50th ANNUAL MEETING

March 24th - 29th, 2024 - Seward, AK

ALASKA CHAPTER

AMERICAN FISHERIES SOCIETY

BREAKING BARRIERS TO BRIDGE NEW CONNECTIONS TO ALASKA FISHERIES

MANY THANKS TO OUR GREAT SPONSORS

Halibut Level
$5,000+

Sea Grant
Alaska

MANY THANKS TO OUR GREAT SPONSORS

Lingcod Level
$2,500+

Special thanks to UAF College of Fisheries and Ocean Sciences, for their sponsorship and support of our student membership.

CFOS

UAF
COLLEGE OF FISHERIES AND OCEAN SCIENCES
University of Alaska Fairbanks

MANY THANKS TO OUR GREAT SPONSORS

Lingcod Level
$2,500+

NORTH PACIFIC RESEARCH BOARD

ALASKA DEPARTMENT OF FISH AND GAME

MANY THANKS TO OUR GREAT SPONSORS

Rockfish Level
$1,000+

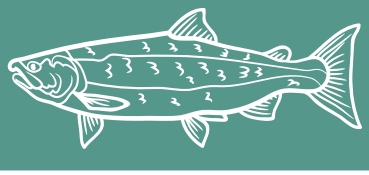
Norton Sound Economic Development Corporation

North Pacific Fisheries Management Council

SEALASKA

MANY THANKS TO OUR GREAT SPONSORS

Coho Level $500



Alaska Seafood
Wild, Natural & Sustainable®

Southeast Alaska Fish Habitat Partnership

Kenai Peninsula Fish Habitat Partnership

Pollock Conservation Cooperative

Oregon RFID

Sockeye Level $250

SalmonState

International Pacific Halibut Commission 100 years

John & his dog, Chaco

Cover Art:
John Jeffrey Schlegel

- email for inquiries -
schlegels.inbox@gmail.com

Business Meeting Agenda

50th Annual Alaska Chapter AFS Business Meeting
March 28, 2024, 12:00-1:30 pm
Gateway Hotel Event Center, Seward

Agenda

1. Call to Order
2. Determination of a quorum (20 chapter members)
3. Approval of agenda
4. Approval of 2023 annual business meeting minutes (pg. 37)
5. AFS Western Division report – Eric Fetherman, WDAFS President
6. April 2023 - March 2024 Chapter review:
    - Treasurer's Report – Trenten Dodson
    - Secretary's Report – Scott Ayers
    - Student Representative's Report – Rebecca Shaftel
    - Past President's Report – Megan McPhee
        - Bylaws & Procedures Manual
    - Vice President's Report – Whitney Crittenden
        - Membership update
        - Recognition of new 25-year members: Michael Carey, Jeffrey Olson, and Chris Zimmerman
        - 2025 Alaska AFS Annual Meeting
    - President-Elect – Donald Arthur
        - 2024 Annual Meeting program review
    - Standing Committees
        - Diversity, Equity & Inclusion - Sara Gilk-Baumer/Madeline Lee
        - Financial Assets Oversight - Ray Hander
        - Molly Ahlgren Scholarship - Ray Hander
        - Environmental Concerns - Joel Markis/Sue Mauger
        - Professional Development - Sara Miller
        - Resolutions & Bylaws - Hamachan Hamazaki
        - Electronic Communications - Hamachan Hamazaki/Joel Markis
        - Awards - Peter Westley
    - President's Report – Erik Schoen
7. Farewell remarks from outgoing President – Erik Schoen
8. Remarks from the new President – Donald Arthur
9. New Business:
    - Appointment of new Executive Committee officers: Andy Seitz (Vice President) and Amber Perk (Student Rep)
10. Open forum
11. Adjourn

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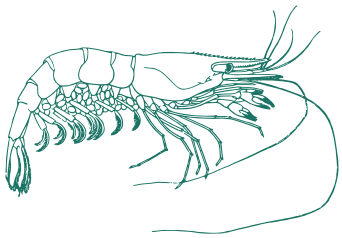
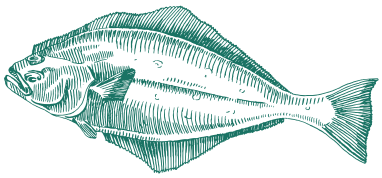


Letter of Welcome



Greetings,

Welcome to the 50th Annual Meeting of the Alaska Chapter of the American Fisheries Society! This meeting represents a major milestone for our Chapter. Alaska's fisheries are *under pressure* (Lewis 2007) from *today's challenges* (Stahl 2014) and the past's. With that, we mustn't turn from the past to address these challenges as the pioneers of the Chapter are well-versed in these time-old battles and they have built the framework to bring the great minds of Alaska's fisheries *together for the love of fish* (Mauger 2021). Although, if we were to turn back the time to our Chapter's first meeting, the membership would look noticeably different. A wave of transformation permeates our profession, presenting opportunities to *celebrate our professional diversity* (Stuby 2009) and fortify our unity within the fisheries field. Now, more than ever, it is imperative to foster support within the fisheries community and *partner with change* (Moss 2006). *Expanding our Chapter's perspectives* (Hamazaki 2008) into a *mosaic of fisheries* (Maclean 2005) professionals will allow us to view the challenges of Alaska's fisheries, *past, present, and future*, (Woody 2000) through many lenses and *bring new solutions for a resilient future* (Schoen 2023).

It has taken more than a half-century for the Annual Meeting to land in Seward, a town with a rich history and deep connection to the sea. While there are challenges with attending a meeting in a small town, the membership has shown up in force, regardless! There are over 75 talks and posters, an impressive suite of workshops, and a feature student film. The town of Seward has been the utmost welcoming to the Chapter and as a result, we are excited to announce a public event in collaboration with the Seward Chamber of Commerce featuring our very own fisheries professionals! To add, you'll find countless activities focused on diversity, equity, and inclusion, intended to ***break barriers***, and many socials and coffee breaks to help ***bridge new connections***. Last, but not least, the meeting will conclude with a Spawning 5K along the Resurrection Bay shore front and the Awards Banquet at the Alaska Sea Life Center to truly display the beauty of Seward!

Many thanks to the volunteers who helped put this meeting together, including the hard-working and creative planning committee! We want to express our deep appreciation to our meeting sponsors: Alaska Sea Grant, UAF College of Fisheries and Ocean Sciences, North Pacific Research Board, Alaska Department of Fish and Game, Norton Sound Economic Development Corporation, North Pacific Fisheries Management Council, Sealaska, Alaska Seafood Marketing Institute, Pollock Conservation Cooperative, Oregon RFID, the Southeast Fish Habitat Partnership and the Kenai Peninsula Fish Habitat Partnership, Midnight Sun Brewing, Specialty Imports, Salmon State, the International Pacific Halibut Commission, Stoney Creek Brewhouse, and the Mermaid Grotto. These organizations helped us overcome additional cost of hosting a meeting in small town, support student attendance, and provide for an amazing conference experience. Thanks for being a part of our Chapter, and we look forward to seeing you in Seward!

Here's to the 100th Annual Meeting!

Sincerely,

Donald Arthur
President Elect
Alaska Chapter AFS

Erik Schoen
President
Alaska Chapter AFS

AFS Meeting Code of Conduct

All participants, including but not limited to attendees, speakers, volunteers, and others, must abide by the American Fisheries Society Meetings Code of Conduct (below).

Purpose

American Fisheries Society (AFS) meetings are among the most respected scientific meetings of fisheries professionals in the natural resource scientific community. AFS values the diversity of views, expertise, opinions, backgrounds, and experiences reflected among all attendees, and is committed to providing a safe, productive, and welcoming environment for all meeting participants and AFS staff. All participants, including, but not limited to, attendees, speakers, volunteers, exhibitors, staff, service providers, and others, are expected to abide by this Meetings Code of Conduct. This Code of Conduct applies to all AFS meeting-related events, including those sponsored by organizations other than AFS but held in conjunction with AFS events, in public or private facilities.

