

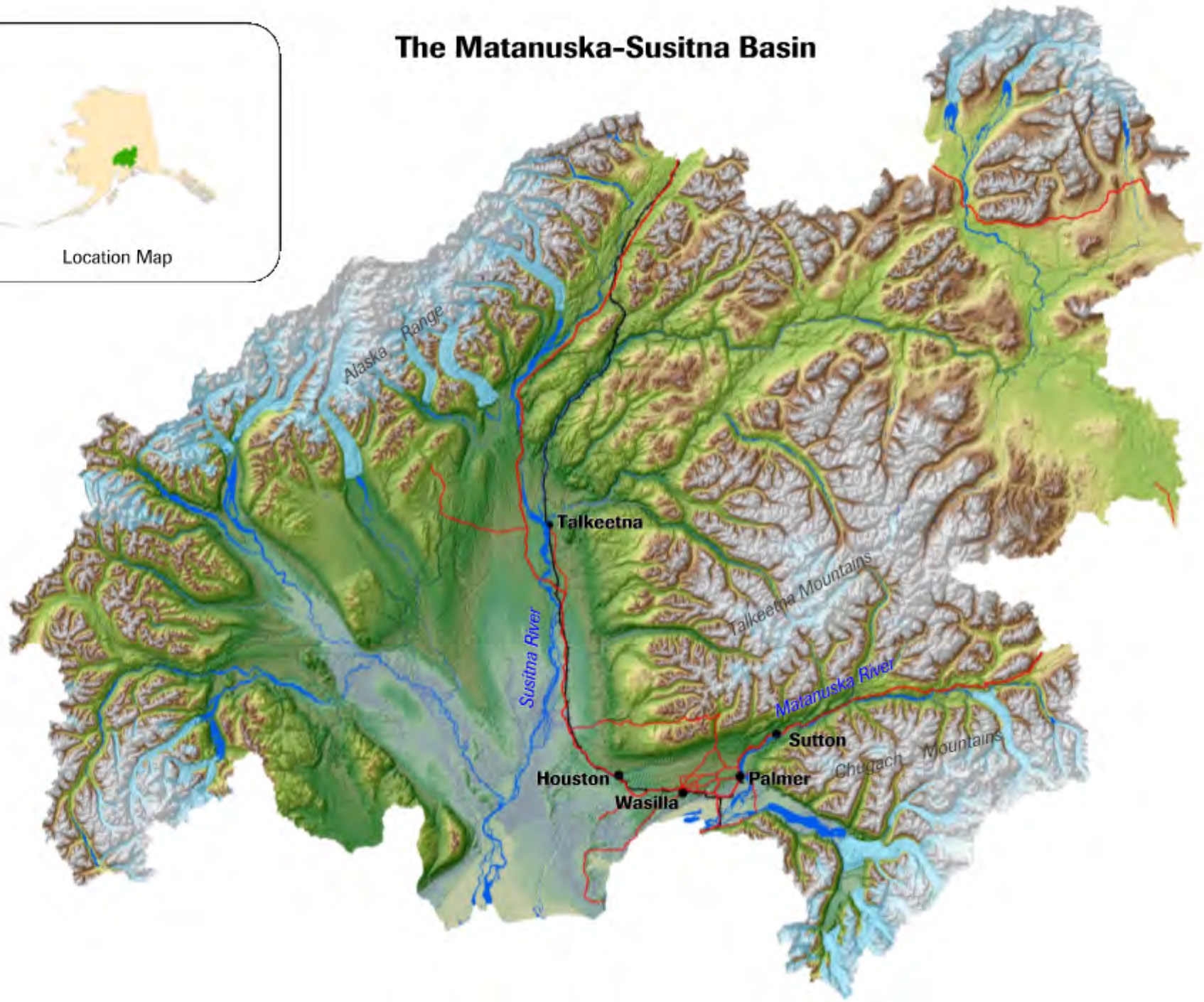
12TH ANNUAL

Mat-Su Salmon Science and Conservation Symposium



**NOVEMBER
13 & 14, 2019
PALMER, AK**

The Matanuska-Susitna Basin





Welcome to the 12th annual Mat-Su Salmon Science and Conservation Symposium Hosted by the Mat-Su Basin Salmon Habitat Partnership

Thank you for attending the 12th annual Mat-Su Salmon Symposium. This year's Symposium is dedicated to the First Peoples of the Mat-Su – the Dena'ina and the Ahtna, including the federally recognized tribes of Knik Tribal Council, Chickaloon Native Village, Native Village of Eklutna and Native Village of Tyonek – who have successfully stewarded their salmon resources for thousands of years. This two-day event is an opportunity to learn, share and explore how we can work together to ensure thriving salmon and healthy communities in the Mat-Su for years to come.

We have a wonderful line-up of presentations, including a special session focused on the impacts of stream temperature on salmon which is of particular relevance following a very hot and dry summer. On Wednesday evening there will be a Wild, Local and Traditional Foods Dinner, where Angie Wade of Chickaloon Native Village will highlight uses of salmon and lead a short salmon skin craft that can be taken home.

We are excited to have Dr. Courtney Carothers, Professor of Fisheries in the College of Fisheries and Ocean Sciences at University of Alaska Fairbanks, and Jonathan Samuelson, Yup'ik and Athabascan from Kuskokwim River Inter-Tribal Fish Commission as this year's keynote speakers. They will present their project *Indigenizing Salmon Science and Management* that examines how Indigenous peoples have stewarded Alaska's lands and waters for thousands of years yet have been largely excluded from science and management systems. Their project aims at better understanding the ways in which Alaska Native people steward salmon, the values connected to salmon stewardship, and ideas for improving current management practices and systems. Our keynote speakers will also host an open dialogue taking a deeper and more personal dive into this topic. We hope you will join us.

