

15TH ANNUAL MAT-SU SALMON SCIENCE & CONSERVATION SYMPOSIUM

November 14-15, 2022
Palmer, Alaska



Hosted by the
Mat-Su Basin Salmon Habitat Partnership

Notes:

2022 Mat-Su Salmon Science & Conservation Symposium

Welcome to the 15th annual Mat-Su Salmon Science & Conservation Symposium, hosted by the Mat-Su Basin Salmon Habitat Partnership.

After two years of successfully hosting this symposium on Zoom, it is energizing to see everyone face-to-face again. Although the growing pains of adapting to virtual presentations are hopefully just a memory for everyone now, the digital connectivity brought about by the pandemic has forever changed how we connect and share information. The recent research by our keynote speaker, Dr. Johnathan Moore, is exceptionally timely and of interest to everyone with a stake in the future of salmon in a warming climate. While Dr. Moore could not join us in person, we are grateful for his willingness to join us virtually.

This year's symposium covers a broad range of topics related to salmon habitat, representing the diverse areas of expertise held by members of the Partnership. We will have presentation blocks on identifying and addressing potential threats to salmon habitat, proposed development and management plan changes in the Susitna River drainage, aquatic invasive species, and restoring salmon habitat and accessibility. Additionally, we are excited to host a poster session allowing you to browse additional research and talk one-on-one with the people behind the projects, as well as a special art display from students at Palmer High School.

Congress passed the Infrastructure Investment and Jobs Act in November of 2021, authorizing \$1.2 trillion in spending. The dollar value of programs and grants available that can impact salmon habitat is staggering. It is extremely important that these funds are used wisely and result in the maximum benefit.

About the Mat-Su Basin Habitat Partnership

The Mat-Su Basin 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 (NFHP), this coalition of more than 65 organizations plus individual citizens uses a collaborative, cooperative, and non-regulatory approach that brings together diverse stakeholders. It is part of a broader network of 20 fish habitat partnerships across the U.S. and one of four partnerships in Alaska. Mat-Su salmon partners share a common vision for thriving fish, healthy habitats and vibrant communities in the Mat-Su.

The Partnership's essential functions are providing a forum for sharing information, increasing collaboration and education, and funding projects that support the goals of the Partnership's Strategic Action Plan. In 2022, the Deshka River was the focus of much of the Partnership's activities. This included piloting a year-long effort to translate new scientific knowledge into tangible conservation outcomes. These efforts focused on cold water refugia identified in the Deshka and Big Lake basins. The Partnership hosted a site tour for community leaders on the Deshka River in August. This year's symposium will share some of the highlights from both activities. In October, the National Fish Habitat Partnership recognized the Deshka River as a National Water to Watch.

The Partnership is guided by a Strategic Plan that identifies 12 primary potential threats to salmon and their habitat and strategies to address them. In 2022 the Partnership provided \$335,000 to six local area projects through funding from the National Fish Habitat Partnership. In 2020, Congress passed the America's Conservation Enhancement (ACE) Act, codifying the National Fish Habitat Partnership Program. Because of the law the funding mechanism for NFHP supported projects will differ from the past, but the law helps ensure that Fish Habitat Partnerships like the MSBSHP can continue our work.

Mat-Su Basin Salmon Habitat Partnership Steering Committee

Erika Ammann, NOAA Fisheries
Eric Booton, Trout Unlimited
Theo Garcia, Knik Tribe
Margaret Stern, Susitna River Coalition
Laurie Stuart, Tyonek Tribal Conservation District

Trent Liebich, U.S. Fish and Wildlife Service
Michael Mazzacavallo, Alaska Dept. of Fish & Game
Matthew Varner, U.S. Bureau of Land Management
Andy Wizik, Cook Inlet Aquaculture Association

Cover art by Lily Michaels of Talkeetna, Alaska



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



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

City of Wasilla

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



Monday November 14, 2022

Palmer Community Center (Depot), 610 S. Valley Way, Palmer

8:30 Registration

9:00 Symposium Welcome

Margaret Stern (MSBSHP Steering Committee member, Susitna River Coalition)

Gary Harrison (Chief, Chickaloon Village Traditional Council)

9:15 Keynote Address:

Salmon Futures: Stewardship of Salmon Systems in an Era of Rapid Change

Dr. Jonathan Moore (Simon Fraser University)

Introduction: Sue Mauger (Cook Inletkeeper)

10:15 Break

10:45 Identifying & Addressing Potential Threats to Salmon & Their Habitat

Moderator: Becky Shaftel (University of Alaska Anchorage)