Please use this anonymous form to report any violation(s) to the Alaska Chapter AFS' Diversity, Equity, and Inclusion Committee (DEIC). You may also contact the Executive Committee (president@afs-alaska.org) and/or DEIC (deic@afs-alaska.org) directly.

AK AFS Anonymous Reporting Form

Expected Behaviors

• Treat all participants, attendees, staff, and vendors with respect and consideration, valuing a diversity of views and opinions, and critiquing ideas rather than individuals.
• Refrain from demeaning, discriminatory, or harassing behavior and speech directed toward other attendees, participants, staff, and suppliers/vendors.
• Be mindful of your surroundings and of your fellow participants. Alert AFS staff or venue event staff if you notice a dangerous situation or someone in distress.
• Respect the rules and policies of the meeting venue, hotels, AFS-contracted facility, or any other venue.
• To foster a welcoming environment, assist AFS members with impaired physical or cognitive abilities, if necessary.

Unacceptable Behaviors

• Harassment, intimidation, or discrimination in any form is unacceptable. Harassment includes speech or behavior that is not welcome or is personally offensive. Behavior that is acceptable to one person may not be acceptable to another, so use discretion to be sure respect is communicated. Harassment intended in a joking manner still constitutes unacceptable behavior. Regardless of your intent, if you are advised directly or by another party that some aspect of your speech or behavior at an AFS meeting is harassment, you are expected to stop engaging in such speech or behavior. Do not physically or verbally abuse any attendee, speaker, volunteer, exhibitor, AFS staff member, service provider, or other meeting guest.

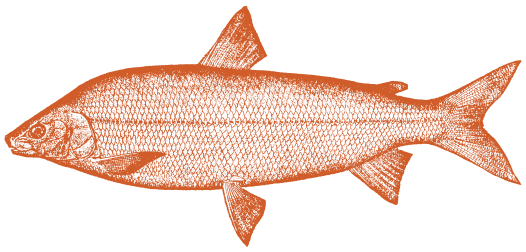
Unacceptable Behaviors cont.

• Examples of unacceptable behavior include, but are not limited to, unwelcome or offensive verbal comments related to age, appearance, or body size, employment or military status, ethnicity, gender identity and expression, individual lifestyle, marital status, national origin, physical or cognitive ability, political affiliation, sexual orientation, race, or religion. Harassment can also include the use of sexual and/or discriminatory images in public spaces or in presentations; deliberate intimidation; stalking; following; harassing photography or recording; sustained disruption of talks or other events; bullying behavior; inappropriate physical contact; and unwanted sexual attention.

• Appropriate and responsible personal use of photographs or posts to social media of another individual's oral presentation, poster, or likeness is acceptable unless permission is specifically denied by the individual.

• Do not disrupt talks at oral or poster session or activities in the exhibit hall or at other events organized by AFS at the meeting venue, hotels, or other AFS -contracted facilities.

• Any retaliation against participants for reporting unacceptable behavior is unacceptable. Like harassment or discrimination, retaliation against reporting poor behavior will be subject to consequences.



Reporting Unacceptable Behaviors

• Anyone experiencing or witnessing behavior that constitutes an immediate or serious threat to public safety at any time should contact local law enforcement (by calling 911) and immediately notifying facility security without delay.
• If you are not in immediate danger but feel that you are the subject of unacceptable behavior, you are encouraged to contact ana AFS Alaska Executive Committee officer, (p.5) representative of the Cultural Diversity Committee (p. 6), and/or file a formal complaint to the AFS National Ethics and Professional Conduct Committee (Parent Society) which will then be forwarded to the Ethics and Professional Conduct Committee for assessment.

Consequences

• Anyone requested to stop unacceptable behavior is expected to comply immediately.
• Consequences to unacceptable behavior will be determined by the AFS Ethics and Professional Conduct Committee in conjunction with AFS officers and the AFS Executive Director.
Consequences may include one or more of the following actions:

- Dismissal from the meeting without refund
- Reporting to your agency
- Exclusion from any future AFS (subunit/chapter/division) meetings for five years
- Revoke of AFS membership without the opportunity for renewal for five years
- If the offense is criminal, local law enforcement will be contacted.

2023-2024 Alaska Chapter AFS Executive Committee Members

Erik Schoen
President

Donald Arthur
President-Elect

Megan McPhee
Past President

Whitney Crittenden
Vice President

Scott Ayers
Secretary

Rebecca Shaftel
Student Rep

Trent Dodson
Treasurer

2023-2024 Annual Meeting Planning Committee

Nate Cathcart

Maggie Chan

Taylor Cubbage

Johnna Elkins

Nick Ellickson

Leah Ellis

Teresa Fish

Kyle Gatt

Sara Gilk-Baumer

Sierra Greene

Madeline Lee

Sara Miller

Will Samuel

Rebecca Shaftel

Kate Wedemeyer

Katelyn Zonneville

Alaska AFS Committees

Diversity, Equity, and Inclusion Committee:
Madeline Lee (Co-Chair)
Sara Gilk-Baumer (Co-Chair)

Awards:
Peter Westley, Chair & Student Presentation Awards
Ray Hander, Molly Ahlgren Scholarship
Vacant, Wally Noerenberg Award

Environmental Concerns Committee:
Joel Markis (Co-Chair)
Sue Mauger (Co-Chair)

Financial Assets Oversight Committee:
Ray Hander (Chair)

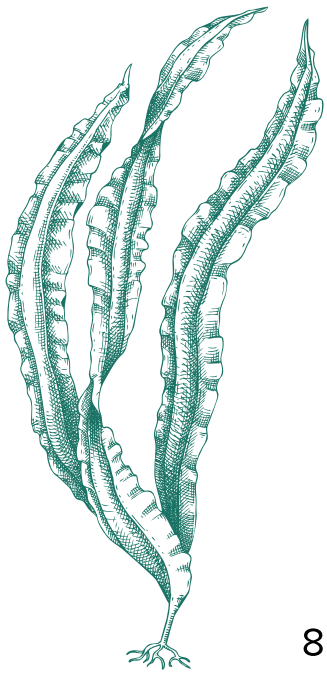
Promotions:
Bill Bechtol, Newsletter Editor
Hamachan Hamazaki, ListServ Administrator

Financial Assets Oversight Committee:
Ray Hander (Chair)

Professional Development Committee:
Sara Miller (Co-Chair)
Maggie Chan (Co-Chair)

Resolutions and Bylaws Committee:
Toshihide “Hamachan” Hamazaki (Chair)

Student Sub-Unit
Allison Guzman, President
Sydney Almgren, Vice President
Erica Ebert, Secretary
Linnaea Doerner, Treasurer
Anna Medina, DEI Liaison



Meeting Schedule at a Glance

For the most current information, please check the meeting website:
https://units.fisheries.org/ak-mtg/schedule/

Monday, March 25th

Date/Time	Activity	Location
8:00 AM – 5:00 PM	**Registration Open!**	Gateway Hotel Event Center
8:00 AM – 5:30 PM	**Wilderness First Aid Training**	Orca Room at Harbor 360
8:30 AM – 5:00 PM	**Two-eyed Seeing Workshop (FULL)**	Gateway Hotel
1:00 PM – 5:00 PM	**Genetics in Alaska 101 Workshop**	Seward Public Library
6:15 PM – 9:00 PM	**Welcome Social**	Alaska Sea Life Center

Tuesday, March 26th

8:00 AM – 5:00 PM	**Registration Open**	Gateway Hotel Event Center
8:15 AM – 9:45 AM	**Conference Welcome / Plenary Session**	Gateway Hotel Event Center
9:45 AM – 10:30 AM	**Coffee Break (Short)**	Gateway Hotel Event Center
10:30 AM -- 11:45 AM	**Symposia / Contributed Talks**	Gateway Hotel Event Center
11:45 AM -- 1:30 PM	**Lunch Break**	
11:45 AM – 1:15 PM	**Allyship Lunch Discussion**	Gateway Hotel Event Center
12:15 PM – 1:15 PM	**Alutiiq Pride Hatchery Tour #1**	Alutiiq Pride Marine Institute
1:30 PM – 2:30 PM	**Symposia / Contributed Talks**	Gateway Hotel Event Center
2:30 PM – 3:30 PM	**Coffee Break (Long)**	
2:30 PM – 3:30 PM	**Mentorship Mixer**	Gateway Hotel Event Center
3:30 PM – 5:00 PM	**Symposia / Contributed Talks**	Gateway Hotel Event Center
6:00 PM -- 9:00 PM	**Fish Trivia / Evening Social**	Seward Alehouse