The Partnership believes that thriving fish, healthy habitats and vibrant communities can co-exist in the Mat-Su Basin. Thank you for your part in keeping wild salmon abundant in the Mat-Su today and into the future. To the 2019 Symposium Planning Committee, presenters, moderators, collaborators, to our Symposium supporters and especially, to the First Peoples of the Mat-Su, chin'an/tsin'aen (thank you)! We hope you enjoy this year's event!

Mat-Su Salmon Partnership Steering Committee:

Erika Ammann, NOAA Fisheries
Thomas Cappiello, Retired, Alaska Department of Fish and Game
Christy Cincotta, Tyonek Tribal Conservation District
Kristin Collins, The Alaska Center
Ted Eischeid, Matanuska-Susitna Borough
Melissa Heuer, Susitna River Coalition
Jessica Johnson, Alaska Department of Fish and Game
Marc Lamoreaux, Native Village of Eklutna
Trent Liebich, U.S. Fish and Wildlife Service
Jessica Speed, The Nature Conservancy (Partnership Coordinator)

Learn more about the Partnership and Symposium at www.matsusalmon.org



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Symposium Planning Committee:

Kelsey Aho, International Arctic Research Center
 Thomas Cappiello, Retired, Alaska Department of Fish and Game
 Ted Eischeid, Matanuska-Susitna Borough
 George Hoden, Matanuska-Susitna Borough
 Catherine Inman, Mat-Su Conservation Services
 Katrina Liebich, U.S. Fish and Wildlife Service
 Adam St. Saviour, Alaska Department of Fish and Game
 Katherine Schake, Symposium Coordinator
 Jessica Speed, The Nature Conservancy (Partnership Coordinator)

Cover artwork by: Annie Helmsworth



Mat-Su Basin Salmon Habitat Partners

* Steering Committee Members

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

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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
*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
Wasilla Soil and Water Conservation District*

The partnership includes 62 organizations and three private individuals.



The Matanuska-Susitna Basin Salmon Habitat Partnership believes that thriving fish, healthy habitats, and vital communities can co-exist in the Mat-Su Basin. 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 to get results.

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



Wednesday November 13, 2019

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

8:30 Registration & Coffee/Snacks

9:00 Symposium Welcome

Mike Daigneault (Mat-Su Basin Salmon Habitat Partnership Strategic Plan Committee Member; Alaska Region Habitat Restoration and Partnerships Coordinator, U.S. Fish and Wildlife Service)

Debra Call (Representative, Knik Tribe)

Maria Coleman (Cultural Facilitator, Eklutna Native Village)

Lisa Wade (Health, Education and Social Services Division Director/Council Secretary, Nay'dini'aa Na' Kayax (Chickaloon Village Traditional Council))

Jim Sykes (Assembly Member, Mat-Su Borough)

9:30 Keynote Address: *Indigenizing Salmon Science and Management* – Courtney Carothers, University of Alaska Fairbanks and Jonathan Samuelson, Kuskokwim River Inter-Tribal Fish Commission

Introduction: Meredith Marchioni (Alaska Pacific University)

10:30 Networking Break

11:00 Stewardship and Monitoring for Healthy Salmon Systems

Moderator: Dan Rinella (U.S. Fish and Wildlife Service)

Restoring the Eklutna River - A Short Film

Ryan Peterson (Alaskanist Stories), Marc Lamoreaux (Native Village of Eklutna)

Brad Meiklejohn (The Conservation Fund), Eric Booton (Trout Unlimited)

Eklutna River Salmon Habitat Assessment

Carrie Brophil (Native Village of Eklutna)

Moose Creek Juvenile Salmon Distribution and Outmigration Timing Project

Jerrid Hixon, (Chickaloon Village Traditional Council)

Vulnerability Assessment: Prevalence of Paralytic Shellfish Toxins in the Marine Food Webs of Lower Cook Inlet and the South Alaska Peninsula, Alaska

Bruce Wright (Knik Tribe)

12:00 LUNCH

12:45 Partnerships – Working Together, Achieving Greater Impacts

Moderator: Erika Ammann (National Oceanic and Atmospheric Administration)

Updates from the Mat-Su Basin Salmon Habitat Partnership

Jessica Speed (Mat-Su Basin Salmon Habitat Partnership, The Nature Conservancy)

Salmon Habitat Project Mapper: A Tool for Measuring Progress Toward Partnership Goals

Marcus Geist (University of Alaska Anchorage)

The Sustainable Southeast Partnership

Paul Hackenmueller (Sustainable Southeast Partnership)



1:30 First People, First Stewards

Moderator: Sue Mauger (Cook Inletkeeper)

Idlughet Qayeht'ana (Eklutna Village Dena'ina) Overview and History of The People, The Salmon, and Traditional Lands, Yesterday and Today

Maria Coleman (Eklutna Native Village)

Chickaloon Village Traditional Council Salmon Conservation Efforts in the Twenty-First Century

Jessica Winnestaffer (Chickaloon Village Traditional Council)

2:00 Tidbits

Moderator: Nicole Swenson (Tyonek Tribal Conservation District)

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

2:15 Break

2:30 *Talking Circle Dialogue: Salmon Management to Salmon Stewardship*

Moderators: Courtney Carothers & Jonathan Samuelson

A safe space for facilitated dialogue about Indigenizing salmon management – through an equity lens. This dialogue will explore how shifting from management to stewardship practices can ensure a sustainable and equitable future for Alaska.

4:00 Announcements and Adjourn

Moderator: Thomas Cappiello (Retired, Alaska Department of Fish and Game)

5:30 – *Wild, Local and Traditional Foods Dinner*

7:30 *Join us for an evening of celebrating wild, local and traditional foods of the Mat-Su as well as acknowledging the First Peoples and first salmon stewards of this land. Following dinner, Angie Wade of Chickaloon Native Village will highlight several varied uses of salmon and engage participants in a short salmon skin craft for everyone to take home.*

Location: Turkey Red, 550 S. Alaska St, Palmer

Everyone welcome. Doors open at 5pm, Dinner 5:30 – 7:30pm.

