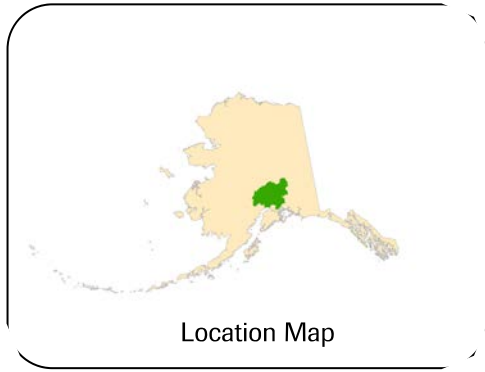
An aerial photograph of a river flowing through a forested area. A concrete bridge with metal railings spans the river in the upper right. A person is wading in the river in the lower left, near a large log jam. The riverbank is rocky and covered in green vegetation. The sky is overcast.

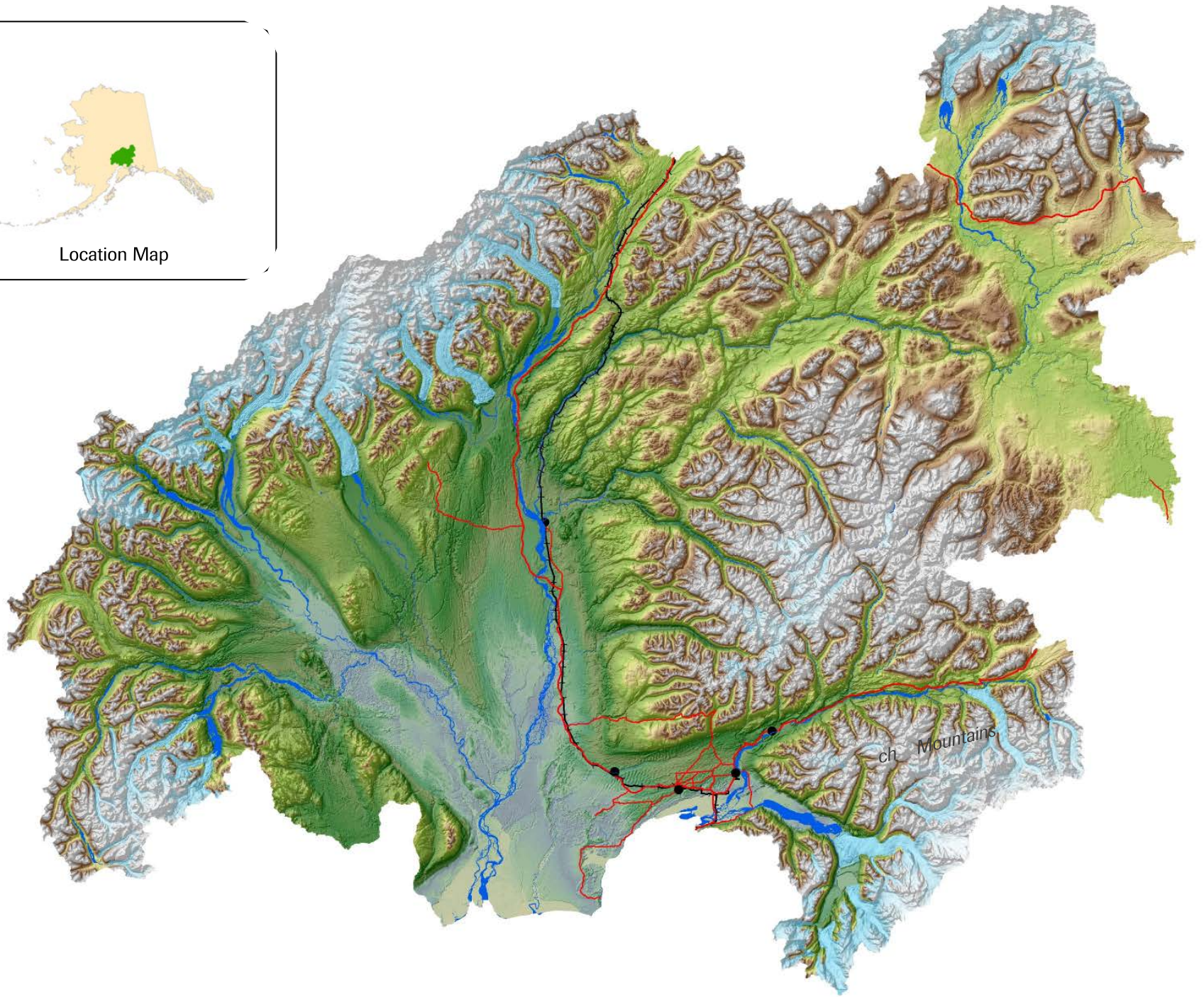
14th Annual
Mat-Su Salmon Science & Conservation Symposium