Meeting Schedule at a Glance

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Wednesday, March 27th

8:00 AM – 5:00 PM	**Registration Open**	Gateway Hotel Event Center
8:15 AM – 8:30 AM	**Welcome Message**	Gateway Hotel Event Center
8:30 AM – 9:30 AM	**Symposiums / Contributed Talks Room #1**	Gateway Hotel Event Center
8:30 AM – 9:30 AM	**Symposiums / Contributed Talks Room #2**	Breeze Inn Mt. Alice Room
9:30 AM – 10:30 AM	**Coffee Break (Long)**	
9:30 AM – 10:30 AM	**Coffee Break Mixer (Affinity Group)**	Breeze Inn Mt. Marathon Room
10:30 AM – 12:10 PM	**Symposiums / Contributed Talks Room #1**	Gateway Hotel Event Center
10:30 AM – 11:30 AM	**Symposiums / Contributed Talks Room #2**	Breeze Inn Mt. Alice Room
12:00 PM – 1:30 PM	**Lunch Break**	
12:15 PM – 1:15 PM	**Women in Fisheries Luncheon (RSVP)**	Gateway Hotel Event Center
12:15 PM – 1:15 PM	**Alutiiq Pride Hatchery Tour #2**	Alutiiq Pride Marine Institute
1:30 PM – 2:30 PM	**Symposiums / Contributed Talks Room #1**	Gateway Hotel Event Center
1:30 PM – 2:30 PM	**Symposiums / Contributed Talks Room #2**	Breeze Inn Mt. Alice Room
2:30 PM – 3:30 PM	**Coffee Break (Long)**	
2:30 PM – 3:30 PM	**Coffee Break Mixer (Affinity Group)**	Breeze Inn Mt. Marathon Room
3:30 PM – 5:00 PM	**Symposiums / Contributed Talks Room #1**	Gateway Hotel Event Center
3:30 PM – 5:00 PM	**Symposiums / Contributed Talks Room #2**	Breeze Inn Mt. Alice Room
6:00 PM – 8:30 PM	**Chamber After 5 Public Event**	Mermaid Grotto

Meeting Schedule at a Glance

For the most current information, please check the meeting website:
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Thursday, March 28th

8:00 AM – 5:00 PM	**Registration Open**	Gateway Hotel Event Center
8:30 AM – 8:45 AM	**Welcome Message**	Gateway Hotel Event Center
9:00 AM –11:45 AM	**Poster Session/Tradeshow**	Gateway Hotel Event Center
9:45 AM – 10:45 AM	**Coffee Break Mixer (Affinity Group)**	Breeze Inn Mt. Marathon Room
12:00 PM – 1:30 PM	**Chapter Business Meeting (Lunch Provided)**	Gateway Hotel Event Center
1:30 PM – 2:30 PM	**Symposiums / Contributed Talks Room #1**	Gateway Hotel Event Center
2:30 PM – 3:30 PM	**Coffee Break (Long)**	
2:30 PM – 3:30 PM	**Coffee Break Mixer (Affinity Group)**	Breeze Inn Mt. Marathon Room
3:30 PM – 4:45 PM	**Symposiums / Contributed Talks Room #1**	Gateway Hotel Event Center
5:00 PM – 6:00 PM	**Spawning 5K Fun Run/Walk**	Seward Mariner's Memorial
6:30 PM – 9:00 PM	**Awards Ceremony/Banquet**	Alaska Sea Life Center

Meeting Schedule at a Glance

For the most current information, please check the meeting website:
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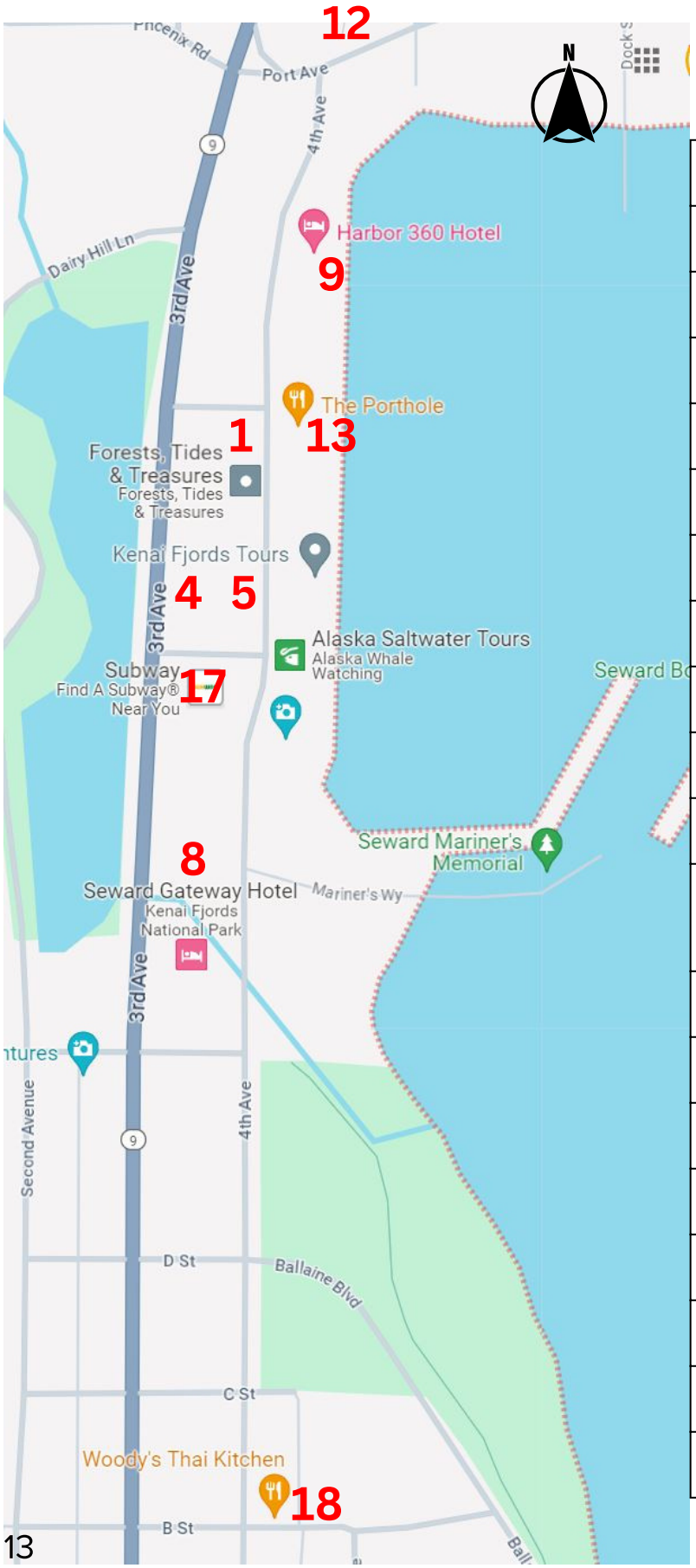
Friday, March 29th