Winter Stream Monitoring in the Matanuska Watershed – Kendra Zamzow (Chickaloon Village Traditional Council)

Identifying Heat Stress in Pacific Salmon Using Skeletal Muscle Tissue – Vanessa von Biela (U.S. Geological Survey)

Phytoremediation at Road-Stream Crossings – Lucas Byker (U.S. Fish and Wildlife Service)

Farmland Conservation: Interactions to Improve Salmon Habitat – Amy O'Connor (Alaska Farmland Trust)

11:45 Mat-Su Borough Fish & Wildlife Commission Update

Andy Couch (Mat-Su Borough Fish and Wildlife Commission)

12:00 Lunch

1:00 Proposed Development & Management Plan Changes in the Susitna River Drainage

Moderator: Matthew LaCroix (U.S. Environmental Protection Agency)

Things to Watch: An Update on Three Important Issues in the Susitna Drainage – Margaret Stern (Susitna River Coalition)

Salmon and Trout Ecology and Habitat of Susitna Basin Recreation Rivers – Sarah O'Neal (University of Washington)

1:30 Community Perspective: Paul Warta



Monday, November 14, 2022

1:45 Poster Session

Moderator: Amy O'Connor (Alaska Farmland Trust)

Poster authors will be on hand to answer questions about their work.

Proof of Concept: Operating a Video Camera Floating-Panel Weir on Moose Creek in Sutton, Alaska –
Laura Pevan (Chickaloon Village Traditional Council)

Mapping Meadow and Montana Creeks' Riparian Zones – Marcus Geist and Anjanette Steer (University of
Alaska Anchorage)

Settlers Bay Coastal Park Expansion Project – Libby Kugel (Great Land Trust)

Understanding the Condition and Trend of Aquatic Habitats Using an AIM Based Approach – Matt Varner
(Bureau of Land Management)

New Tools on the Horizon for Stream Restoration Planning – Matt Varner (Bureau of Land Management)

Improving Fish Passage in the Mat-Su Borough – Mike Campfield (Mat-Su Borough)

Wasilla Creek Headwaters Trail Improvements in the Matanuska Valley Moose Range – Mike Campfield
(Mat-Su Borough)

Eklutna River Habitat Characterization – Carrie Brophil (Native Village of Eklutna)

Multimedia Salmon Art Showcase – Palmer High School Students

2:15 Break

2:30 Tidbits

Moderator: Andy Wizik (Cook Inlet Aquaculture Association)

Please sign up at the registration desk to present a 3- minute project summary or
announcement. If you have a slide or two to project (maximum 2 slides), please load them by
the end of lunch.

2:45 Science to Conservation Outcomes: Cold Water Refugia

Moderator: Mike Daigneault (U.S. Fish and Wildlife Service)

Partners have worked hard to fill gaps in our scientific knowledge about salmon and their habitat in the
Mat-Su. What happens however, after a science gap has been filled? This session will highlight a pilot
effort to assist in moving science to conservation outcomes, focused on cold water refugia, and will
include presentations and break-out group discussion (land classification, area-wide planning, data
quality, data availability, landowner outreach).

4:00 Announcements & Adjourn

4:15 Evening Social & Poetry Reading

Feather and Flour, 927 S Cobb St., Palmer

Come visit with colleagues and hear local Palmer Poet Danni Psenak Linden share a short reading of her
original salmon poetry. The poetry reading is scheduled for 4:45pm. The Mat-Su Salmon Partnership is
providing appetizers, and a cash bar will be available till 6:15.



Tuesday November 15, 2022

Palmer Community Center (Depot), 610 S. Valley Way, Palmer

8:30 Registration

9:00 Symposium Welcome

Laurie Stuart (MSBSHP Steering Committee member, Tyonek Tribal Conservation District)

9:15 Updates from the Mat-Su Salmon Partnership: Deshka River Outreach

Jessica Speed (Mat-Su Basin Salmon Habitat Partnership Coordinator, Trout Unlimited)

9:30 Traditional Dena'ina Use of the Deshka River

Kevin Toothaker (Knik Tribe)

Fran Seger-Boss (Knik Tribe and Chickaloon Village Traditional Council)

9:45 Non-native & Aquatic Invasive Species

Moderator: Parker Bradley (ADF&G)

Anadromous Waters and Elodea Surveys in the Remote Western Mat-Su Borough –Jillian Jablonski (Tyonek Tribal Conservation District)