Salmon skin activity begins during dessert. Cost \$20 per person.

Pre-registration required.



Thursday November 14, 2019

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

8:30 Registration & Coffee/Snacks

9:00 Symposium Welcome

Gillian O'Doherty (Mat-Su Basin Salmon Habitat Partnership Science and Data
Committee Member, Alaska Department of Fish and Game)

John Wood (Member, Alaska Board of Fisheries)

Israel Payton (Member, Alaska Board of Fisheries)

9:30 Scale & Scope of Valuing Salmon

Moderator: Marcus Geist (University of Alaska Anchorage)

Economics of Sport and Commercial Fishing in the Mat-Su

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

Mat-Su Borough Fish and Wildlife Commission: An Update

Mike Wood and Howard Delo (Mat-Su Borough Fish and Wildlife Commission)

Endangered Cook Inlet Beluga Whales and the Threats to Their Recovery

Bonnie Easley-Appleyard, (NOAA National Marine Fisheries Service, Alaska Region)

Protecting Fish and Wildlife Habitat in the Mat-Su Basin

Leah Ellis and Kevin Keith (Alaska Department of Fish and Game)

How Data is (or is not) Tractable to Management: A Case Study in the Kuskokwim

Sarah Inman (University of Washington)

10:45 Networking Break

11:15 Tidbits

Moderator: Catherine Inman (Mat-Su Conservation Services)

Please sign up at the registration desk to present a 3-minute project summary, announcement or artistic work. If you have a slide or two to project (maximum 2 slides), please load them during the networking break.

11:30 Addressing Invasive Species in the Mat-Su Basin

Moderator: Kristine Dunker (Alaska Department of Fish and Game)

Invasive Species in the Tyonek Tribal Conservation District: Updates on our Terrestrial Plant, Northern Pike, and Elodea projects

Nicole Swenson (Tyonek Tribal Conservation District)

What's Happening with Pike in the Valley?

Parker Bradley (Alaska Department of Fish and Game)

Mat-Su Elodea Update

Dan Coleman (Alaska Department of Natural Resources)

12:15 LUNCH



1:00 Changes in Freshwater Keep Salmon on the Run: Understanding the Interaction Between Stream Fishes and Water Temperature Processes Part 1

Moderator: Jon Gerken (U.S. Fish and Wildlife Service)

Interactions Between Stream Fishes and Water Temperature Processes

Jon Gerken and Mary Kate Swenarton (U.S. Fish and Wildlife Service)

Wild Salmon in a Warming World

Sue Mauger (Cook Inletkeeper)

Examining Heat Stress in Migrating Adult Pacific Salmon

Vanessa von Biela (U.S. Geologic Survey)

Freshwater Drivers Influence Chinook Salmon Productivity in Southcentral Alaska

Leslie Jones (University of Alaska Anchorage)

Landscape Setting Modulates Projected Climate Change Impacts to Growth Rates of Stream-Resident Juvenile Salmon in the Kenai River Watershed

Benjamin Meyer (University of Alaska Fairbanks)

Community Perspective 5-10 min.

2:30 Networking Break

2:45 Changes in Freshwater Keep Salmon on the Run: Understanding the Interaction Between Stream Fishes and Water Temperature Processes Part 2

Moderator: Jon Gerken (U.S. Fish and Wildlife Service)

Interpreting Stream Discharge Variation in the Deshka River Watershed

Franklin Dekker (U.S. Fish and Wildlife Service)

2019 Distribution of Juvenile Chinook and Coho Salmon in the Deshka River Watershed

Benjamin Rich (U.S. Fish and Wildlife Service)

The Influence of Stream Temperature on the Relative Abundance of Juvenile Salmon in the Deshka River

Daniel Rinella (U.S. Fish and Wildlife Service)

Susitna River Chinook Salmon Stock-Recruit Analysis

Nicholas DeCovich (Alaska Department of Fish and Game)

Community Perspective 5-10 min.

3:45 Conclusions

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

4:00 Adjourn



Keynote Speakers:

Professor Courtney Carothers, Ph.D.



Courtney Carothers is a Professor of Fisheries in the College of Fisheries and Ocean Sciences at the University of Alaska Fairbanks. She holds a Ph.D. and an M.A. in environmental anthropology from the University of Washington and an A.B. in Biology and Society from Cornell University. Her research explores how fishery systems are being remade by enclosure and privatization processes. She also partners with Indigenous communities to understand social and cultural dimensions of knowledge systems, climate change, subsistence livelihoods, and decolonizing research. Her work focuses on human-environment relationships, cultural values, equity, and well-being. Her research has been reported in over 50 publications and 100 professional presentations, and featured in venues such as *Science*, Proceedings of the National Academy of Sciences, the *New York Times*, and the U.S. Senate. She has served on a number of boards and working groups, including: the SEARCH (Study of Environmental Arctic Change) Science Steering Committee, the North Pacific Research Board Science Panel, the Alaska Sustainable Salmon Fund Expert Panel, the Social Wellbeing Indicators for Marine Management working group, Lenfest's Ecosystem-Based Fisheries Management Task Force, and The Salmon Project board of directors.

Jonathan Samuelson



Jonathan Samuelson is Yup'ik and Athabascan from the Kuskokwim River communities of Bethel, Georgetown, and McGrath. He currently works for Kuskokwim River Inter-Tribal Fish Commission and has been appointed by his tribal council to represent them on the Commission since its formation. Jonathan also serves on the Environmental Committee for the Native Village of Georgetown and is a member of the Indigenizing Salmon Management project team headed by the University of Alaska Fairbanks. Jonathan gathers with his family every summer in Georgetown to harvest and put away fish.