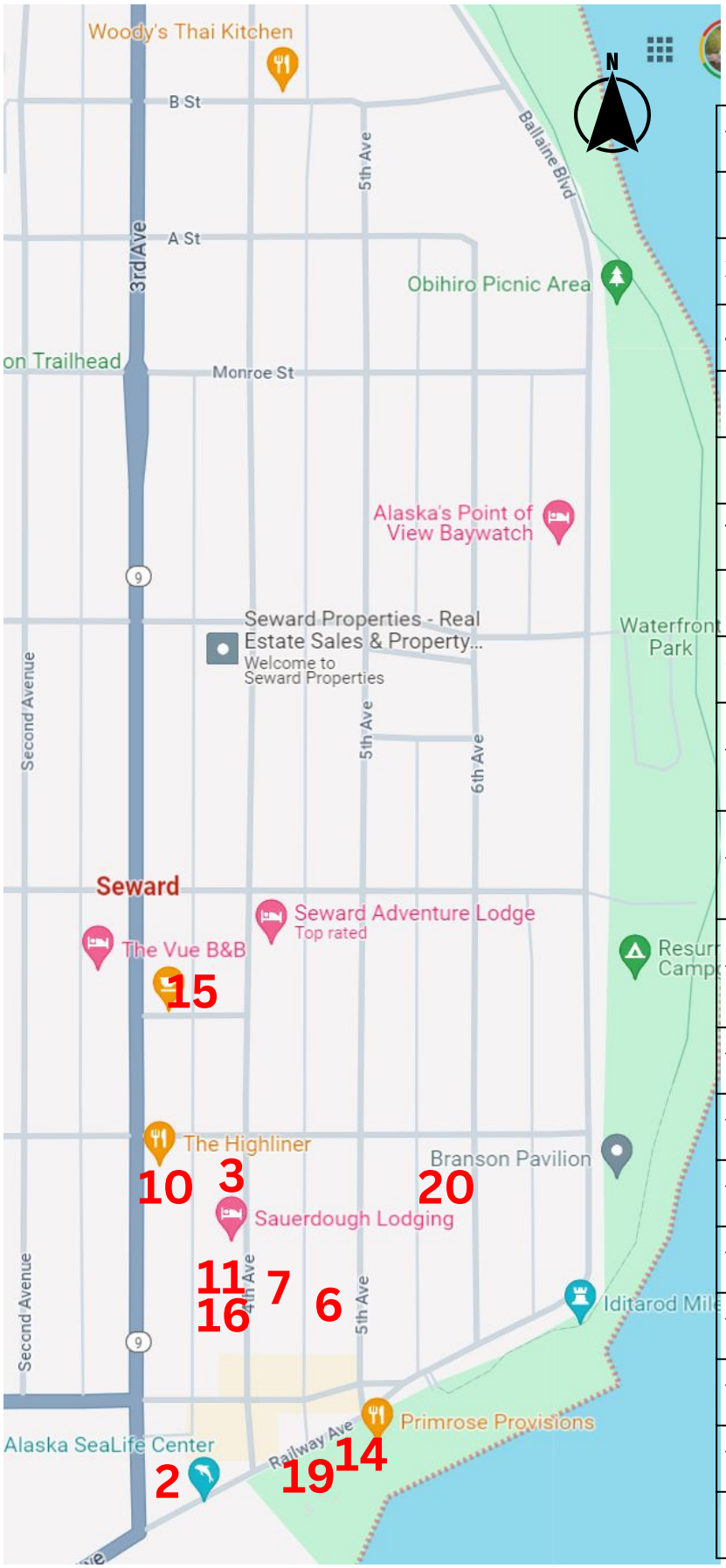
12:15 PM – 1:15 PM	**Alutiiq Pride Hatchery Tour #3**	Alutiiq Pride Marine Institute
12:30 PM – 4:30 PM	**Field Trip – Major Marine Tours Cruise**	Seward Harbor



Seward Venue

1	Alaska Seafood Grill
2	The Alaska Sealife Center
3	Apollos Italian Resturant
4	Breeze Inn Hotel
5	Breeze Inn Restaurant
6	The Cookery
7	The Flamingo Lounge
8	Gateway Hotel
9	Harbor 360 Hotel
10	Highliner Restaurant & Bar
11	Lone Chicharron Taqueria
12	Mermaid Grotto and Kraken Lounge
13	The Porthole
14	Primrose Provisions
15	Resurrection Art Coffee
16	The Seward Alehouse
17	Subway
18	Woody's Thai Kitchen
19	Zudy's Café
20	The Library

Seward Venue



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13	The Porthole
14	Primrose Provisions
15	Resurrection Art Coffee
16	The Seward Alehouse
17	Subway
18	Woody's Thai Kitchen
19	Zudy's Café
20	The Library

Seward Restaurants

Vegan Options

Gluten Free Options

Walking Distance from Hotels

Small Eats

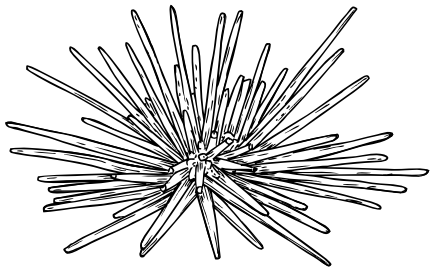
Alaska Seafood Grill	Open everyday, 11am-8pm
Apollos Italian Resturant	Open Fri.-Mon., 3:30pm-9:30pm
Breeze Inn Restaurant	Open daily, 7am-10pm
Highliner Restaurant & Bar	Open Wed. - Sun. 11am-8pm
Primrose Provisions	Open Mon. & Thurs.-Sat. 11am-8pm
Resurrection Art Coffee	Open daily, 7am-5pm
Subway	Open daily, 10am-8pm
The Cookery	Open Wed.-Sat., 5pm-9pm
The Flamingo Lounge	Open Thurs.-Mon. 5pm-8:30pm
Lone Chicharron Taqueria	Open Tues.-Sat., 12pm-8pm
The Porthole	Open Wed.-Mon., 9am-4pm
Woody's Thai Kitchen	Open Tues.-Sat., 3pm-7:30pm
Zudy's Café	Open Tues.-Sat., 11am-3pm

AFS Alaska Member Survey

SCAN ME

- Anonymous and confidential
- Inform us about the AK AFS membership
- Track changes through time
- Improve diversity, equity, and inclusion

Professional Development Workshops



Wilderness First Aid

Sunday/Monday, March 24-25 8:00am-5:30pm-Orca Room at the Harbor 360 Hotel (45 min lunch break)

The Wilderness First Aid course introduces participants to emergency care in non-urban environments. The curriculum covers basic anatomy and physiology, assessment and treatment of a variety of injuries and illnesses, appropriate short-term to multi-day patient care, and evacuation decision-making as it applies to Alaska's remote environments.

REGISTRATION REQUIRED by March 15th

Genetics 101 in Alaska

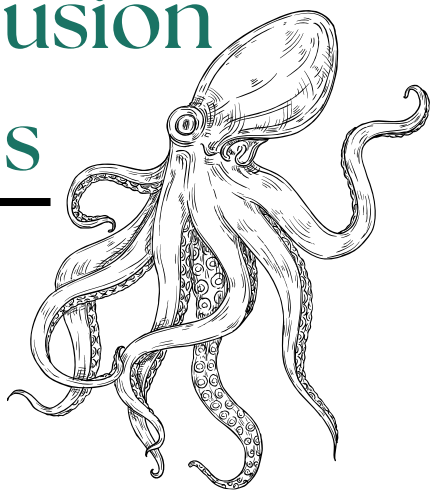
Monday, March 25th 1:00pm-5:00pm-Seward Public Library

A chance to learn about the use of genetics in fisheries management in Alaska from working geneticists. What kind of research questions can be addressed with genetics? How many samples would you need to collect and analyze? What are the different types of data generated and how do we analyze them? How are the data used? No previous genetics experience or coursework are needed. There may be an opportunity to discuss research and project ideas you may be interested in with workshop instructors.

FREE-No Registration

Registration Full

Diversity, Equity & Inclusion Committee Workshops



Two Eyed Seeing in Fisheries Workshop

Monday, March 25th 8:30am-5:00pm

Applying a Two-Eyed Seeing Etuaptmumk approach, an Indigenous research framework championed by Mi'kmaw Elder Albert Marshall, can support positive cross-cultural communication in fisheries.

People attending this workshop will have an opportunity to co-learn about Alaska Native value systems in Alaska's fisheries and practice overcoming challenges together. Our agenda includes listening to a multigenerational Tribal Elder and youth panel and building relationships through sharing stories, traditional foods and handicrafts skills. The goal for participants is to learn the value of cross-cultural team building and develop plans to move forward in collaboration between Tribes and agencies.