Factors Affecting Northern Pike (Esox lucius) Leaping Ability: Implications for Barrier Design in Invaded Systems – Taylor Cubbage (University of Alaska Fairbanks)

Predation on Salmonids in Joint Base Elmendorf-Richardson — MaryKate Swenerton (U.S. Fish and Wildlife Service)

Impacts of Introduced Alaskan Blackfish (Dallia pectoralis) – Lucas Byker (U.S. Fish and Wildlife Service)

10:45 Networking Break

11:15 Restoring Salmon Habitat & Accessibility

Moderator: Benjamin Meyer (Kenai Watershed Forum)

2022 Fish Passage Construction in the Mat-Su Borough – Jessica Straub (U.S. Fish and Wildlife Service) and Tracy Link (Mat-Su Borough)

ADF&G Fish Passage Program Update – Michael Mazzacavallo and Kevin Keith (Alaska Department of Fish and Game)

Falls Creek Restoration – Corinne Marzullo (Watershed Restoration Engineer), Howard Carbone (Alaska Nature Guides), Ed O'Connor

12:00 Lunch

1:00 Tidbits

Moderator: Nate Cathcart (ADF&G)

Please sign up at the registration desk to present a 3- minute project summary or announcement. If you have a slide or two to project (maximum 2 slides), please load them by the end of lunch.



Tuesday, November 15, 2022

1:30 Infrastructure Investment & Jobs Act: Funding Opportunities and Resources

Moderator: Austin Williams (Trout Unlimited)

This session will include presentations and a panel discussion to assist partners in learning more about funding opportunities through the Infrastructure Investment and Jobs Act (IIJA), aka the Bipartisan Infrastructure Law.

Erika Ammann (NOAA)

Mike Daigneault (U.S. Fish and Wildlife Service)

Erin Reinders (Alaska Municipal League)

2:45 Conclusions

Andy Couch (Member, Mat-Su Borough Fish and Wildlife Commission)

3:00 Adjourn

Thank you to Symposium Volunteers!

Eric Booton
Sue Mauger
Kevin Keith
Taylor Cabbage
Ashley Oleksiak
Marcus Geist
Andrea James
Leah Ellis
Theo Garcia
Alexa Millward
Becky Shaftel
Matthew LaCroix
Amy O'Connor
Andy Wizik

Mike Daigneault
Parker Bradley
Benjamin Meyer
Nate Cathcart
Mike Campfield
Anna Folsom & Palmer High Students
Anjanette Steer
Laura Pevan
Mick Campfield
Austin Williams
Margaret Stern
Laurie Stuart
Erika Ammann
Marian Giannulis

Symposium Planning Committee:

Libby Kugel, Great Land Trust
Theo Garcia, Knik Tribe
Jessica Speed, Trout Unlimited (Partnership Coordinator)
Grant Robinson, Trout Unlimited (Partnership Outreach Coordinator)



About the Keynote Speaker:

Jonathan Moore

Jonathan Moore is a Professor at Simon Fraser University in British Columbia, Canada, and holds the Liber Ero Research Chair of Coastal Science and Management. He received his PhD from University of Washington and has researched salmon and their watersheds, from Alaska to California to British Columbia. He studies freshwater biodiversity, watersheds, and global change, with particular focus on BC's rivers and their salmon, and he has published over 100 papers on these topics. He works closely with a diverse array of collaborators and partner organizations to codevelop research and communicate their findings so that contribute to positive watershed change. He lives in North Vancouver, British Columbia, and loves exploring coastal oceans, mountains, forests, and rivers with his family.



Salmon Futures: Stewardship of Salmon Systems in an Era of Rapid Change

In watersheds of western North America migratory salmon support ecosystems, economies, and cultures. However, these fish and their fisheries are threatened by climate change and multiple stressors. How do we steward salmon systems in this era of rapid change? Here I will share some stories of science and its application for salmon stewardship and climate resilience. The symptoms of climate change and other human pressures are challenging the resilience of salmon systems, ranging from sea level rise to warming river temperatures to glacier retreat. While these are grave challenges, there are opportunities for forward-looking and collaborative science to help guide proactive conservation and management. Such proactive options can include restoring connectivity, reducing local stressors, and conservation of future habitats for the increased resilience of salmon. There is a need and opportunity for the proactive stewardship of rapidly changing salmon systems to help them cope and adapt to climate change.