**Mat-Su
salmon**
PARTNERSHIP

November 17, 2021



Location Map





14th Annual Mat-Su Salmon Science and Conservation Symposium

Hosted by the Mat-Su Basin Salmon Habitat Partnership

Welcome to the 14th annual Mat-Su Salmon Science and Conservation Symposium. While field seasons were once again altered and variant outbreaks prevented planning an in-person symposium, members of the Mat-Su Salmon Habitat Partnership have continued to advance the understanding of salmon and their habitat in the region of Alaska experiencing the most growth in human population.

The Partnership believes that thriving fish, healthy habitats and vibrant communities can co-exist in the Mat-Su Basin. The Steering Committee commits that the Partnership will continue to adapt, apply science to inform decisions, and work toward strategic goals to ensure that thriving salmon are a constant in the Mat-Su.

For the second year in a row, the symposium will be virtual. The Partnership thrives by bringing together people with diverse expertise and experiences. While we cannot meet in person, we encourage you to use this symposium as an opportunity to connect with other people who may be outside of your discipline. To facilitate following up, we have included contact information for participants in this booklet.

We are excited to welcome John McMillan as our keynote speaker. McMillan is the Science Director for Trout Unlimited's Wild Steelhead Initiative. Before joining TU, McMillan studied salmonids for the U.S. Forest Service, Hoh Indian Tribe, Wild Salmon Center and NOAA Fisheries' Northwest Fisheries Science Center. He will present a case study on dam removals and subsequent salmonid responses on the Elwha River in Washington over the past six years. While still early, the results are promising and may be helpful for informing decision making in South Central Alaska after the removal of the Lower Eklutna Dam.

The 14th Annual Mat-Su Salmon Science and Conservation Symposium would not be possible without the generous support of our sponsors. We also want to give special thanks to the Symposium Planning Committee, our presenters, and moderators. This event is in the true spirit of the Partnership in that it is only possible through collaboration and the dedication of partners.

Finally, thank you for your part in ensuring wild salmon are abundant in the Mat-Su today and into the future. We hope you find the symposium enriching.

Mat-Su Salmon Partnership Steering Committee:

Erika Ammann, NOAA Fisheries
Eric Booton, Trout Unlimited
Ted Eischeid, Matanuska-Susitna Borough
Theo Garcia, Knik Tribe
Melissa Heuer, Susitna River Coalition
Libby Kugel, Great Land Trust
Trent Liebich, U.S. Fish and Wildlife Service
Michael Mazzacavallo, Alaska Department of Fish and Game
Jessica Speed, Trout Unlimited (Partnership Coordinator)
Andy Wizik, Cook Inlet Aquaculture Association



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Mat-Su Basin Salmon Habitat Partners

** Representative on Steering Committee*

**Alaska Department of Commerce,
Community and Economic Development**

Alaska Department of Environmental
Conservation

***Alaska Department of Fish and Game**

Alaska Department of Natural Resources

**Alaska Department of Transportation and
Public Facilities**

Alaska Outdoor Council

Alaska Pacific University

Alaska Railroad Corporation

Alaska Salmon Alliance

Alaska Trails

AlaskaChem Engineering

Alaskans for Palmer Hay Flats

Aquatic Restoration and Research Institute

Bureau of Land Management

Butte Area Residents Civic Organization

Chickaloon Village Traditional Council

City of Palmer

ConocoPhillips Alaska, Inc.

***Cook Inlet Aquaculture Association**

Cook Inletkeeper

Eklutna Tribal Conservation District

Environmental Protection Agency

Envision Mat-Su

Fishtale River Guides

Glacier Ridge Properties

*Great Land Trust

HDR Alaska, Inc.

Innovative Funding

Knik River Watershed Group

*Knik Tribal Conservation District

Matanuska River Watershed Coalition

*Matanuska-Susitna Borough

Mat-Su Anglers

Mat-Su Conservation Services

Mat-Su Trails and Parks Foundation

Montana Creek Campground

***National Marine Fisheries Service**

National Park Service

Native Village of Eklutna

Natural Resources Conservation Service

**Palmer Soil and Water Conservation
District**

Pioneer Reserve

Pound Studio

SAGA

Sierra Club

*Susitna River Coalition

Sustainable Design Group

The Alaska Center

The Conservation Fund

The Nature Conservancy

The Wildlifers

Three Parameters Plus, Inc.