Keynote Abstract

Indigenizing Salmon Science and Management

This project is centered in Indigenous cosmologies and methodologies to better understand the ways in which Alaska Native people steward salmon, the values connected to salmon stewardship, and ideas for improving current management practices and systems. Indigenous people have stewarded Alaska lands and waters for thousands of years yet have been largely excluded from science and management systems. Our collaboratively developed objectives explore Indigenous values, knowledge, and governance of salmon in Alaska and the adaptation of these systems over time. We assess current salmon science and management systems and inequities from Indigenous perspectives, and provide recommendations for ways to better incorporate Indigenous peoples, values, knowledge, management, and governance mechanisms into current systems. We adopt Indigenous research frameworks and methodologies that uphold cultural knowledge and remake research relationships. Indigenous methodologies of talking circle dialogues and multi-generational interviews co-led by Indigenous students in their home communities are the building block methods of our project. By better documenting Indigenous cosmologies, values, practices, and knowledge around salmon, we hope to elevate an understanding of the deep cultural and spiritual connections that Indigenous peoples across Alaska have with salmon. We hope that the process of creating safe spaces for dialogue about historical and current inequities in the salmon science and management systems will be healing and transformative. We hope this project and related efforts will facilitate larger system change in our state, so that Indigenous peoples, values, practices, and knowledge are better included in salmon science and management systems for the betterment of all peoples, as well as the salmon and the ecosystems on which they depend.

Talking Circle Dialogue: Salmon Management to Salmon Stewardship

A safe space for facilitated dialogue about Indigenizing salmon management – through an equity lens. Within Alaska’s salmon science and management system there is an inverse relationship where the people with intact local knowledge and deep connections to salmon tend to have the least access to, and influence on, management decisions. This dialogue will explore how shifting from management to stewardship practices can ensure a sustainable and equitable future for Alaska. Key questions include: What is Indigenous stewardship? What are the Indigenous values, knowledge, and governance mechanisms that will improve the long-term sustainability and equity of the Alaska salmon system for the benefit of all? What do we learn about the strengths and weaknesses of our current salmon science and management system when we view it from Indigenous experiences and perspectives? How can Indigenous values, knowledge, and governance mechanisms be better included in current or alternative management systems?



Presentation Abstracts

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

Ryan Peterson, Alaskanist Stories; Marc Lamoreaux, Native Village of Eklutna; Brad Meiklejohn, The Conservation Fund; Eric Booton, Trout Unlimited

Restoring the Eklutna River - A Short Film

Removal of the Lower Eklutna River dam was the first step in a multi-year, \$7.5 million effort to restore the fisheries and Native heritage of the Eklutna River. The Eklutna River has been in a badly degraded condition since the 1920's due to a series of dams and water diversions. A 7-minute film by Ryan Peterson of Alaskanist Stories (producer of the award-winning film "The Super Salmon" on the proposed Susitna Dam) looks at the challenges of the dam removal project, the story of the Eklutna Dena'ina, the relationship of dams and salmon, and the next steps in the recovery of the Eklutna River.

Carrie Brophil, Native Village of Eklutna

Eklutna River Salmon Habitat Assessment

During the summer of 2019, the Eklutna River was surveyed for salmon habitat characterization. The river was surveyed on foot from the inlet to Eklutna Lake during a 3-week interval. The California Salmonid Stream Habitat Restoration Manual (CSSHRM, Flosi et al., 1998) was used to develop survey methods in a previous 2007 survey of the lower Eklutna River. The same methods, utilizing the 2010 updates, were applied to the whole Eklutna River during the 2019 survey season. Photos were taken throughout the survey and will be displayed as an interactive photo tour on the NVE website. Data obtained from this survey will help scientists and officials in restoring the Eklutna River, including release of flows from Eklutna Lake.

Jerrid Hixon, Chickaloon Village Traditional Council

Moose Creek Juvenile Salmon Distribution and Outmigration

Timing Project

Chickaloon Village Traditional Council (CVTC) is an Ahtna Dene' (Athabascan) Tribal government based in the Matanuska Watershed of southcentral Alaska. CVTC has conducted restoration and research for salmon perpetuation since 2003. For the summers of 2017, 2018 and 2019 CVTC has conducted research on juvenile Coho and Chinook salmon to learn more about their distribution and outmigration timing in Moose Creek of the Matanuska Watershed. This presentation will explain the project activities, which involves the use of PIT Tags and a floating antenna array system, discuss the data and analysis, explain several lessons learned, and discuss upcoming steps of the project.



Bruce Wright, Knik Tribe

Vulnerability Assessment: Prevalence of Paralytic Shellfish Toxins in the Marine Food Webs of Lower Cook Inlet and the South Alaska Peninsula

The Knik Tribe PSP (paralytic shellfish poisoning) project will review the PSP results from communities along the Gulf of Alaska coast up into the Bering Sea. The Sand Point weekly mussel samples showed a surprisingly early and strong PSP event and a peak of 17,900 micrograms/100 grams on May 21, 2019. That's over 220 times above the FDA limit for PSP in bivalves and the third highest level ever recorded in Alaska. Some salmon had high levels of PSP in their digestive tracts, kidneys and livers, but the eggs and edible meat that was tested had very low PSP levels. The consequences to salmon from harmful algal blooms will be discussed in relation to our recent findings and from the perspective of this publication entitled "Saxitoxin and tetrodotoxin bioavailability increases in future oceans," in Nature Climate Change.