Jonathan Moore

Professor, Aquatic Ecology & Conservations, Liber Ero Chair of Coastal Science and Management

Biological Sciences

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Presentation Abstracts

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

*Denotes Poster

Winter Stream Monitoring in the Matanuska Watershed

Kendra Zamzow (Chickaloon Village Traditional Council)

Chickaloon Native Village has conducted stream water quality monitoring at 18 sites in the Matanuska River Watershed since 2015. In winter 2020-2021 and 2021-2022, they expanded their stream water quality monitoring to include winter data. We will present tips for winter sampling, working with handheld field meters in freezing temperatures, some winter water quality measures that differed significantly from in summer, and Halloween coho with a new AWC nomination.

Identifying Heat Stress in Pacific Salmon Using Skeletal Muscle Tissue

Vanessa von Biela (U.S. Geological Survey)

The pace of warming has accelerated at northern latitudes with potential to lower productivity of Pacific salmon (*Oncorhynchus* spp.) and other cold-water fishes valuable to the public. Heat stress biomarkers provide a tool to understand this stressor as it impacts vast and remote regions. We conducted a ~48 hr heat stress experiment using juvenile Chinook salmon (*O. tshawytscha*; n=151) and coho salmon (*O. kisutch*; n = 141) in southcentral Alaska to validate biomarkers for heat stress in skeletal muscle. Individuals were exposed to 15, 17, 19, 21, or 23°C for 12 or 36 h. We examined response of heat shock protein 70 (HSP70 protein) and transcription (mRNA) of 13 genes including three heat shock proteins (HSP70, HSP90, HSP27). HSP70 protein response followed a 'dimmer switch' pattern with a separation between 'off' (unstressed values) that cluster near zero following cooler treatments and a range of 'on' (stressed values) spread out along the tail of the histogram following warmer treatments. A threshold for heat stress classification in Chinook salmon was apparent with 100% of 21 and 23°C treated individuals >2 ng HSP70 protein mg.1 total protein compared to just 4% in cooler treatments (n=151). For coho salmon, 100% of 23°C treated individuals had >3 ng HSP70 protein mg.1 total protein compared to 4% in cooler treatments (n=141). Thus juvenile Chinook salmon in our study were more temperature sensitive than juvenile coho salmon. Gene transcription responses to temperature were strongest for heat shock protein genes in both species, especially HSP90 and HSP70. Gene transcription generally classified temperature exposure correctly >85% of the time with improvement likely if gene panels are revised. Our findings support the use of HSP70 protein measured in muscle as a useful tool for examining heat stress in wild Pacific salmon with an option for non-lethal biopsies for returning adults.

Vanessa R. von Biela¹, Amy M. Regish², Lizabeth Bowen³, Stephen D. McCormick², Ashley E. Stanek¹, Shannon Waters³, Michael P. Carey¹, Christian E. Zimmerman¹, Jonathon Gerken⁴, Daniel Rinella⁴

1. U.S. Geological Survey, Alaska Science Center, Anchorage, AK

2. U.S. Geological Survey, Eastern Ecological Science Center, Conte Anadromous Fish Research Laboratory, Turners Falls, MA

3. U.S. Geological Survey, Western Ecological Science Center, Davis, CA

4. U.S. Fish and Wildlife Service, Anchorage Field Office, Anchorage, AK



Phytoremediation at Road-Stream Crossings

Lucas Byker (U.S. Fish and Wildlife Service)

Phytoremediation has been utilized as a technique for mitigating toxic runoff from mine reclamation areas as well as a means to reduce the introduction of road runoff toxins and heavy metals. As levels of zinc, copper, and other road runoff based pollutants rises in response to increased development and coverage by impervious surfaces, this technique could be employed as a potential means to reduce the volume of toxins entering anadromous waters. This presentation will discuss the sources of the pollution, the potential impacts of the pollutants to fish, case studies of success from the lower 48, and possible solutions for the Mat-Su valley. Additionally, the presentation will explore reducing the bioavailability of heavy metals versus the removal of metals.

Farmland Conservation: Interactions to Improve Salmon Habitat

Amy O'Connor (Alaska Farmland Trust)

The Alaska Farmland Trust works across Alaska to keep agricultural land in production by protecting soils, and farmlands at greatest risk of being lost to development. Of the 380+ acres currently in permanent conservation easements the downstream effects greatly improve salmon habitat along the adjacent waterways. As the Alaska Farmland Trust works toward additional land acquisitions for 2023 the intersection of sustainable agriculture, salmon safe management practices, and land stewardship promotes a robust local food network that spans fisheries, farms and families.