***Trout Unlimited**

Turkey Red

Tyonek Tribal Conservation District

United Cook Inlet Drift Association (UCIDA)

United Fishermen of Alaska

Upper Susitna Soil and Water Conservation
District

U.S. Army Corps of Engineers

*U.S. Fish and Wildlife Service

U.S. Geological Survey

U.S. Forest Service, Chugach National Forest

Valley Community for Recycling Solutions

Wasilla Soil and Water Conservation District



Symposium Planning Committee:

Louisa Branchflower, Palmer Soil and Water Conservation District
Kelsey Anderson, Mat-Su Borough
Libby Kugel, Great Land Trust
Jessica Speed, Trout Unlimited (Partnership Coordinator)
Grant Robinson, Trout Unlimited (Partnership Outreach Coordinator)



The Mat-Su Salmon Partnership formed in 2005 to address increasing impacts on salmon habitat from human use and development in the Mat-Su Basin. Modeled after the National Fish Habitat Partnership, this coalition of now 66 organizations uses a collaborative, cooperative, and non-regulatory approach. The Matanuska-Susitna Basin Salmon Habitat Partnership supports abundant wild salmon and healthy habitat that coexist with vibrant communities. Because wild salmon are central to life in Alaska, the partnership works to ensure quality salmon habitat is safeguarded and restored. This approach relies on collaboration and cooperation of diverse stakeholders.

Learn more about the Partnership and Symposium at the Mat-Su Salmon Partnership website at www.matsusalmon.org and follow us on [Facebook](#)!



Veteran Mat-Su fishing guide Andy Couch speaks to attendees of the Partnership's Summer Site tour of the Little Susitna River on August 26, 2021. (Libby Kugel / Great Land Trust)



Wednesday, November 17, 2021

Virtual

8:30 Webinar opens

9:00 Symposium Welcome

Grant Robinson, Mat-Su Basin Salmon Habitat Partnership Outreach Coordinator
Aaron Leggett, President, Native Village of Eklutna

9:30 Keynote Address:

John McMillan, Trout Unlimited

Elwha River Dam Removal Case Study – What Can We Learn?

10:30 Coffee & Comfort Break

10:45 Science to Inform Conservation and Management Action

Moderator: Laura Eldred, Alaska Department of Environmental Conservation

Rebecca Shaftel UAA Alaska Center for Conservation Science

Spatial Patterns in Thermal Regimes Across the Little Susitna and Deshka Watersheds and Linkages to Temperature Requirements for Salmon

Anjanette Steer UAA Alaska Center for Conservation Science

Mapping Riparian Habitat in the Montana and Meadow Creek Watersheds

Bruce Wright Knik Tribe

Paralytic Shellfish Toxins in Fish and Invertebrates of Southcentral and Southwest Alaska

11:30 Lunch Break

12:30 Increasing our Knowledge of Invasive Northern Pike in the Mat-Su

Moderator: Nicole Swenson, Tyonek Tribal Conservation District

Taylor Cubbage University of Alaska Fairbanks

*Physiological Drivers of Invasion Success in Alaskan Northern Pike (*Esox lucius*)*

Ben Rich University of Alaska Fairbanks

Deshka Pike Diet Then and Now

1:00 Keeping New Aquatic Invasive Species Out of the Mat-Su

Tobias Schwoerer International Arctic Research Center, UAF

Batten Down the Hatches: Biological Invasion Risk of Dreissenid Mussels to Alaska Fisheries



Matt Bowser U.S. Fish & Wildlife Service Kenai National Wildlife Refuge
A Can of Worms for Alaska Salmon: More Than We Angled For

Aaron Martin U.S. Fish & Wildlife Service
Working Together to Detect Aquatic Invasive Species in the Mat-Su

1:45 Break

2:00 Updates from the Mat-Su Basin Salmon Habitat Partnership
America's Conservation Enhancement Act of 2020 and the codification of the National Fish Habitat Partnership (NFHP)

Jessica Speed Mat-Su Basin Salmon Habitat Partnership Coordinator
Ted Eischeid Mat-Su Borough, NFHP Board Member

2:15 Tidbits
Moderator: Libby Kugel, Great Land Trust

2:45 Engaging Communities: Tangible Changes at the Intersection of People and Salmon
Moderator: Dan Rinella, U.S. Fish & Wildlife Service

Marye Martin, Riley Whitney Alaska Geographic / U.S. Fish & Wildlife Service
Fishing for Connections: Fostering Life-Long Stewardship with Urban Youth Through Angling

Margaret Stern Susitna River Coalition
Susitna River Coalition: Three Things to Watch