Jessica Speed, The Nature Conservancy; Mat-Su Basin Salmon Habitat Partnership
Updates from the Mat-Su Basin Salmon Habitat Partnership

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 (NFHP), this coalition of now 65 organizations uses a collaborative, cooperative, and non-regulatory approach that brings together diverse stakeholders. It's 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 co-existing in the Mat-Su. This presentation will share some updates and reflections from the last two years in areas of progress toward conservation and organizational goals, what you should know about the Partnership's recent Addendum to the 2013 Strategic Plan, and where that document points us going forward.

Marcus Geist, University of Alaska Anchorage

Salmon Habitat Project Mapper: A Tool for Measuring Progress Toward Partnership Goals

The Mat-Su Salmon Habitat Partnership has funded nearly 100 projects during the past twelve years while the group has grown to include more than sixty organizations. Currently, the Partnership website catalogs past projects in a long list with narrative descriptions. This project intends to create a comprehensive project inventory that is digital, spatial, informative, and content enriched. Through a simple web-based mapping application the project inventory will allow partners and other Mat-Su stakeholders to see and ask: where the Partnership is working, what it is doing, how the projects align with its strategic goals, and lastly it will link to vital project resources. Such links will all contain basic project metadata (who, what, where, when); and in some cases, may contain reports, tabular datasets, and appropriate geospatial layers.



Paul Hackenmueller, Sustainable Southeast Partnership Director; Quinn Adoudara, Klawock Community Catalyst; Bob Christianson, Community Forestry & Fisheries; Bethany Goodrich, Communications Director; Ian Johnson, Hoonah Community Catalyst
The Sustainable Southeast Partnership

The Sustainable Southeast Partnership (www.sustainablesoutheast.net) is a group of tribal governments, environmental organizations, entrepreneurs, educators, municipalities, and Native corporations in southeast Alaska. Together we are working to build a region with self-reliant communities, a vibrant place-based culture, healthy functioning watersheds and a robust local economy. Our projects range from local food and energy production, to localizing natural resource stewardship. We are excited to share more about our partnership and work focused on understanding community use and the ecology of local salmon populations, so as to better steward and manage this critical resource. Our partners have initiated community-led land management collaboratives, put locals to work studying and restoring salmon habitat, engaged youth in combining western scientific techniques and traditional knowledge to care for salmon, facilitated culture camps that perpetuate the values of Tlingit and Haida stewardship, and more.

Maria D.L. Coleman (*Deborah Ezi Stineburg*), Eklutna Native Village Cultural Facilitator
Idlughet Qayeht'ana (Eklutna Village Dena'ina) Overview and History of The People, The Salmon and Traditional Lands, Yesterday and Today

Maria Coleman is a descendant of the Honored Ezi Chiefs known in the Mat-Su Valley, Anchorage, and other areas of Alaska. She has served Eklutna for nearly 20 years as an employee, and as a member of the Traditional Tribal Council and ANCSA Village Board of Directors. Native Village of Eklutna designated her as one of the Tribal Historic Preservation Officers for the federally recognized tribe in 2004. The presentation will provide a tribal perspective of its history, its connection to the Matanuska Susitna Valley, and the importance of Salmon to all Eklutna People, with emphasis on restoration for the Eklutna River Watershed.

Jessica Winnestaffer, Chickaloon Village Traditional Council
Chickaloon Village Traditional Council Salmon Conservation Efforts in the Twenty-First Century

Chickaloon Village Traditional Council (CVTC) is an Ahtna Dene' (Athabascan) Tribal government that has nurtured and utilized the lands, plants and animals of southcentral Alaska for millennia. Salmon continue to be a primary source of food and seasonal life ways for Chickaloon Tribal Citizens. In collaboration with many federal and state agencies, CVTC has conducted fish passage restoration, population enhancement, and research for salmon perpetuation since 2003. This presentation will provide a brief introduction to some of the Tribe's cultural values and the manifestations of these values through activities which steward the environment and protect salmon for the benefit of all.



Andy Couch and Mike Wood, Mat-Su Borough Fish and Wildlife Commission
Economics of Sport and Commercial Fishing in the Mat-Su

Commissioners Couch and Wood will share results from a recent study for the Mat-Su Borough on the economic impacts of sportfishing. They will provide a comparison of economic impact changes from a study done in 2007 with a 2017 study. They will also share qualitative data on their respective fishery businesses in the Mat-Su.

Mike Wood and Howard Delo, Mat-Su Borough Fish and Wildlife Commission
Mat-Su Borough Fish and Wildlife Commission: An Update

Chairman Wood will review recent Fish and Wildlife Commission activities as well as provide a preview of current efforts preparing for the Board of Fisheries Upper Cook Inlet Finfish meeting next February.

Bonnie Easley-Appleyard, National Oceanic and Atmospheric Administration
Endangered Cook Inlet Beluga Whales and the Threats to Their Recovery

Beluga whales (*Delphinapterus leucas*) reside year-round in the waters of Cook Inlet, Alaska. The Cook Inlet population declined an estimated 50% between 1994 and 1998, and has remained between 300 and 400 animals since 1999. Due to a rapid population decline and the failure of this population to recover, the Cook Inlet beluga whales were listed as endangered under the Endangered Species Act (ESA) in 2008. The Cook Inlet beluga whale recovery plan identifies ten different threats that could be inhibiting the recovery of the population; this includes habitat loss and degradation, and reduction in prey. Habitat loss and degradation may occur from ecological changes such as increased water temperature, siltation, and salinity changes due to climate change or episodic events (i.e. earthquakes or volcanic eruptions). Anthropogenic activities can also result in substantial temporary or permanent changes to habitat, including loss of suitable habitat. These factors may also impact prey species, resulting in reduced food availability for Cook Inlet beluga whales. Belugas in Cook Inlet appear to feed mostly on spawning eulachon in the spring, then shift to foraging on salmon species as eulachon runs diminish and salmon return to spawning streams. While winter foraging is not well known, some components of beluga whale populations in other areas forage more on benthic species. Impacts to these prey species may have indirect effects on the Cook Inlet beluga whale population. Based on these threats and others, the recovery plan provides a list of recommended research, management, and education/outreach actions targeted at recovering Cook Inlet belugas.