Things to Watch: An Update on Three Important Issues in the Susitna Drainage

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. During the 2022 Mat-Su Salmon Symposium, the SRC presented on three issues with the potential to alter the future physical and management landscape of the watershed. These three issues include the proposed West Susitna Industrial Access Corridor, the proposed update of the Recreation Rivers Management Plan, and the Susitna-Watana Dam. In the past year, many changes have occurred within each of these issues. This presentation will provide a brief history and status update of each of these items, changes that have occurred over the past year, and what to expect into the future.

Salmon and Trout Ecology and Habitat of Susitna Basin Recreation Rivers

Sarah O'Neal (University of Washington)

In light of the Alaska Department of Natural Resources plan to revise the Susitna Basin Recreation Rivers Management Plan, a literature review was conducted to summarize peer-reviewed, government, and other grey literature regarding the ecology and habitat of Pacific salmon and other sportfish inhabited by the seven designated streams: Alexander and Lake creeks; and Deshka, Little Susitna, Talachulitna, and Talkeetna rivers. Some highlights include:

- The Susitna Basin supports the fourth largest Chinook (king) salmon population in the State of Alaska, making it globally significant in light of worldwide declines of Chinook populations.



- In contrast to other fisheries in the Susitna basin and generally in Alaska, Chinook sportfishing harvests frequently equal or exceed commercial Chinook harvests.
- The Little Susitna River supports the second largest coho (silver salmon) sport fishery in the State of Alaska.
- Sockeye (red) and pink (humpy) salmon are the most commercially valuable species produced in the Susitna basin, though their populations are largely unquantified.
- Barring increased development and habitat fragmentation, climate change and predatory, introduced Northern pike are the greatest current threats to Susitna basin salmon and other sportfish.

Because of its proximity to population centers, accessibility, overharvest, climate change, and other factors, the Susitna and Little Susitna's salmon and trout populations have already declined to a concerning degree, even with the existing protections of the Recreation Rivers Management Plan. Moreover, the lack of long-term and widespread data describing salmon numbers, productivity, and habitat may impede the ability to make sufficiently protective management decisions. As a result, a precautionary principle should be used to maintain salmon and trout sustainability. In its current format, the Susitna Basin Recreation Rivers Management Plan serves as one of the most precautionary, protective regulations in the State with respect to conserving salmon habitat.

Proof of Concept: Operating a Video Camera Floating-Panel Weir on Moose Creek in Sutton, Alaska*

Laura Pevan (Chickaloon Village Traditional Council)

With funding provided by the US Fish and Wildlife Service (USFWS) Tribal Wildlife Grant, the Chickaloon Village Traditional Council (CVTC) Environmental Stewardship Department installed and operated a video camera floating-panel fish weir on Moose Creek, located in Sutton, Alaska. Weir installation occurred in May 2022, with the aim to describe the run timing, enumeration, and species composition of anadromous spawning salmon populations on this tributary to the Matanuska River. A fish weir has never been used on Moose Creek. Spawner surveys have been conducted on Moose Creek for Chinook salmon annually by CVTC staff since 2005, and sporadic flight surveys by ADF&G since the 2004. Temporal limitations of these surveys have led to wide variability in reported numbers, and no information is known about other salmon species. Moose Creek is a culturally and historically significant tributary, having a rich history of abundant anadromous salmon, pre-colonialization. While the Moose Creek fish weir was meant to collect age, sex, and species type of any salmonids passing through a video-monitored fish chute, it experienced many difficulties in operation during the 2022 field season, including equipment malfunction and inaccessibility due to high water, flooding of the weir (not "fish-tight"), periods of low flow limiting salmon movement upstream, flooding-related incision of the creek thalweg, and electrical challenges. In total, 10 days of 24-hour video were recorded while the weir was operational. The main purpose of the 2022 field season was to determine weir feasibility through initial placement and implementation. Many lessons can be learned by a review of the season, and hopeful that this project will continue in 2023 to determine the original objectives of the Moose Creek video weir project, as grant funds allow.

Mapping Meadow and Montana Creeks' Riparian Zones*

Marcus Geist and Anjanette Steer (University of Alaska Anchorage)

The project's primary objective was mapping the riparian corridors of Montana and Meadow Creeks using currently available digital resources and establish methods for delineating riparian areas along the Matanuska-Susitna Salmon Basin core-area streams. We sought to develop an approach that is consistent throughout the region and durable to support prioritization and conservation of riparian habitat for salmon.