Cole Branham Matanuska-Susitna Borough
Mat-Su Borough Fish Passage Projects

3:30 Making Connections: Lamprey and Salmon

Christina Wang U.S. Fish & Wildlife Service
The Lamprey and Salmon Connection

Trent Sutton University of Alaska Fairbanks
Lampreys in the Last Frontier: What We Know (or Don't Know) About Alaska's Lampreys

Alicia Marrs Pacific Lamprey Conservation Initiative
Leveraging Lamprey & Salmon Conservation - New Opportunities to Engage in Fish Habitat Conservation in Alaska – the Pacific Lamprey Conservation Initiative

4:15 Conclusions
Ted Eischeid, Mat-Su Borough

4:30 Adjourn



About the Keynote Speaker:

John McMillan



John McMillan is the Science Director for Trout Unlimited's Wild Steelhead Initiative. He was raised along the banks of the Washougal River where he was indoctrinated into a fly-fishing family, which eventually led to snorkeling, then to an undergraduate degree in Hydrology and English Literature and then a Masters Degree in Fisheries Science.

Before coming to TU, John studied salmonids for the US Forest Service, Hoh Indian tribe, Wild Salmon Center, and finally, with NOAA/NWFSC as part of the Elwha River dam removal project.

His research and monitoring has often focused on the biology, behavior and ecology of steelhead and rainbow trout, with a particular interest in the mechanisms influencing why individual fish adopt particular life history strategies -- such as anadromy and residency -- and why such life histories are critical to the resilience of wild steelhead. As a result, he has published several peer-reviewed manuscripts on steelhead and salmon science and has written books and book chapters about fish and fly fishing. What his publications won't reveal is how much time he spends underwater with the fish. From summer low flows to icy cold winter days, John has snorkeled just over 2,000 km of stream habitat, largely focusing on the behavior of salmonids and how they use and interact with their habitat.

Keynote Abstract:

Elwha River dam removal case study: What can we learn?

Impassable dams can affect stream fish communities in many ways, including blocking migration pathways and reducing the productivity, abundance, diversity, and distribution of migratory fishes, such as salmonids. For over 100 years two impassable dams limited the distribution of anadromous salmonids to the lower five miles of the Elwha River in Washington. In 2015, after four years of deconstruction, both dams were entirely removed, allowing anadromous salmonids to resume migrations throughout the entire watershed. Scientists tracked the response of Chinook Salmon, Coho Salmon, steelhead, and bull trout using a suite of methods, including radiotelemetry, redd counts, snorkel surveys, juvenile sampling, and smolt traps. To date, results suggest several interesting patterns.

First, dam removal produced a dramatic increase in sediment and greatly altered the stream channel conditions, resulting in a large decrease in the abundance of salmonids and macroinvertebrates below the two dams. Second, despite the challenging conditions, bull trout and steelhead both rapidly expanded their spatial distribution, abundance, and diversity, including the resumption of anadromy by bull trout and the remarkable re-establishment of a wild summer steelhead life history, which was formerly rare to non-existent below the dams.



Third, during the early stages of dam deconstruction, adult Coho Salmon were relocated to tributaries that were unaffected by the released sediment formerly held behind the dams. This helped jumpstart their recovery process, and so far, Coho Salmon have recolonized a large extent of their former habitat and increased in abundance and life history diversity. Fourth, production of Chinook Salmon has mostly resulted from hatchery releases until the last two years, during which production of natural-origin Chinook dramatically increased. The improved production of Chinook is likely related to the stabilization of the main-stem Elwha River channel following dam removal.

Overall, these results provide encouraging signs for recovery of anadromous salmonids in the Elwha River. However, it is also important to remember that the populations are still in the early stages of recolonization and some species, such as pink salmon, sockeye salmon, and chum salmon have not responded as quickly. Consequently, much remains to be learned about how dam removal can benefit endangered and/or threatened species, but so far, the response has been promising.

Presentation Abstracts

Presentation abstracts are arranged in chronological order, as listed in the agenda.

Spatial Patterns in Thermal Regimes Across the Little Susitna and Deshka Watersheds and Linkages to Temperature Requirements for Salmon