REGISTRATION REQUIRED-FULL

Affinity Groups

Affinity groups provide safe spaces for people who identify with underrepresented and/or historically marginalized groups to gather, build community, and bolster a sense of belonging.

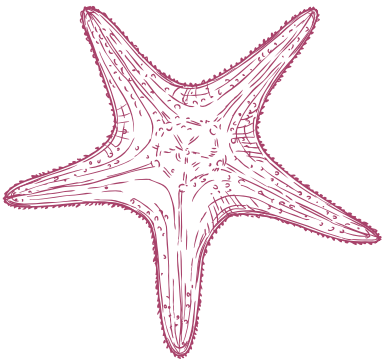
Note: You must identify as a member to any affinity group that you intend to join.

Schedule

- **Tues AM Coffee Break:** People with Disabilities (45 min) Breeze Inn Mt. Marathon Room (9:45am)
- **Tues PM Coffee Break:** Mentorship Mixer (1 hr) Gateway Hotel and Event Center (2:30pm)
- **Wed AM Coffee Break:** Dependent Caregiver (1 hr) Breeze Inn Mt. Marathon Room (9:30am)
- **Wed PM Coffee Break:** BIPOC (1 hr) Breeze Inn Mt. Marathon Room (2:30pm)
- **Thurs AM Coffee Break:** LGBTQIA2S+ (1 hr) Breeze Inn Mt. Marathon Room (9:45am)
- **Thurs PM Coffee Break:** First Generation College Students (past, present, and future) (1 hr) Breeze Inn Mt. Marathon Room (2:30pm)

Coffee/refreshments & snacks/pastries available.

Affinity Group Luncheons



Tuesday, Luncheon March 26th 12:15pm-1:15pm
Allyship Discussion Lunch
FREE Gateway Hotel Event Center

This luncheon is intended for individuals who are interested in allyship: supporting our colleagues from underrepresented groups in a meaningful way at AK-AFS and beyond. We welcome participants who are serious about exploring and holding accountable the legacies of the institutions we are part of and doing the challenging work towards equity.

Tuesday, March 26th-PM Coffee Break
Mentorship Mixer
FREE Gateway Hotel Event Center

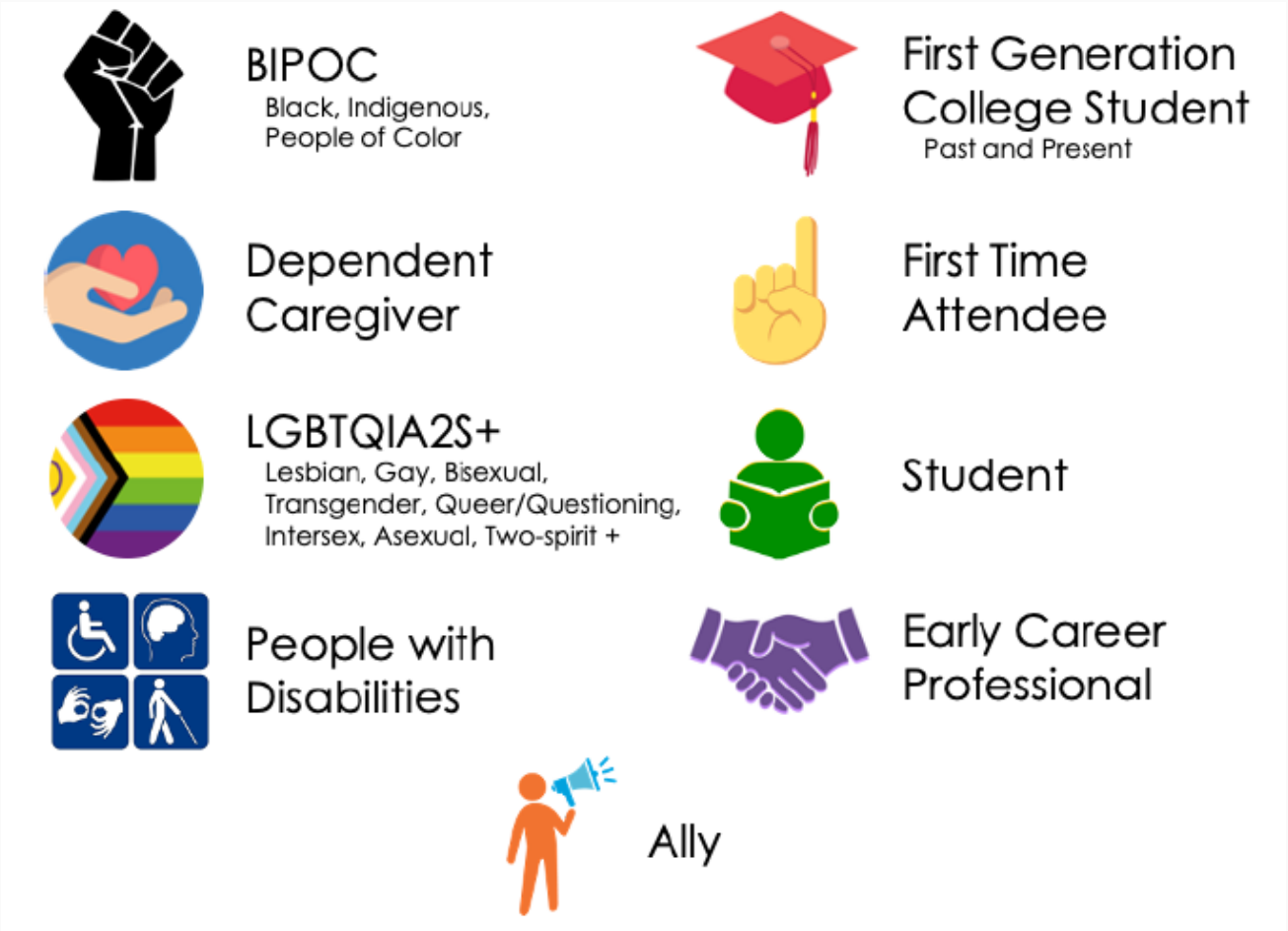
This coffee break event co-hosted with the CFOS student group. Informal conversations may center around professional development, issues related to career advancement, and personal identity and belonging in STEM.

Wednesday, March 27th 12:00pm-1:00pm
Women in Fisheries Luncheon
$25 *Must sign up online*

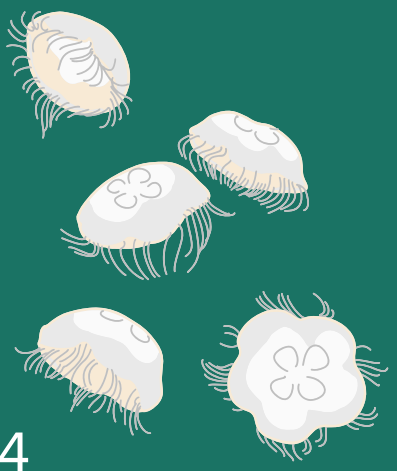
Back by popular demand, we are planning a Women in Fisheries Luncheon during the Seward meeting to offer a wider time slot to discuss challenges, solutions, and accomplishments unique to this community.

Affinity Stickers

Available at the DEIC table. Many of these stickers are used to help those with underrepresented identities build community within the AK Chapter of AFS. Others identify first-time attendees, students, and early career professionals so that long-time AFS members can help them network!



Monday, March 25th



Welcome Social

6:00 pm- 9:00 pm

Alaska Sealife Center

301 Railway Ave, Seward, AK 99664

Mingle over food and drinks with your peers and reconnect after a long hiatus from in-person meetings. Heavy appetizers will be served from Primrose Provision, a local charcuterie and wine bar.

One free drink ticket is included with your Meeting registration. There will be a cash bar with beer and wine. Non-alcoholic drinks available. Bring your reusable tumbler from your registration package to house your drinks!

Tuesday, March 26th

Conference Welcome & Plenary Speaker

8:30 pm- 9:45 pm

Gateway Hotel Event Center

1115 4th Ave, Seward, AK 99664

The Program Committee is proud to introduce our esteemed and impactful plenary speaker for the 2024 chapter meeting!