Montana Creek has experienced significant flooding in the recent past including the September 2012 event which was one of the top three discharges on record for the creek (Curran, 2012). FEMA has recently completed flood hazard mapping for this section of Montana Creek. Some portions of the flood zone "A" also known as the 1%- or



100-year floodplain are over 3,000 feet wide and we wanted to compare this flood zone with recent channel locations over the past forty years using historic aerial imagery. The images show that Montana Creek's main channel has migrated over 800 feet laterally in some areas over the past forty years. This active stream corridor deserves considerable attention in regards to future planning for human and fish habitat.

Settlers Bay Coastal Park Expansion Project *

Libby Kugel (Great Land Trust)

After the success of purchasing and conserving 293 acres in the Mat-Su to create the Settlers Bay Coastal Park, Great Land Trust is now seizing an opportunity to expand the park by purchasing an adjacent property that will add 187 acres to the park, increasing important habitat protection and expanding recreation opportunities.

Understanding the Condition and Trend of Aquatic Habitats Using an AIM Based Approach*

Matt Varner (Bureau of Land Management)

The Bureau of Land Management's Assessment, Inventory, and Monitoring (AIM) program provides a framework for assessing baseline conditions for streams and rivers across Alaska. The statistical design allows for scalable applications of the information for decision-making, and repeat sampling provides an understanding of how habitats might be evolving in response to climate change. By using the AIM methods to assess streams impacted by development, direct comparisons can be made to regional reference conditions across a variety of metrics.

New Tools on the Horizon for Stream Restoration Planning*

Matt Varner (Bureau of Land Management)

The Bureau of Land Management has been using applied science and robust regional data collection to help develop data sets and resources necessary for stream restoration planning. Tools like regional curves aid in designing stream dimensions while the forthcoming Stream Design Guide for Interior Alaska serves as a step-by-step guide for developing a stream restoration plan. These resources coupled with the Bureau's technical assistance program have helped improve the quality of stream reclamation being completed by placer miners as well as the restoration of Abandoned Mine Lands in Alaska.

Improving Fish Passage in the Mat-Su Borough*

Mike Campfield (Mat-Su Borough)

This poster will show the status of all fish passage culverts in the MSB, with the red, green and grey ratings system developed by ADF&G. It includes the most recent fish passage improvements by the MSB from the past year and looks ahead to those scheduled for improvements. This map was created in partnership with ADF&G habitat division.



Wasilla Creek Headwaters Trail Improvements in the Matanuska Valley Moose Range*

Mike Campfield (Mat-Su Borough)

The Mat-Su Borough in cooperation with the USFWS has been working to make trail improvements and restore salmon spawning and rearing habitat in the Matanuska Valley Moose Range. Damage to fish habitat along Wasilla Creek and its tributaries has become a growing issue with the increased local population and related use of the Moose Range for recreation. Motorized recreationist had been driving off-road vehicles (ORVs) through the creeks and swamps damaging creek banks and sensitive wetlands, where soft native soils cannot adequately resist the forces from the weight of the vehicles and the rotation of the tires. This was in part due to a lack of well-defined trails that avoid these sensitive areas. The project developed a new trail through uplands that avoid these impacts, including a new steel bridge and rock fords across Wasilla Creek and removed portions of the old trail. Streambank and wetland restoration including revegetating the creek banks is part of the project, which is now in-progress.

Matanuska Valley Moose Range and Jonesville Public Use Area Management Planning Process:

<https://aws.state.ak.us/OnlinePublicNotices/Notices/View.aspx?id=208024>

Eklutna River Habitat Characterization*

Carrie Brophil (Native Village of Eklutna)

Historically, the Eklutna people subsisted on the plentiful salmon of the Eklutna River. Beginning in 1929, a series of dams were constructed for hydroelectric projects, leading to the disruption of natural stream hydrology and connectivity. The lower dam (constructed in 1929) blocked fish passage to the lake/upper tributaries until its removal in 2018. The upper dam (at the Eklutna Lake outlet) and the associated power project, which came online in 1955, prevented the release of water from Eklutna Lake and deprived the river of its main water source. Most of the water remaining in the lower system comes from a small tributary- Thunderbird Creek. The Native Village of Eklutna performed minnow trapping and salmon spawning surveys from 2021-22 in order to 1) identify the fish species using the Eklutna River and the tributaries above Eklutna Lake, and 2) to assess the state of the anadromous salmon populations of the river. The data obtained from these studies will provide a baseline index by which the effects of potential restoration and mitigation measures can be compared.