Rebecca Shaftel, Alaska Center for Conservation Science, UAA

Sue Mauger, Cook Inletkeeper

Dan Rinella, U.S. Fish & Wildlife Service

The Little Susitna and Deshka Rivers are home to two of the most productive fisheries in the Matanuska-Susitna (Mat-Su) basin. However, water quality data are lacking to inform management and conservation decisions in these watersheds despite annual air temperature increases over 2° C in the past 50 years. The U.S. Fish and Wildlife Service, Cook Inletkeeper, and University of Alaska Anchorage have collected year-round stream temperature data across a range of stream sizes and elevations in both watersheds to fill this data gap. Migration corridors in the lower portions of both rivers have exceeded temperatures known to cause heat stress in migrating Chinook salmon, although the timing of maximum summer water temperatures may differ due to high elevation snowmelt inputs to the Little Susitna River. As hydrologic inputs and catchment characteristics are distinctly different across these two watersheds, temperature data will be used to characterize and compare stream thermal regimes across habitats supporting different salmon life stages. Stream thermal regimes include the magnitude, frequency, duration, timing, and variability of stream temperatures. The timing of warm events, their overlap with habitat use by life stage, and opportunities for thermal refugia will be assessed for migrating adults using daily counts from ADF&G weirs. Thermal regimes in important spawning habitats will be compared to spawn timing to assess temperature stress during spawning and early incubation. For juvenile rearing, the spatial extent and seasonal pattern of optimal temperatures to support growth will be evaluated. Results will be used to describe differences in thermal conditions by life stage for Chinook and Coho salmon in these two important watersheds and will help the Mat-Su Salmon Habitat Partnership meet specific objectives identified in their strategic action plan by identifying thermal characteristics that support high quality habitats for juvenile Chinook and Coho Salmon.



Mapping Riparian Habitat in the Montana and Meadow Creek Watersheds

Anjanette Steer, Alaska Center for Conservation Science, UAA

Riparian wetland habitat has been mapped in two watersheds (Montana and Meadow/Lucile Creeks), using current aerial imagery (MAXAR), LIDAR data and FEMA/MSB Floodplain maps to inform the riparian habitat delineation. The mapped riparian habitat has been prioritized based on current knowledge of the system including discrete salmon spawning enclaves, important overwintering areas, and thermal refugia locations. We will present the GIS mapping methods, analytical metrics used to determine the riparian habitat prioritization, and riparian corridor maps for each watershed. Watershed wetland mapping needs will also be identified. The final prioritized wetlands dataset will combine information from recent, high resolution base layers (imagery and elevation) along with the wealth of research completed by Mat-Su Salmon Habitat Partners over the past ten years. The composite, riparian wetland layer will provide salmon habitat managers a single dataset that incorporates attributes derived from previous partner efforts as well as current conditions such as floodplain zones, land ownership, and development status. The presentation will focus on how the final data product can help to ensure healthy salmon habitat throughout the Mat-Su Basin by demonstrating the draft data product that has been informed by the Partnership's best collective science of the recent past. These data are intended to be simple and easy to understand yet supported by detailed source layers and reports. This project is a pilot project to create a workflow that is repeatable for other riparian corridors in the Matanuska-Susitna basin.

Paralytic Shellfish Toxins in Fish and Invertebrates of Southcentral and Southwest Alaska

Bruce Wright, Knik Tribe

In Alaska, paralytic shellfish poisoning (PSP) is caused by ingestion of seafood products containing saxitoxins, potent neurotoxins produced by the dinoflagellate *Alexandrium catenella*. PSP is usually caused by consumption of toxin-containing bivalves (mussels, clams, etc.), but there is growing evidence that toxins can also be transferred to other biota during *Alexandrium* blooms, including species that do not feed directly on shellfish. Here, we report preliminary results from two concurrent projects examining the potential occurrence of PSP toxins in marine fish and invertebrates across southcentral and southwest Alaska. Samples were collected during 2014-2020 at sites in Lower Cook Inlet, Prince William Sound, the Kodiak Islands, the Alaska Peninsula, the Aleutians and the Pribilof Islands, and were analyzed for PSP toxin concentrations by ELISA and HPLC. Resulting data indicate toxin concentrations in forage fishes reached the highest levels in Dolly Varden (*Salvelinas*), Pacific Herring (*Clupea*) and Pacific Sand Lance (*Ammodytes*), with concentrations several times the U.S. regulatory limit of 80 µg STX Eq. 100 g⁻¹ in some specimens. Toxins were also present in tissues of five salmon species and other predatory fishes, with maximum concentrations in organs (kidney, liver, digestive tract) and much lower toxin levels in muscle tissue and roe. Among invertebrates, the highest toxin concentrations were recorded in bivalve consumers (crabs, sea stars, predatory snails), but with appreciable levels in amphipods, urchins, tunicates and other species. Regional differences in toxin levels among biota were examined, with implications for high level marine predators, human health and the Alaskan seafood industry.