Leah Ellis and Kevin Keith, Alaska Department of Fish and Game
Protecting Fish and Wildlife Habitat in the Mat-Su Basin

ADF&G's Instream Flow Program is tasked with protecting aquatic resources by quantifying streamflow and acquiring water rights (Reservations of Water) for the purpose of sustaining Alaska's fish and wildlife resources. In the Mat-Su Basin, we are currently operating stream-gaging networks in the Deshka and Little Susitna watersheds to support instream flow reservations. We have also recently filed for reservations in the Matanuska and Big Lake watersheds. An overview of the existing and anticipated water reservations, as well as the hydrologic data collection efforts to support these reservations will be presented.

**Sarah Inman, University of Washington; Janessa Esquible, Orutsararmiut Native Council;
Mike Jones, University of Michigan; Bill Bechtol, University of California San Diego;
Brendan Connors, Simon Fraser University**

***How Data is (or is not) Tractable to Management: A Case Study in
the Kuskokwim***

Many large river basins are characterized by limited data to support salmon fisheries management, particularly in remote regions such as Western Alaska. In response, managers often turn to local resource users to gather data through community-based monitoring (CBM) initiatives. However, definitions and proposed outcomes of community-based monitoring are vast and contested. We inquire not only about a current CBM initiative, but also seek an understanding of how existing approaches measure against claims made by CBM programs to understand pathways for data utility for decision-makers and approaches to capacity building and meaningful engagement of local citizens. Our review of the literature identifies major gaps in the CBM literature, which we explore through our case study. We find that while the intention of the CBM program was to collect more or better-quality data, a primary interest of most interview participants in the case - user stakeholders, in-season managers, and scientific researchers - were attune to increasing trust in data stewards rather than data practices specifically. Through an exploration of a case study in the Kuskokwim region of Alaska, we outline findings from our interview study to look at how data is utilized by decision-makers.



Nicole Swenson, Tyonek Tribal Conservation District

Invasive Species in the Tyonek Tribal Conservation District: Updates on our Terrestrial Plant, Northern Pike and Elodea Projects

The Tyonek Tribal Conservation District is vast in size with relatively few permanent human residents. Given the low human pressure, invasive species introductions have been relatively few and far between, providing a unique opportunity to get invasive species populations while at a manageable size. TTCD and many partners have been able to make headway on both terrestrial and aquatic invasive species populations in the District through persistent action and by harnessing the power of partnerships. In this presentation we will provide an update on the status of our invasive species efforts.

Parker Bradley, Alaska Department of Fish and Game

What's Happening with Pike in the Valley?

The northern pike is a predatory fish that is invasive to Southcentral Alaska and is responsible for the loss of several fisheries across the region. They are native throughout much of the state but do not naturally occur south and east of the Alaska Range. It is thought that northern pike were first introduced by an air charter operator to the Yentna River drainage (Bulchitna Lake, Lake Creek drainage) in the late 1950's and, from there, subsequently spread throughout the Susitna River basin via natural migration and further illegal stockings. Because they are such a popular sport fish, very little was done to control their populations or prevent their spread for about half a century. As a result, we have seen multiple salmon stocks collapse or severely decline due to pike predation. Within the last decade, we have eradicated northern pike from most of the Kenai Peninsula and Anchorage areas and will now be focusing efforts on the Mat-Su Valley. ADF&G fishery biologist Parker Bradley will be discussing current research on northern pike, what suppression efforts are underway, and plans for eradication.

Dan Coleman, Alaska Department of Natural Resources

Mat-Su Elodea Update

Elodea is Alaska's first known submerged freshwater invasive plant and is considered a threat to Alaska's salmon and freshwater resources with wide ranging ecological and economic consequences. Elodea can change salmon habitat, alter nutrient availability, and displace native plants. In the Matanuska-Susitna Basin, Alexander and Sucker Lakes are fully infested with elodea, and a new infestation was recently discovered in Big Lake. A Task Force is collaborating on eradicating elodea from the Matanuska-Susitna Basin.



Jon Gerken and Mary Kate Swenarton, U.S. Fish and Wildlife Service

Interactions Between Stream Fishes and Water Temperature Processes

Changes in freshwater salmon habitat are more evident in the northern landscape of Alaska than other locales of the United States. In recent years, Alaska salmon fisheries have seen declines in the abundance of statewide Chinook salmon populations, many Coho salmon populations, and most recently Sockeye salmon populations in notable areas of the Alaska Peninsula, Kodiak Island, and the Copper River. Potential reasons for population declines may range from overharvest and density dependence in marine waters to lack of suitable freshwater habitat affected by temporal and spatial changes in water temperature and watershed discharge. The problems are complex due to the combination of environmental variables, vast geography of Alaska, and numerous land managers and fish managers with different authorities and mandates. Salmon populations have specific habitat requirements influenced by water temperatures and quantities that allow them to survive. The spatial distribution of water temperatures and its change under different water quantities is of great importance to fish managers because they influence salmon population distribution and abundance, needed to provide recreational and subsistence fishing opportunity, are of value to land managers to identify priority habitats, and are needed to employ conservation easement or mitigation strategies.