Traditional Dena'ina Use of the Deshka River

Kevig Toothaker (Knik Tribe)

Fran Seger-Boss (Knik Tribe, Chickaloon Village Traditional Council)

The Deshka River and its watershed is an area rich with Indigenous history. The Deshka's productive waters have sustained the Dena'ina for generations. Kevin Toothaker leads cultural and educational project with the Knik Tribe, and Fran Seger-Boss is an archaeologist who works with both the Knik Tribe and Chickaloon Village Traditional Council. Their presentation will give a glimpse of the significance of the Deshka for Alaska's first peoples.

Anadromous Waters and Elodea Surveys in the Remote Western Mat-Su Borough

Jillian Jablonski (Tyonek Tribal Conservation District)

The Matanuska-Susitna Borough's western Cook Inlet is remote, with current access limited to air, water, and snow. Though remote, salmon habitat degradation and impacts to salmon populations can occur via biological invasions, i.e., the aquatic invasive plant *Elodea canadensis* (hereafter, *Elodea*), and increased access from proposed development. In the 2022 season, Tyonek Tribal Conservation District focused on filling two distinct data



gaps in this region: (1) identifying data gaps in the state Anadromous Waters Catalog (AWC) near proposed development and conducting fish surveys to add waterbodies (and/or species and life stages) to the AWC, and (2) conducting presence/absence Elodea surveys in high-risk waterbodies. We identified regions where these needs overlap and, in 2022, focused sampling efforts on a selected subregion southwest of Alexander Lake. We conducted fish surveys at 20 locations and caught anadromous and/or resident fish at 17 of the sites. We surveyed six waterbodies for Elodea; no Elodea was detected. Both fish and Elodea surveys occurred concurrently at five of the six waterbodies. This work resulted in eight nominations to the Anadromous Waters Catalog for both previously unlisted waterways and the addition of species and/or life stages. Our efforts highlight the prevalence of native anadromous and resident fish and the abundance of high-quality salmon habitat in this subregion and indicate there are still many productive anadromous waters in the remote western Mat-Su not yet listed in the AWC.

Factors Affecting Northern Pike (*Esox lucius*) Leaping Ability: Implications for Barrier Design in Invaded Systems

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 native fish populations via predation along with the fisheries and ecosystems they support. The highly interconnected river and lake systems of southcentral Alaska make pike suppression and eradication difficult; however, potential differences in pike and salmonid leaping abilities could make selective vertical drop barriers a viable option. To determine the efficacy of barriers, we assessed pike leaping ability as a function of barrier height, pool depth, and flow rate, with individual pike sex, size, growth rate, body condition, and anaerobic metabolic capacity analyzed as covariates. During the summer of 2021, adult pike (N = 55) were collected from Fort Peck Reservoir, Montana, USA and used in leaping trials in an open channel flume system at the U.S. Fish and Wildlife Service Fish Technology Center in Bozeman, Montana. We detected pike passage over barriers via a Passive Integrated Transponder antennae array, estimated body condition via bioelectrical impedance analysis and proximate composition analysis, quantified growth rates via cleithra increment analysis, and assessed anaerobic metabolic capacity via heart, liver, and muscle tissue enzyme assays. Likelihood of successful barrier passage declined with barrier height, generally increased with pool depth depending on pike size, and increased with standardized pike growth rate. However, successful passage was not affected by tested flow rates, pike sex, or other standardized physiological traits. These predictive models and insights into pike leaping behavior can help managers determine if pike-selective barriers are a viable option in southcentral Alaska and elsewhere pike are invasive to reduce predatory impacts of pike on native fish communities.

Predation on Salmonids in Joint Base Elmendorf-Richardson

MaryKate Swenerton (U.S. Fish and Wildlife Service)

Colette Brandt (Joint Base Elmendorf Richardson)

The objective of this study was to assess predation on early life stage salmonids in Sixmile Lake on Joint Base Elmendorf-Richardson (JBER). We sampled Invasive Northern Pike (*Esox lucius*, n=43), stocked Rainbow Trout (*Oncorhynchus mykiss*, n=149), and Coho Salmon (*Oncorhynchus nerka*, n=129) year-round from 2020 to 2022, identified stomach contents to the lowest possible taxonomic unit, and weighed them individually. Northern pike primarily consumed salmonids (*Oncorhynchus* spp.), which proportionally made up 99.3% of their identifiable diet. Coho Salmon and Rainbow Trout primarily consumed Threespine stickleback (*Gasterosteus aculeatus*) and dragonfly larvae. Salmonids were the third most important diet item by weight for Coho Salmon and the fourth



most important diet item by weight for Rainbow Trout. The proportion of salmonids in the diet did not differ by season (ice on vs. ice off) or predator size (fork length) for any of the three predators studied. These results indicate high consumption of early life stage salmon by Northern Pike, even when other prey items are available. In the future, we plan to use bioenergetics modeling to determine consumption rates of salmonids and the impacts of predation on salmonid recruitment. Managers should allocate effort and financial resources into outreach, and early detection and response for Northern Pike on JBER and throughout Southcentral Alaska.