Physiological Drivers of Invasion Success in Alaskan Northern Pike (*Esox lucius*)

Taylor Cabbage, University of Alaska Fairbanks

The spread of invasive species has caused drastic ecological and economic consequences on a global scale, including the expansion of Northern Pike (*Esox lucius*) throughout Southcentral Alaska. Illegal introductions and subsequent establishment of pike in the region threaten salmon populations along with the fisheries and ecosystems they support. Trophic, morphological, and genetic plasticity exists in Alaskan pike, and along with variation in physiological parameters may facilitate the success of individuals in new habitats. Pike (N = 123) were collected from invasive (Matanuska-Susitna Basin) and native (Yukon Basin) habitats in Alaska during the summer of 2020 to quantify and compare their physiology and ecology. We measured body condition via bioelectrical impedance analysis and proximate composition analysis, growth via cleithra increment analysis, metabolic capacity via heart, liver, and muscle tissue enzyme assays, and diet from stomach contents. Invasive pike had higher body condition relative to native populations, potentially driven by energy-rich diet items such as juvenile salmonids. Preliminary results of metabolic assays indicate considerable individual variation within invasive and native populations. Such variation may be better explained by additional physiological factors such as individual growth rates. The higher body condition and available energy stores of invasive pike may facilitate the expansion of Southcentral Alaska populations through increased dispersal rates, fecundity, and fitness. As an opportunistic predator that is highly tolerant to a wide variety of environmental conditions, invasive pike are a clear threat to salmon populations in the Mat-Su region. An improved understanding of the physiological mechanisms that facilitate invasion success of pike will help to design and implement appropriate management tactics in Alaska and elsewhere pike are invasive, and contribute to our knowledge of aquatic invasion ecology.

Deshka Pike Diet Then and Now

Ben Rich, University of Alaska Fairbanks

Global climate change is having a disproportionate effect on freshwater systems and ecosystems in the arctic and subarctic. These effects include warming water temperatures and changing precipitation patterns and have the capacity to change the quality and quantity of freshwater habitats for native fishes as well as their interactions with invasive species. The Deshka River (Tuquentu) is home to an invasive population of Northern Pike (*Esox lucius*) that have likely been in residence since the 1970s (Sepulveda et al. 2015). A 2011 study by collaborator Adam Sepulveda et al. found that pike preferred juvenile Chinook (*Oncorhynchus tshawytscha*) and Coho Salmon (*Oncorhynchus kisutch*) as prey, but did not have large scale impacts on the spawning population of these species like they did on neighboring Alexander Creek (also Tuquentu). In the last ten years we have seen drops and destabilization of returns in Deshka River Coho and Chinook Salmon as well as rapidly warming water temperatures. We hypothesized that warming water temperatures may be increasing pike predation on juvenile salmon and significantly contributing to these declines. To assess how pike predation may have changed in response to warming water temperatures we collected 521 Northern Pike on the Deshka River in the summer of 2021 and conducted diet analysis on all of them. We analyzed the diet proportions by Northern Pike size class and site and did a cursory comparative analysis between the 2011 data and 2021 data in one slough, and between our six principle 2021 sites. These results are preliminary and we will expand upon them by inputting them into a bioenergetics model to estimate consumption.



Batten Down the Hatches: Biological Invasion Risk of Dreissenid Mussels to Alaska Fisheries

Tobias Schwoerer, International Arctic Research Center, UAF

Alaska's aquatic ecosystems support some of the world's most productive fisheries such as the state's wild salmon fisheries. Historically, Alaska's fisheries have not yet had to face challenges related to aquatic invasive species. However, human population, development, and trade have been associated with an influx of non-native species to Alaska. The potential transmission of aquatic invasive species (AIS) such as zebra mussels (*Dreissena polymorpha*) through the trade and traffic of recreational watercraft from mussel-infested regions, is especially worrisome. Since invasive mussels have not yet been found in Alaska, the state has a unique window of opportunity to prevent Dreissenid mussel transmissions, yet little investment has been directed towards prevention. Also, there is little data and analysis to guide adequate policy responses. This study tries to fill knowledge gaps by combining key informant interviews with an analysis of existing data from watercraft inspections and registrations. To assess AIS transmission risk, we estimated the number of used motorized watercraft being bought by Alaska residents and the number of visiting motorized watercraft that have previously been used outside Alaska. Results indicate that likely more than 200 watercraft annually enter Alaska freshwater that have previously been used elsewhere with a third originating in Dreissenid mussel infested U.S. states and Canadian provinces. Policy recommendations point towards the need for inspection stations at all possible points of entry. Policy implications for resource management and habitat conservation are discussed.

A Can of Worms for Alaska Salmon: More Than We Angled For

Matt Bowser, U.S. Fish and Wildlife Service

Earthworms in the Land of the Midnight Sun
Anglers toss on the ground when their fishing is done.
Set free they disperse peristaltically,
Change the woods, in time, irreversibly.
Some worms do some days end up in the lake,
Where salmonids gladly of them partake.
But for salmon what else are their effects?
Worms' biggest effects may be indirect.