Dr. Sonia Ibarra

University of Alaska Fairbanks

Increasing representation of Indigenous voices and knowledge systems in Western science

“Complex resource issues that incorporate scientific approaches often require thinking outside of disciplinary boxes, challenging our notions of what are useful data to consider, and should be considerate of what voices or data are left out. In Southeast Alaska, the reintroduction and expansion of sea otter populations have triggered cascading effects with profound impacts on local food security—particularly the harvest of customary and traditional subsistence foods in rural coastal communities. This presentation will share work that bridges local and traditional ecological knowledge with ecological studies to investigate how sea otters and people impact local shellfish beds in rural communities and to explore Indigenous community management recommendations that may facilitate environmental and community sustainability. Prior to conducting our work, we consulted with tribal councils, tribal leaders, community members, and elders with the implicit purpose to elicit feedback on all aspects of research. By engaging communities throughout the entire research, we created a strategic road map that helped identify knowledge that is sensitive or inaccessible, fostered opportunities for constructive community engagement and community awareness of the project, with hopes of creating an equitable platform in which researchers and community members are drivers of genuine collaborative research.”

Tuesday, March 26th

Film: Science Education Through an Indigenous Lens- *by Court Pegus*

4:45 pm- 5:15 pm

Gateway Hotel and Event Center
1115 4th Ave, Seward, AK 99664

Evening Social: Fish Trivia!

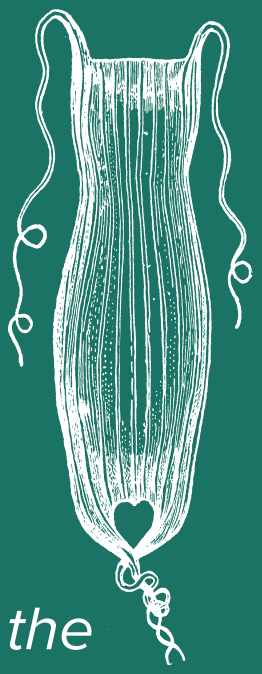
6:30 pm- 9:30 pm

Seward Alehouse
215 4th Ave, Seward, AK 99664

Hang out with your peers and test your fish knowledge over a few rounds of Fish Trivia!
First place team wins a prize!

Drinks available for purchase from the Alehouse Bar.
Tacos and more available for purchase right in the bar from The Lone Chicharron Taqueria.

Wednesday, March 26th



Welcome Message

8:15 am- 8:30 am

Gateway Hotel and Event Center

1115 4th Ave, Seward, AK 99664

Chamber After 5-*In collaboration with the Seward Chamber of Commerce*

6:00 pm- 8:30 pm

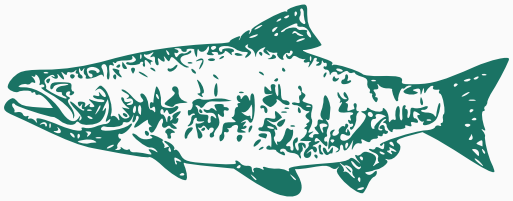
Mermaid Grotto & Kraken Lounge

412 Port Ave, Seward, AK 99664

Join us for insightful presentations and the opportunity to talk to 6 of Alaska's fisheries professionals!

Beer and non-alcoholic drinks provided by Midnight Sun and Stoney Creek Breweries! Stoney Creek is a local Seward brewery. Drinks $6. Snacks provided by the Seward Chamber. Food for purchase from local food trucks.

Thursday, March 27th



Welcome Message

8:15 am- 8:30 am

Gateway Hotel and Event Center

1115 4th Ave, Seward, AK 99664

Poster Session & Tradeshow

9:00 am- 12:00 pm

Gateway Hotel and Event Center

1115 4th Ave, Seward, AK 99664

Spawning 5K Fun Run

5:00 pm- 6:00 pm

Start Location :

Seward Mariner‘s Memorial

Awards Ceremony & Banquet

6:30pm- 9:00pm

Alaska Sealife Center

301 Railway Ave, Seward, AK 99664

Join everyone to finish off the 50th annual meeting with a dinner provided by The Cookery, a Seward dining favorite. One free drink ticket per person, bring your reusable cup! Beer & wine for purchase $6, non-alcoholic drinks provided.

Spawning 5K Race Map

Friday, March 28th

Field Trips!

Specific Field Trip Information can be found on the AFS Meeting Website:

Alutiiq Pride Hatchery Tour

12:15 pm- 1:15 pm

Alutiiq Pride Marine Institute

101 Railway Ave, Seward, AK 99664

Tours are free.

Major Marine Tours Resurrection Bay Cruise

12:30 pm- 4:30 pm

Marine Marine Tours

Harbor 360 Hotel Lobby

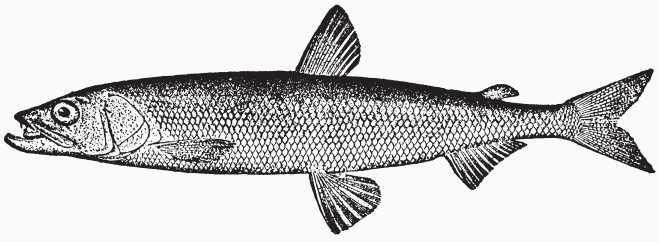
Tours are priced at a group discount.

Technical Session Schedule

Tuesday-Morning

	Contributed talks: Freshwater Ecology	
	Gateway Hotel Event Center **Chair: William T. Samuel**	
10:30 AM	Biomagnification of mercury in Lake Trout *Salvelinus namaycush* food webs **Sarah Laske**	
10:45 AM	Northern Pike Suppression Efforts on Shell, Whiskey, Hewitt & Chelatna lakes. **Emily Heale**	
11:00 AM	Salmon declines coincide with climate mediated increases in consumption by a novel predator **Benjamin Rich***	
11:15 AM	Hydropower in Alaska: Creating Energy and Mitigating Risks for Fish **Leah Ellis**	
11:30 AM	An overview of beaver effects on fish in Alaska **William T. Samuel**	
11:45 AM	LUNCH BREAK	

*- Student Award Presentation †- Short talk



Technical Session Schedule

Tuesday-Afternoon

	Contributed talks: Spatial distribution and movement of salmon and trout	**Contribute talks: Community and tribal fisheries knowledge, management, and research**
	Gateway Hotel Event Center **Chair: Taylor Cubbage**	**Gateway Hotel Event Center** **Chair: Kristen Reece**
1:30 PM	Run Timing and Spawning Distribution of Copper River Chinook Salmon **Matt Piche**	
1:45 PM	Habitats occupied by Chinook salmon in the Gulf of Alaska and in the U.S. Navy's Temporary Maritime Activities Areas **Andrew C. Seitz**	
2:00 PM	Coastal Cutthroat Trout: The Phantom of Prince William Sound **Taylor Cubbage**	
2:15 PM	Pacific salmon in Alaska's Arctic: Old wine in new bottle? **Peter Westley**	
2:30 PM	COFFEE BREAK	
3:30 PM		Community-based Mapping of Salmon Habitat in the Kenai Peninsula Borough, Alaska **Benjamin Meyer**
3:45 PM		Engaging Rural Communities in Critical Habitat Data Collection: Fish Map App **Nyssa Russell** **(Presented by Benjamin Meyer)**
4:00 PM		Unveiling Over a Century of Tribally-Led Sockeye Salmon Escapement with the Native Village of Nanwalek **Madeline Lee**†
4:08 PM		Collaboration between Yukon First Nations and a Biological Consulting Company **Petra Szekeres**
4:23 PM		Nanutset qit'a ideshni "We Understand Our History": Historical Analysis of Dena'ina Dispossession and Resiliency in Tikahtnu (Cook Inlet) and Kahtnu (Kenai River) Fisheries **Nicholas Jacuk***
4:38 PM 5:15 PM	Film Showing: Science Education Through an Indigenous Lens Length: 30 minutes **Court Pegus**	