Sue Mauger, Cook Inletkeeper

Wild Salmon in a Warming World

The summer of 2019 was dramatic in its record-breaking temperatures and low flow conditions in freshwater systems across the state. In any one year we might see some pre-spawn salmon mortality or stalled upstream migrations or measure high-water temperatures or low water conditions. But in 2019 we saw all these responses and stressors play out in the same year, across the state and impacting not only all 5 species of salmon but also commercial, sport and subsistence users. In Mat-Su basin streams, we reached or exceeded maximum stream temperature values predicted for 50 years in the future. It will be years before we understand how these conditions impacted egg and juvenile life stages and what that means for salmon populations in the future. So, what are the implications of these freshwater conditions for management and conservation? Can adverse freshwater conditions be mitigated? What new tools do our land and fisheries managers need to build more resilience across our salmon landscape? Who is missing in our conversations?



Vanessa von Bielal, Michael Carey, Christian Zimmerman, Stephen McCormick, Amy Regish, Lizabeth Bowen and Shannon Waters, U.S. Geological Survey; Randy Brown, U.S. Fish and Wildlife Service; Sean Larson, Alaska Department of Fish and Game; Stan Zuray, Rapids Research; Kevin Keith, Norton Sound Fisheries Research and Development; Merlyn Schelske, Bureau of Land Management

Examining Heat Stress in Migrating Adult Pacific Salmon

Freshwater temperatures across Alaska now routinely exceed thresholds associated with heat stress and mortality ($> 18\text{ }^{\circ}\text{C}$) in migrating Pacific salmon (*Oncorhynchus spp.*). We examined the prevalence of thermal stress in two wild salmon populations, Pilgrim River Sockeye salmon (*O. nerka*) near Nome (2014-2016) and Yukon River Chinook salmon (*O. tshawytscha*) across the watershed (2016-2017). Heat stress was identified using heat shock protein 70 (HSP70) from non-lethal sampling of muscle tissue following experimental validation for each species. Migrating Pilgrim River Sockeye salmon generally experienced cool temperatures $<18\text{ }^{\circ}\text{C}$ and a heat stress response was only indicated in 5% of individuals ($n = 66$). Across the larger Yukon River watershed, river temperatures and heat stress prevalence were higher with variability among locations and years. Overall, heat stress was indicated in 39% ($n = 477$) of Chinook salmon sampled based on HSP70. Moreover, a gene transcription panel of mRNA suggested a more moderate level of heat stress in an additional 26% of individuals. Together, HSP70 and the gene transcription panel indicated heat stress in 65% of migrating Yukon River Chinook salmon sampled. Heat stress was generally more prevalent in locations and years with warmer water temperatures (e.g., 2016 East Fork Andreafsky River, 2017 Gisasa River, and both years at Rampart Rapids Fish Wheel). A new research project to expand this work to Deshka River Chinook salmon in juveniles and migrating adults will begin in 2020. Identifying the areas where heat stress is most prevalent in migrating Pacific salmon provides actionable science to decision makers.



Leslie Jones, University of Alaska

Freshwater Drivers Influence Chinook Salmon Productivity in Southcentral Alaska

Alaska's salmon (*Oncorhynchus spp.*) streams are undergoing rapid alteration driven by climate change and habitat alterations. Understanding how—and how consistently—salmon populations respond to changes in the freshwater and marine environment has major implications for fisheries management and habitat conservation. Chinook salmon (*O. tshawytscha*) populations across Alaska have suffered declines since the mid-2000s, yet the contribution of freshwater environmental drivers remains uncertain. Focusing on Chinook salmon populations from 15 streams within Cook Inlet, we estimated the effects of stream temperature, precipitation, river ice-breakup, and ocean conditions on population productivity (recruits / spawner) during the 1980–2009 brood years. We quantified the effects of these indicators using a hierarchical Bayesian stock-recruit approach. Recruitment of the 2003-2007 broods was 57% below the previous long-term average, leading to declines in adult returns beginning around 2008. These declines were explained in part by density dependence, with reduced population productivity following years of high spawning abundance. High precipitation totals during spawning and early incubation had a strong negative association with productivity across all populations. Productivity was also consistently reduced for cohorts with either below average or very high precipitation during freshwater juvenile rearing. Above- average temperatures during spawning and rearing had variable effects, with the strongest negative effects occurring in the warmest streams. Productivity was also negatively associated with an index of ocean climate. We found that the cumulative effects of adverse conditions in freshwater, including high spawning abundance, heavy fall rains, and high stream temperatures may have contributed to the recent population declines across the region. Identifying both regionally coherent and population-specific responses to environmental changes underscores the importance of watershed-specific habitat conservation for maintaining resilient salmon runs in a warming world.



Benjamin Meyer and Erik Schoen, University of Alaska Fairbanks; Mark Wipfli, and Jeff Falke, U.S. Geological Survey; Daniel Rinella, U.S. Fish and Wildlife Service
Landscape Setting Modulates Projected Climate Change Impacts to Growth Rates of Stream-Resident Juvenile Salmon in the Kenai River Watershed

Climate change is affecting extent and productivity of salmon habitat. Due to the diversity of environments that salmon inhabit, interpreting the magnitude and direction of climate change effects is complex. Some south-central Alaska salmon streams already approach water temperatures near their thermal optimum threshold range of 15 -17°C during summer months, which if exceeded may be decreasing growth rates of rearing juveniles. Food resources are an additional key control on growth, and temporal and spatial patterns of the influence these variables have on juvenile salmon growth is not well characterized. To explore impacts of climate warming on juvenile salmon rearing habitat in South-central Alaska we coupled bioenergetics models for rearing juvenile Chinook and Coho salmon with stream temperature sensitivity models. The coupled model incorporates influence of water temperature and food consumption on individual growth rates, and assessed potential impacts of future shifting water temperature regimes on somatic growth rates throughout a lowland-to-montane spectrum of sub-drainages within the Kenai River, Alaska watershed. We used field-derived data from summers 2015-2016 on fish size (n = 4275), diet (n = 818), and water and air temperature. We also used published projections of air temperature inputs to model fish growth for the 2030-2039 and 2060-2069 time periods, comparing back to 2010-2019. Our results estimate that change in mass at the end of summer for these two time periods relative to the 2010-2019 period ranged from -19.9% to +3.8%, depending on local sub-population, food consumption level, and greenhouse gas emissions scenario. Shifts in future water temperature and growth were of smaller magnitude in the cooler glacially-influenced watershed and main stem relative to the montane and lowland watersheds. Our results exemplify how diverse ecoregions differentially filter a climate signal to juvenile rearing salmon habitat and contribute to overall diversity of a portfolio of juvenile salmon sub-populations.