Working Together to Detect Aquatic Invasive Species in the Mat-Su

Aaron Martin, U.S. Fish and Wildlife Service

We are at a crossroad in Alaska on how we are going to collectively conserve and restore our aquatic resources. There have been incredible successes towards addressing major threats (e.g., fish passage) identified in the Mat-Su Salmon Habitat Partnership's (Partnership) Strategic Action Plan. Fortunately, there continues to be growing interest and organization towards addressing the threat of aquatic invasive species (AIS) in the Mat-Su River Basins (Basins) and beyond, but greater involvement is needed to achieve the successes that are possible. Preventing and responding to AIS introductions and spread is a team effort; the threats and vectors are too many for any one entity to address on their own. The challenges are amplified in much of the Mat-Su due to the high number of vectors (e.g., ATVs, watercraft, and aviation traffic) and higher population numbers of the Mat-Su Borough compared to



other parts of Alaska. During this presentation I will provide an overview of pertinent statewide and national invasive species efforts such as emerging survey and identification techniques, outreach and education opportunities, and new data management resources. We are fortunate to have relatively few species of aquatic invaders in the Mat-Su and the momentum is there for us to make considerable strides in preventing and eradicating AIS, if action is taken now. By expanding awareness and early detection and rapid response through our day to day actions, we can sustain and restore the salmon resources of the Mat-Su.

Fishing for Connections: Fostering Life-Long Stewardship with Urban Youth Through Angling

Marye Martin, Alaska Geographic
Riley Whitney, U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service's Urban Fishing Program facilitates youth from Anchorage neighborhoods building cumulative skills around angling, cold water safety, and wild food preparation. In doing so, the program promotes connections with fish as important ecological and cultural aspects of Alaska. The program partners with local youth-serving organizations to build excitement about fish and to develop life skills through safe and structured angling. In its 11-year history, the program has fostered long-term connections between adult mentors and fish and wildlife professionals with hundreds of youth from Anchorage and, more recently, Eagle River, and Mat-Su communities. Participants often share that the program provides an opportunity for them to experience a new recreational activity regardless of barriers their families might face. Moreover, the program has demonstrated the ability to challenge ideas youth possess about the type of person who engages in activities like angling. In the past year, the program expanded to offer year-round virtual programming in order to continuously and consistently engage with youth for sustained relationship-building through challenging times. Our approach is informed by multiple bodies of literature, including the role of outdoor experiences on youth mental health and restoration (Zamora et al., 2021), the associations between positive experiences in nature in childhood and later stewardship behavior (Broom, 2017; Chawla, 2012), and the contributions of outdoor and environmental education programs to long-term environmental identity development in middle school and adolescent youth (Chawla, 2012; Kellert, 2002).

Susitna River Coalition: Three Things to Watch

Margaret Stern, Susitna River Coalition

The Susitna River Coalition (SRC) is a grassroots organization based in Talkeetna, Alaska. The SRC engages residents of the Susitna Valley on issues relevant to clean energy and healthy habitat in the watershed. Three proposed developmental and legislative actions carry the possibility to harm the health of the Susitna watershed's ecosystem. These projects include the proposed West Susitna Access Road, the potential dismantling of Recreational Rivers in Alaska through SB97, and the Susitna-Watana Dam. The proposed West Susitna Access Road is a 100-mile mining access road through the currently roadless West Susitna Drainage. The possibility of the road has been explored through a financial partnership of AIDEA (Alaska Industrial Development and Export Authority), the Mat-Su Borough, and NOVA Minerals Ltd (an Australian company). If built, the road would open up the culturally and biologically significant West Susitna drainage. SB 97 was introduced to the Alaska state legislature in spring of 2021. This bill, if passed, would repeal the "establishment of recreational rivers and recreation river corridors." The six Recreational Rivers within the Susitna watershed would lose their designation if



SB97 is passed. The Susitna-Watana Dam continuously pops up amongst the state's proposed development projects. The proposed dam would be 735 feet tall and span the entire width of the Susitna river, blocking passage upstream. Most recently, the project was discussed in a presentation by AEA (Alaska Energy Authority) to House Resources in April of 2021. This presentation will provide a brief history and status update of each of these potential threats and the related work of the Susitna River Coalition.