Impacts of Introduced Alaskan Blackfish (*Dallia pectoralis*)

Lucas Byker (U.S. Fish and Wildlife Service)

Alaska Blackfish (*Dallia pectoralis*) have become an introduced species of concern where they have been introduced in Southcentral Alaska. Previous studies focused on introduced blackfish diet suggest significant dietary overlap exists between blackfish and native fish species. This dietary overlap, coupled with the blackfish' unique physiological adaptations, have raised concerns that introduced populations of blackfish may have a negative impact on native fish assemblages. This study sought to quantify the effects of an introduced population of blackfish in the lower Kenai River by comparing indexes of abundance of various native fish species in blackfish-impacted streams and unimpacted streams. Additionally, the growth of juvenile Coho salmon (*Oncorhynchus kisutch*) was compared between the two stream types. This study concluded, based on field data and literature review, that Alaska Blackfish are a likely a benign invader to most, but not all, Kenai Peninsula native fish species.

2022 Fish Passage Construction in the Mat-Su Borough

Jessica Straub (U.S. Fish and Wildlife Service)

Tracy Link (Mat-Su Borough)

This presentation will cover another collaborative year of fish passage projects in the Mat-Su Borough. It will focus on projects constructed in 2022, highlighting successes and some lessons learned, and it will provide a forecast for fish passage construction next year.

ADF&G Fish Passage Program Update

Michael Mazzacavallo; Kevin Keith (Alaska Department of Fish and Game)

There has been lot of things happening with the Alaska Department of Fish and Game (ADF&G) Fish Passage Group over the past year. For starters, the group has seen a big change in personnel. Currently, the group is finishing up a pair of fish passage research projects: a fish tagging study at Buddy Creek and a culvert stability study. The group has also been updating the Mat-Su Borough prioritization of culverts for removal or replacement. This updated prioritization utilizes the available NHD(+) elevation data to help better estimate the potential upstream extent of Pacific Salmon habitat upstream of culvert barriers. This talk will serve as an opportunity to introduce the new faces of the ADF&G Fish Passage Group and give a quick update of current projects.



Falls Creek Restoration

Corinne Marzullo (Watershed Restoration Engineer)

Howard Carbone (Alaska Nature Guides)

Ed O'Connor

In 2022 a landowner implemented a stream channel and floodplain restoration project on Falls Creek, a tributary to Cache Creek in the Mat-Su Borough, Alaska. Beginning in 1906, mining operations in the area have adversely affected stream function and habitat. The channels are deeply entrenched creating poor fish habitat, have little sinuosity or large woody debris, few pools and side channels, and are artificially straightened and confined limiting interaction with the riparian and flood plain areas. To design the new channel, a disturbed reference reach was used as a template. Neighboring miners and their heavy construction equipment were hired to construct a new stream channel corridor that approximated the reference reach morphology. The results were an increase in the overall channel length by 30%, channel sinuosity from 1.0 to 1.3, average slope from 2.5% to 1.8%, the amount of pool habitat from 0% to 15%, glide type habitat from <1% to >35% and riffle area from 99% to 50% and increased large in-stream wood from <5 to >155 pieces within the project reach. The Stream Quantification Tool was used to establish a baseline before the project and will be used for long term monitoring. One result was that adult Chinook (*Oncorhynchus tshawytscha*) and Coho salmon (*O. kisutch*) and fry were observed to be using the project area for the first time since observations began in 2019. The project was funded as a demonstration project for Salmon Gold, who works with miners to do enhanced reclamation and habitat restoration.



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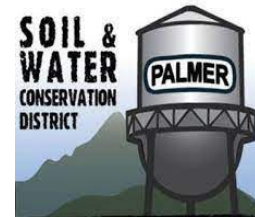
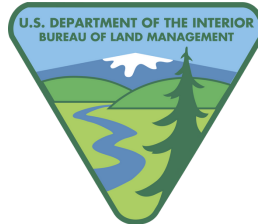
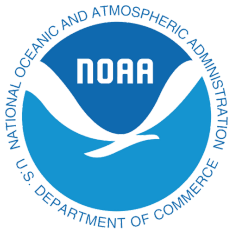
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