Kissinger [1,2], Andrew J, Paul [1,3] & John R, Post[1]

Affiliation: [1] Department of Biological Sciences, University of Calgary, 2500 University Dr NW, Calgary, AB

[2] fri Research, 1176 Switzer Drive, Hinton, AB

[3] Office of the Chief Scientist, Alberta Environment and Protected Areas, University Research Centre, 3535 Research Road NW, Calgary, AB

Global biodiversity is under major threat from multiple stressors. Using multi-species occupancy models, we investigate the temporal trends in species richness, species turnover and occupancy probability for fishes across the Alberta eastern slopes over a 25-year period (1996-2020). Using backpack electrofishing data, 12,945 surveys were binned into 5-year periods (1996-2000, 2001-2005, etc.) and grouped within 387 unique HUC10s across the eastern slopes. Forty-eight fish species were identified within the eastern slopes between 1996 and 2020, with estimated species richness at a HUC10 scale remaining stable throughout that study period. Jaccard's similarity index suggested that the greatest species turnover happened between 2005 and 2015 (J = 0.74; a change of 12 species), with the overall similarity between periods 1 and 5 being 0.88 (a change of five species). This suggests that within smaller time periods, rarer species appear and disappear from electrofishing databases in the eastern slopes, but across longer periods the species present remain more stable. Of the 36 species observed in both periods 1 and 5, the trend in occupancy probability showed 6 species increasing in occupancy probability and 8 declining. Native, cold-water species were either stable or have declined in HUC10 occupancy probability, with the largest declines observed for Arctic grayling, longnose sucker and mountain whitefish (-0.17, -0.11 and -0.11, respectively). Native, cold-water fishes listed as "at risk" and being actively conserved at a provincial level were largely stable in HUC10 occupancy, indicating species in decline may be in need of similar attention.

Status assessment of bull trout in Canada with an emphasis on Alberta designatable units

Authors: John R. Post[1]

Affiliations:[1] Biological Sciences University of Calgary, 2500 University Dr NW, Calgary, AB

COSEWIC is currently re-assessing the status of Bull Trout in Canada. The proposal is to support five designatable units as in the previous assessment (COSEWIC 2012). Since that time a number of legislative protections have been put in place including listing under the Canadian Species at Risk Act *(2019) as follows: South Coast British Columbia Population - Special Concern; Western Arctic Population - Special Concern; Saskatchewan-Nelson Rivers Population - Threatened. In addition, the Pacific Population is considered Not-at-risk and the Upper Yukon River Population as Data Deficient. In Alberta, Bull Trout are listed as Threatened under* Alberta's Wildlife Act *as of 2014. In British Columbia, Bull Trout are on the Provincial Blue List by the BC Conservation Data Centre. Critical habitat has been identified in the federal recovery strategy and protected by a federal Order in Council in 2021. Bull Trout in National Parks waters are protected under the* Canada National Parks Act *and critical habitat for Bull Trout identified and legally protected in Banff, Jasper and Waterton Lakes National Parks of Canada as of 2021.*

With a focus on Bull Trout in Alberta within the Saskatchewan-Nelson Rivers and Western Arctic designatable units, I will review updated information on distribution, abundance, trends and threats. I will then assess their match to the criteria used by COSEWIC for status assessment and speculate on upcoming recommendations for status of the two Alberta designatable units.

Collaborative initiatives for enhancing headwater health of the Athabasca Watershed

Author: Mitch Wincentaylo[1]

Affiliation: [1]Athabasca Watershed Council, 5101 50 Avenue, PO Box 1058, Athabasca, AB

The Athabasca Watershed Council has undertaken initiatives to improve the health of the Upper Athabasca, McLeod and Pembina Sub-Watersheds through applied research, restoration, genetic analysis, and monitoring. Climate change, increases in industrial activity, recreation, and development pressures within the Athabasca Headwaters have created a greater need for water quality monitoring and data collection to ensure the vitality and long-term health of native fish populations, water quality and riparian habitat. Because so many communities rely on the watershed, we have developed greater baseline data to better understand the overall health of the river systems and to identify and mitigate high-priority areas of concern.

Our goal for the headwaters has been to establish baseline data through initiatives such as the Watershed Biomonitoring Project, which aims to monitor basic water quality, benthic macroinvertebrate communities, fish, and aquatic habitat; the Healthy Shorelines Initiative, which improves the health of shoreline and riparian areas through restoration and monitoring; the Berland-Wildhay Watershed Connectivity Remediation Planning, identifying water-crossings and habitat fragmentation threats to native fish species; and the Athabasca Headwaters Working Group, which is currently operating to advise the Athabasca Watershed Council on priority areas within the headwaters that require restoration, increased monitoring and modified stream crossings.