Mat-Su Borough Fish Passage Projects

Cole Branham, Mat-Su Borough

The Matanuska-Susitna Borough has completed over 100 fish passage projects in the past 20 years. This presentation will include some recent fish passage projects completed, under construction and in design. The most recent fish passage projects the MSB worked on include Cottonwood Creek, Cloudy Lake, Caswell Creek, and O'Brien Creek. The MSB works closely with the Alaska Department of Fish and Game and U.S. Fish and Wildlife Service on these projects.

The Lamprey and Salmon Connection

Christina Wang, U.S. Fish and Wildlife Service

Lampreys are truly ancient species, they were well-established long before the emergence of salmon. The co-evolution of salmon with lamprey has resulted in a unique interdependence of these species in both river and ocean ecosystems. Lamprey and salmon have similar stream habitat requirements, but they have different life histories and swimming abilities. Like salmon, Pacific and Arctic lamprey are critically important to Native American people who have used them for ceremonial, cultural, medicinal and subsistence purposes for generations. Threats to lampreys are similar to that of salmon and occur throughout much of their range. The most significant threats are passage barriers and stream and floodplain degradation. Consideration of lamprey in restoration expands project benefits for a wider variety of species, supports ecosystem functions, is crucial to indigenous people, and is essential for recovering lamprey to their historic levels. We aim to raise awareness of native lamprey species and discuss how lamprey and salmon conservation go hand in hand.

Lampreys in the Last Frontier: What We Know (or Don't Know) About Alaska's Lampreys

Trent Sutton, University of Alaska Fairbanks

Lampreys have experienced wide-spread declines in population abundance on a global scale primarily as a result of anthropogenic disturbances. However, the conservation of native lampreys has not been a fisheries management priority in North America. Even though these ancestral fishes share many of the same habitats as salmonids in freshwater ecosystems, native lampreys as a group have received little management or research attention. This paucity of information limits the development of management and conservation plans for the five lamprey species in Alaska (Arctic lamprey *Lethenteron camtschaticum*, Alaskan brook lamprey *Lethenteron alaskense*, Pacific lamprey *Entosphenus tridentatus*, Western river lamprey *Lampetra ayresii*, Western brook lamprey *Lampetra richardsoni*), which is particularly problematic given ongoing changes and reductions in aquatic habitat availability due to climate change. In addition, Arctic lamprey support important subsistence and commercial fisheries in



the lower Yukon River, but the impacts of these fisheries on the long-term sustainability of populations for this species is unknown. Further, the role of lampreys in freshwater and marine ecosystems, both as predator and prey, also remain largely unknown. As a result, there is a clear need to develop a better understanding of lamprey species in Alaska. In this presentation, we will discuss the current state of knowledge on lamprey populations in Alaska, potential threats to the long-term sustainability and persistence of these species, and describe ongoing and future research efforts in the Yukon and Susitna River drainages to increase our understanding of lamprey species in Alaska.

Leveraging Lamprey & Salmon Conservation - New Opportunities to Engage in Fish Habitat Conservation in Alaska – the Pacific Lamprey Conservation Initiative

Alicia Marrs, Pacific Lamprey Conservation Initiative

The Pacific Lamprey Conservation Initiative (PLCI) is a diverse group of Native American tribes, federal state and local agencies, non-profit organizations and others working collaboratively to conserve and restore lamprey populations and their habitats in Alaska, California, Idaho, Oregon, and Washington. This group of more than 176 organizations is using research, conservation actions, and outreach to achieve long term persistence of Pacific Lamprey and support traditional tribal cultural use.

The collective movement to protect and enhance salmonid habitat across the West, and in Alaska, presents a valuable opportunity to also protect and enhance habitat for lampreys. By considering lampreys from the onset of project development it is possible to include lamprey specific project elements at little or no additional cost. As the newest fish habitat partnership (FHP) under the National Fish Habitat Partnership (NFHP), PLCI is also seeking ways to collaborate with other FHPs throughout the historical range of Pacific Lamprey, especially those in Alaska like the Mat-Su Salmon Habitat Partnership, to increase awareness and understanding of the cultural and ecological importance of Pacific Lamprey, and identify ways to leverage existing knowledge and resources to protect, restore and enhance fish habitat for the benefit of all aquatic species, as well as the communities they support. In 2022, new and existing partners will have the opportunity to sign on to the Conservation Agreement, demonstrating their commitment to supporting lamprey conservation. We will also embark on updating the Pacific Lamprey Assessment. While we know there are lampreys in Alaska, their distribution and status is not well understood. One of PLCI's primary goals is to continue strengthening its network of Alaskan partners and knowledge of lampreys. This presentation will provide an overview of PLCI, its committees and initiatives, and highlight ways new and existing partners can learn more about lampreys and get involved!



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*Thank you as well, to everyone who has offered to pitch-in and
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Notes:

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