Franklin Dekker, U.S. Fish and Wildlife Service

Interpreting Stream Discharge Variation in the Deshka River Watershed

The Deshka River watershed has an outsized importance for Mat-Su Basin salmon and it is hydrologically unique with its expanses of low lying wetlands, while lacking the snowy mountain headwater inputs common to most rivers in the basin. While investigating stream temperature in the Deshka River watershed, discharge was also measured in 11 tributaries. Discharge measurements have been correlated to the USGS gauge in Kroto Creek at Oilwell Road to expand the discharge record for each tributary. After 2 years of data collection, results indicate that not all tributaries have equal magnitude in terms of discharge contribution to the main stem Deshka River. One goal was to understand the variation in tributary discharge by examining various watershed characteristics. The watersheds of each 11 tributaries were analyzed to determine potential control variables for stream discharge such as, watershed area, slope, wetland area and lake area. The analysis was then compared to initial stream temperature results to begin to understand connections between flow and temperature.



**Benjamin Rich, Dan Rinella, Jon Gerken, Anna-Marie Benson, and Mary Kate Swenarton,
U.S. Fish and Wildlife Service Anchorage Field Office**

2019 Distribution of Juvenile Chinook and Coho Salmon in the Deshka River Watershed

We conducted juvenile salmon sampling using minnow traps at 74 sites across the Deshka watershed during June, July, August, and September of 2019. Our sampling was part of a larger effort to anticipate the effects of warming on salmon productivity, and coincided with periods of record low stream flow, and record high stream temperature (27.6 degrees C, 81.7 F).

Preliminary analysis of catch data suggests that juvenile Coho salmon moved from habitat in the main Deshka River, including Moose and Kroto creeks, towards smaller, cooler tributaries in midsummer. These fish appear to have stayed in these areas as stream temperatures cooled during August and September. Chinook salmon catch rates were highest in the upper reaches of Moose and Kroto creeks and a few select tributaries in June, and decreased precipitously in July and August, suggesting that many Chinook left the Deshka River to rear elsewhere, or concentrated in areas we did not sample. This finding is consistent with ADF&G's research from 1981, suggesting that this movement was not necessarily a response to 2019's warm water. In the next two years of this study, we aim to gain more insight into the thermal requirements, distribution, and life history of juvenile Chinook and Coho in the Deshka River watershed and the extent and distribution of thermally suitable habitats that support them.

Daniel Rinella, Mary Kate Swenarton, Benjamin Rich, Jonathan Gerken and Anna-Marie Benson, U.S. Fish and Wildlife Service

The Influence of Stream Temperature on the Relative Abundance of Juvenile Salmon in the Deshka River

The Deshka River is among the warmest of Cook Inlet's salmon streams and recent research suggests that warm summer temperatures reduce the survival of juvenile Chinook Salmon rearing in this and other streams around the region. Management actions to minimize the effects of warming, however, are limited by a poor understanding of salmon thermal requirements and the extent and distribution of thermally suitable habitats. To help close these gaps, we are monitoring stream temperature and the distribution of juvenile salmon throughout the Deshka River watershed. Here we present preliminary analyses characterizing the temperature ranges used by juvenile Chinook and Coho salmon rearing in the Deshka River watershed (i.e., their thermal niches) during the growing season. Further analyses will allow us to estimate how the extent and distribution of thermally suitable habitat has changed over time, how it will change in the future, and the degree to which it has affected the size of past salmon runs. This information can guide conservation and fishery management actions by identifying key rearing areas for juvenile salmon, prioritizing areas for conservation actions that maintain cool water and habitat connectivity, predicting the effects of warming on future salmon production, and reserving instream flow in key tributaries.



Nicholas DeCovich, Alaska Department of Fish and Game
Susitna River Chinook Salmon Stock-Recruit Analysis

The Susitna River drains approximately 52,000 square kilometers of the southern slopes of the Alaska Range and the Talkeetna mountains. This watershed supports wild populations of all five species of Pacific salmon and vibrant sport fisheries when production allows. Chinook salmon spawning escapements have been monitored since the late 1970s by aerial survey and a weir has been used to count returning adults on the Deshka River (a tributary) since 1995. Other fishery data, such as inriver and marine harvest estimates, age estimates, recent mark–recapture abundance estimates, and spawner distribution data are also available. We present a state-space model that incorporates all available datasets to generate annual inriver and spawning escapement abundance estimates of 4 stocks of Susitna River Chinook salmon. These stocks were defined by dividing the drainage into geographical units similar to existing management units used in Alaska Department of Fish and Game sport fishing regulations: the Deshka River, the Talkeetna River, Eastside Susitna and the Yentna River. The state-space model estimates a spawner-recruitment (S-R) relationship for each stock that is used in developing escapement goal recommendations based on the number of spawners that provide maximum sustained yield (SMSY). This relationship also provides valuable insight into time varying productivity, which can provide context to escapement goals. These estimates of productivity can potentially be related to physical factors to better understand the response of stocks to changes in the environment.





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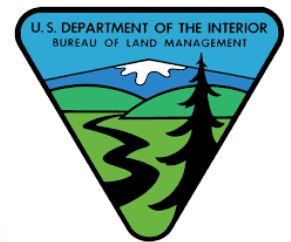
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