Using various methods, such as the Canadian Aquatic Biomonitoring Network (CABIN) sampling protocols, Sequencing the Rivers for Environmental Assessment and Monitoring (STREAM) eDNA metabarcoding analysis and taxonomic analysis, we have begun to establish baseline data for benthic macroinvertebrate populations and overall water-quality for the Upper Athabasca River Watershed. This, along with community-based monitoring has assisted us in targeting restoration efforts to improve water quality and mitigate further degradation in key locations. We hope this data collection will influence more responsible use of the watershed, and contribute to enhanced policy to protect the health and well-being of the Athabasca and its tributaries.

Status and trends of the upper Fording River Westslope Cutthroat Trout population

Author: Bronwen Lewis[1]

Affiliation: [1]EVR Operations Ltd., Sparwood, B.C.

The upper Fording River has an isolated population of Westslope Cutthroat Trout that exists as the only fish species in this location. In 2019, this population was found to have over a 90% reduction in adults and over a 70% reduction in juvenile fish compared to sampling from two years previous. This population has strongly rebounded since then. The pathway of this event was not initially clear, and required the team to rethink the process on how to monitor this population. We worked extensively with Dr. Joe Thorley from Poisson Consulting, among others, to develop and standardize our methods and analysis. Through this work we were able to incorporate monitoring for regional events affecting the population and improve our understanding of population dynamics in the upper Fording River.

Exploring mercury accumulation and macroinvertebrate responses in beaver-modified ponds and canals

Authors: Emma Gregoire[1], Steven Vamosi[1], Benjamin Barst[1] & Cherie Westbrook[2]

Affilitation:[1] University of Calgary, 2500 University Drive NW, Calgary, Alberta, T2N 1N4

[2] University of Saskatchewan, 105 Administration Place, Saskatoon, Saskatchewan

Beaver dams are integral to freshwater ecosystems, influencing hydrology, biodiversity, and contaminant cycling. A key pollutant of concern is mercury, which can be introduced into aquatic environments through atmospheric deposition and local anthropogenic sources, such as logging activities. Once in the ecosystem, mercury can be converted into methylmercury, a highly toxic form that

bioaccumulates and biomagnifies across the food web, posing significant ecological risks. This study examines the effects of a dense network of beaver dams (N=27) on water quality, macroinvertebrate community composition, and mercury contamination in Sibbald Fen, a freshwater peatland in Kananaskis, Alberta. We compare macroinvertebrate communities inhabiting two beaver-modified habitats — ponds and canals — and explore how the cumulative impacts of dam order (from upstream to downstream) affect these factors. We hypothesize that water quality parameters, such as temperature, pH, and turbidity, will vary between ponds and canals, and that downstream sites will show elevated concentrations of total mercury and methylmercury due to bioaccumulation processes in beaver-modified environments. We also predict that these changes in water quality will drive shifts in macroinvertebrate community structure, with distinct differences in species diversity and abundance between pond and canal habitats. This research will enhance our understanding of mercury dynamics within beaver-dam networks and their role in contaminant cycling. Despite growing interest in the conservation and effects of beavers, studies characterizing the biological significance of beaver canals remain sparse, yet these habitats may play a critical role in ecosystem functioning. This case study is one of the first to investigate a large number of beaver-created features within a continuous network, providing new insights into how such densely interconnected habitats influence environmental quality and biodiversity. Ultimately, this research will contribute to the development of informed strategies for managing freshwater ecosystems and mitigating the ecological impacts of mercury contamination.

Population dynamics of Lake Trout in Cold Lake during 2007 to 2023

Authors: Steven Griffeth[1]

Affiliation: [1]Alberta Environment and Protected Areas, 5013 – 51st Street, Cold Lake, Alberta T9M 1P3

*Cold Lake is one of Alberta's most accessible, popular, and complex Lake Trout (*Salvelinus namaycush*) fisheries. Storied with a history of large fish, collapse, and prolonged recovery, the population has recently experienced a population boom with densities increasing from 9.2 fish ≥ 300 mm total length/ha (95% C.I. 7.2 – 11.4) in 2007 to 30.0/ha (95% C.I. 25.2 – 35.6) in 2023. Using standardized gill netting data, I examined why this surge occurred and if population dynamics of Lake Trout have changed since 2007. The results suggest that changes to length-based harvest regulations coupled with several strong year classes may have contributed to the increased density seen today. A more conservative minimum length limit implemented in 2013, from one fish over 65 cm daily to one over 75 cm, aligned with decrease in total annual mortality of age 8 to 12 Lake Trout between 2010 and 2019 and a decrease in harvest rate between 2012 and 2018 winter creel surveys. While density has increased relatively equally across the entire waterbody since 2007, growth, fish condition, and length- and age-at-maturity has remained relatively similar since 2010. The recovery of Lake Trout in Cold Lake is an excellent example of a positive outcome potentially arising in part due to a conservation-orientated change in a minimum length harvest regulation.*