*-Student Award Presentation †- short talk

Technical Session Schedule

Wednesday-Morning

	Western Alaska Salmon	Groundfish in Alaska
	Gateway Hotel Event Center **Chair: Rebecca Shaftel**	**Breeze Inn Mt. Alice Room** **Chair: Jan M. Rumble**
8:30 AM	The Gravel-to-Gravel Keystone Initiative: Investments in stream habitat restoration and partnerships to create a more resilient future for salmon **Rebecca Shaftel**	The Complexities of Lingcod Management in Southeast Alaska **Alexandra R. McCarrel**
8:45 AM	Restoring salmon habitat in Coal Creek, Yukon-Charley Rivers National Preserve, as part of the Gravel-to-Gravel Keystone Initiative **Trey Simmons**	Characterizing Pacific Halibut Movements Within the Bering Sea **Austin J. Flanigan***
9:00 AM	Leveraging lessons learned on placer mined landscapes to springboard stream restoration in support of the new Gravel to Gravel Keystone Initiative **Matthew S. Varner**	Multi-species analysis of geochemical biomarkers suggests island group compartmentalization of Aleutian Island marine ecosystems **Scott D. Chandler***
9:15 AM	Divergent responses of western Alaska salmon to a changing climate **Erik R. Schoen**	What forage-size fish should a predator consume in the nearshore Beaufort Sea? **Ashley E. Stanek**
9:30 AM	COFFEE BREAK	
10:30 AM	Genetic stock composition of chum salmon harvested in commercial salmon fisheries of the South Alaska Peninsula **Sara Gilk-Baumer**	ADF&G Statewide Rockfish Initiative – The Next Chapter **Jan M. Rumble**
10:45 AM	Western Alaska Chinook salmon heat stress assessment during and after summer 2019 heatwave **Vanessa R. von Biela**	The fish that saw the 20th Century – A 121 year old yelloweye rockfish **Aaron P. Baldwin**
11:00 AM	Blood-based biomarkers of cardiac health in Pacific salmon **Morag Clinton**	Deepsea Packraft Fishing in Alaska: A budding artisanal fishery or just abnormal? **Charles N. Cathcart**
11:15 AM	Heartbeat of the Yukon: Examining Ichthyophoniasis in Chinook Salmon cardiac tissue and potential link to en route mortality **Keith D. Herron***	
11:30 AM	Comparison of qPCR, histology, and explant culture for assessing Ichthyophonus infection in Yukon Chinook salmon **Jayde Ferguson**	
11:45 AM	Linking Climate and Early Life History to Recruitment of Yukon River Chum Salmon **Maranda Peterson*†**	
11:53 AM	Reconstructing migratory histories and age of Chinook salmon from the Yukon River and northern Bering Sea with oxygen isotopes and trace elements in otoliths. **James M. Murphy**	

*-Student Award Presentation †- Short talk

Technical Session Schedule

Wednesday-Afternoon

	Changing Shellfish Fisheries in Alaska	**Fisheries Genomics: Forging Fisheries Solutions using the Building Block of Life**
	Gateway Hotel Event Center **Chair: Jan M. Rumble**	**Breeze Inn Mt. Alice Room** **Chair: Jessica R. Glass**
1:30 PM	Building a spatially explicit framework to quantify the role of predation and climate change on the collapse of snow crab in the Bering Sea **Samuel Comeau*†**	Leveraging eDNA Metabarcoding for Fish Biodiversity Assessment in Kachemak Bay, Alaska **Maris R. Goodwin*†**
1:38 PM	Highs and Lows! – Managing the Southeast Alaska Golden King Crab Fishery **Adam J. Messmer**	Macroinvertebrate diversity in burned and unburned streams measured using eDNA **Jeffrey D. Muehlbauer**
1:53 PM	Changes through the Years - Southeast Commercial Tanner Crab Management and Stock Assessment **Tessa L. Bergmann**	Novel passive eDNA device enables cost-effective aquatic biodiversity monitoring **Jessica R. Glass**
2:08 PM	Evaluation of Paralytic Shellfish Toxins in Subsistence Harvested Sea Otters **Emily S. Mailman***	A molecular showdown in eDNA quantification: dPCR or qPCR? **Maggie A.B. Harings***
2:30 PM	COFFEE BREAK	
3:30 PM	East Cook Inlet Razor Clam Trends in Natural Mortality and Recruitment During the Sport Fishery Closure **Holly I. Dickson**	An updated coastwide baseline for genetic stock identification of chum salmon: a key resource for examining stock-specific marine migration and harvest **Andy Barclay**
3:45 PM	Annual Growth of Cook Inlet Razor Clams **Danielle Siegert**	Evaluating the effects of hatchery supplementation on the second generation of a sockeye salmon population **Mary E. Commins*†**
See talk-specific times	**"Weak meat" condition of Alaska weathervane scallops** **Jayde Ferguson** (4:00 PM)	Whole genome sequencing contextualizes mito-nuclear discordance in Pacific herring **Laura E. Timm** (3:53 PM)
	Estimate abundance and special distribution of the Giant Red Sea Cumber (*Apostichopus californicus*) in Prince William Sound **Benjamin Wilkins*** (4:15 PM)	Genomic population structure of Pacific Herring in the eastern Bering Sea **Sydney A. Almgren*†** (4:08 PM)
	Contributed Talks: **Alaska Kelp and Mariculture Science**	Population Structure of Pacific Herring in the Bering Sea and Gulf of Alaska **Isabelle Nicolier*** (4:16 PM)
	Gateway Hotel Event Center Chair: TBD	
4:30 PM	Spatial and temporal variability of carbohydrate composition in cultivated Alaskan kelp **Cameron Jardell*†**	
4:38 PM	Control of farmed bull kelp biomass via novel seeding and cultivation approaches **Tiffany Stephens**	

*- Student Award Presentation †- Short talk

Technical Session Schedule

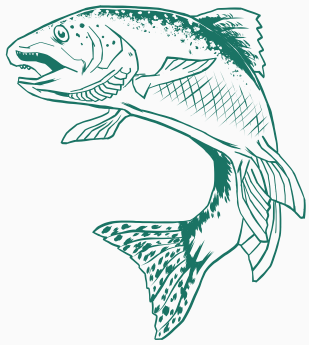
Thursday-Afternoon

	Celebrating success and looking towards the future: The next decade of stream and lake temperature research and management in Alaska	
	Gateway Hotel Event Center **Chair: Erin Larson**	
1:30 PM	Overwintering Habits and Habitat of Arctic Grayling **Lisa Stuby**	
1:45PM	Patterns of Aquatic Insect Emergence in Warm and Cold Urban Streams in Anchorage **Molly Legg***	
2:00 PM	Spatial and decadal-scale temporal changes in water chemistry and macroinvertebrates in central Alaska **Caleb J. Robbins**	
2:15 PM	Grow with the Flow: Influence of Hydrologic Mosaics on Juvenile Salmon Growth in Proglacial Watersheds **Lindsey C. McCulloch***	
2:30 PM	COFFEE BREAK	
3:30 PM	Exploring climate change impacts on juvenile sockeye salmon and threespine stickleback in Iliamna Lake, AK. **Elena Eberhardt*†**	
3:38 PM	Loss of meltwater from glaciers and snowpack will increase synchrony of river habitats and resources in Southeast Alaska **Matt Dunkle**	
3:53 PM 4:45 PM	**Panel Discussion**	

*-Student Award Presentation †- Short talk

Symposia Descriptions:

Wednesday-Morning



“Western Alaska Salmon”

Gateway Hotel Event Center
Chair: Rebecca Shaftel

(chairs: Rebecca Shaftel, Boyd Blihovde, Trey Simmons, & Kate Wedemeyer)

In the Norton Sound – Yukon – Kuskokwim regions of Alaska, unprecedented declines in Chinook and chum salmon have severely impacted communities that depend on these resources. There are several ongoing efforts to address the salmon crisis in western Alaska that include common themes such as collaborative efforts across the entire life cycle and inclusion of indigenous knowledge holders. The Gravel to Gravel Keystone Initiative is a Department of Interior effort focused on ecosystem restoration and resilience as it relates to Pacific salmon health, food security, and cultural survival in the face of climate change and other threats. The goal of this symposium is to bring together AFS attendees interested in sharing their work to identify drivers of the declines such as bycatch, disease, habitat degradation, climate change, genetics, hatcheries, and adult mortality; and those that are proposing actions that can benefit Western Alaska salmon populations. Specific challenges that we invite speakers to address include stakeholder perspectives on managing for subsistence and the status of impacted or degraded habitats and restoration projects or priorities.