Planning Committee:

Alberta Government

Alberta Office of the Chief Scientist

Aseniwuche Winewak Nation of Canada

Alberta Conservation Association

Canada

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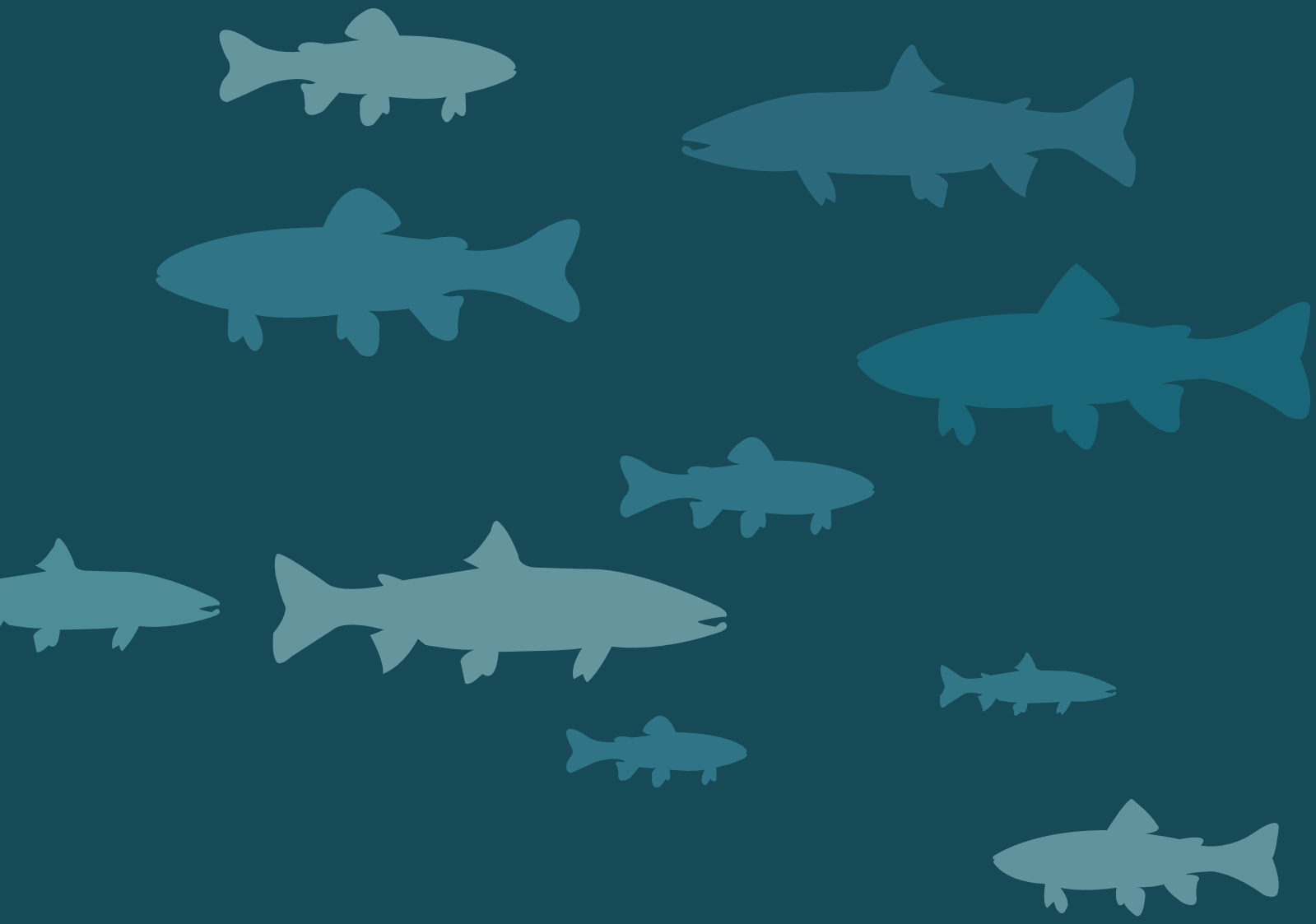

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