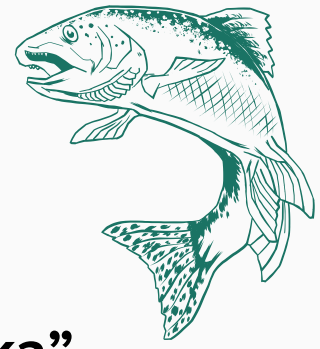
“Groundfish in Alaska: Increasing importance to sport, commercial, and subsistence fisheries”

Breeze Inn-Mt. Alice Room
Chair: Jan M. Rumble

Against the backdrop of declining halibut and crab populations, groundfish fishing has emerged as an increasingly vital sector within Alaska’s marine fisheries. The surge in popularity of groundfish fishing spans across sport, commercial, and subsistence, reshaping the dynamics of Alaska’s seafood landscape and coastal communities.

Symposia Descriptions:

Wednesday-Afternoon



“Changing Shellfish Fisheries in Alaska”

Gateway Hotel Event Center
Chair: Jan Rumble

In recent years, Alaska’s shellfish fisheries have undergone significant transformations owing to climate shifts, which have directly impacted the abundance and distribution of shellfish populations across the region. The repercussions of these changes are felt across various sectors, including commercial, subsistence, and sport fisheries. As shellfish populations fluctuate, fishermen, resource managers, and market stakeholders face unprecedented challenges and opportunities.

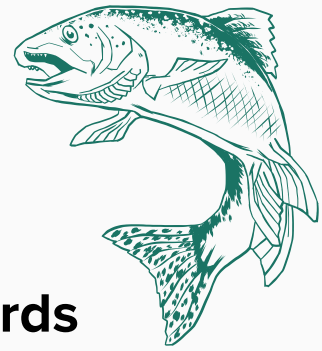
“Fisheries Genomics: Forging Fisheries Solutions using the Building Block of Life”

Breeze Inn-Mt. Alice Room
Chairs: Jessica Glass & Laura Timm

Molecular data – the building blocks of life – are some of the most direct observations we can make about an organism. Techniques that utilize DNA, RNA, eDNA, etc. are advancing rapidly and provide creative solutions to fisheries management and conservation challenges. The aim of this symposium is to showcase the interdisciplinary applications of genomic tools in Alaska for fisheries research such as whole genome sequencing, transcriptomics, environmental DNA, population genomics and phylogeography. We invite speakers whose research showcases the integration of genomic tools across Alaska and Alaskan waters, whether freshwater or marine, Arctic or temperate rainforest. We encourage talks offering creative ideas that will push the boundaries of the field of genomics as applied to fisheries, especially those that leverage genomics with community-led research priorities.

Symposia Descriptions:

Thursday-Afternoon

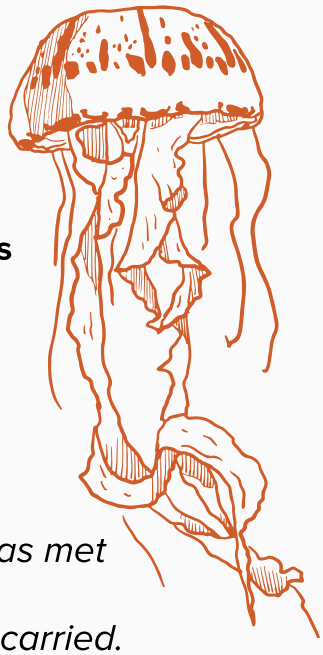


“Celebrating success and looking towards the future: The next decade of stream and lake temperature research and management in Alaska”

Breeze Inn-Mt. Alice Room
(chairs: Erin Larson, Marcus Geist, Sue Mauger, & Rebecca Shaftel)

Lake and stream temperatures affect freshwater fish populations throughout Alaska, with wide-ranging consequences for fisheries across the state. Since the publication of the statewide Stream Temperature Action Plan in 2012, much progress has been made in understanding freshwater temperature regimes in Alaska, with more work still to be done. For example, a statewide freshwater temperature database, AKTEMP, was recently developed and published to help serve data from different entities. Work is currently underway to develop the next decadal stream and lake temperature action plan and to develop more tools to enhance AKTEMP’s utility for research and management. The goal of this symposium is to bring together interested parties to share recent research on freshwater temperature as it relates to Alaska’s freshwater fishes and to have a roundtable discussion to collaboratively inform the next stream and lake temperature action plan.

2023 Alaska Chapter Meeting Notes



Minutes of the 49th Annual Alaska Chapter AFS Business Meeting
30 March 2023, Fairbanks
12:00-1:30pm
Fairbanks Westmark Hotel - Gold Room

1. Call to Order (12:58 PM)
2. Determination of a quorum (20 chapter members)

More than 20 Chapter members were present, a quorum was met

3. Approval of agenda

Motion by Scott Ayers, seconded by Cheryl Barnes. Motion carried.

4. Approval of 2022 annual business meeting minutes

Motion by Kate Wedemeye, seconded by Cheryl Barnes. Motion carried.

5. April 2022 - February 2023 Chapter review:

- Treasurer's Report – Trenten Dodson
  - Trent provided an overview of the Chapter's accounts (see handout) and explained how the Chapter uses each of those accounts.
  - There were around 150 registrants for the meeting this year, which is higher than the virtual meeting last year.
  - He noted that final accounting from the meeting (income and expenses) will be determined at a later date.
- Secretary's Report – Scott Ayers
  - Scott noted that it has been a good year and that he was extremely grateful that the Chapter was finally able to have an in-person meeting again. He noted that he's had so many great interactions and thoughtful conversations that just would not have otherwise happened, and that it was also fantastic to start meeting a whole new cohort of students.
- Student Representative's Report – Jonah Bacon
  - Jonah talked about the student symposium that occurred earlier in the year and how there was just a student retreat. He gave thanks to the many students who volunteered for this meeting and helped make it a success.
- Past President's Report – Sue Mauger
  - The Chapter's Bylaws & Procedures Manual has been approved and is now on the Chapter website.
  - Sue also commented that the past-president's luncheon was a great gathering.

● Vice President's Report – Donnie Arthur
- Membership update: Donnie informed the group that our Chapter membership was at its lowest level since 1990, but that the numbers for 2023 were looking good so far as a number of folks signed up before the meeting.
- 2024 AFS-Alaska Annual Meeting: Donnie announced that the 2024 annual Chapter meeting will be held in Seward.

● President-Elect – Erik Schoen
- 2023 Annual Meeting program review: Many thanks were provided to everyone that showed up this year as it was unclear at the start of the planning process how things would turn out. Erik also gave thanks to the hard work of the planning committee, who did the heavy lifting of really making the meeting come together successfully.

● Standing Committees
- Finance Assets Oversight - Ray Hander (via Dodson)
    - The FAOC meets quarterly to review accounts. Market conditions were rough in 2022 and so all of the Chapter's accounts lost money this year.
    - A student travel endowment account, named the Meacham Family AFS Student Travel Fund, was established this past year thanks to a generous donation from the Meachum family. The family donated $10K last year, and will donate another $10K this year and $10K next year. Anyone can add to the endowment in support of student travel.
- Environmental Concerns - Joel Markis/Sue Mauger (presented by Sue)
    - The Environmental Concerns Committee has committed to providing an update in the Chapter newsletter each quarter. The Committee submitted comments in October 2022 to encourage the Alaska Congressional Delegation to support the Recovering America's Wildlife Act (RAWA). The Chapter also joined the Parent Society in submitting comments in opposition to development of the Pebble deposit.
- Diversity, Equity & Inclusion - Cheryl Barnes
    - Cheryl introduced the whole committee to the meeting and spoke to the Collaborative Approaches to DEI in Fisheries workshop that was held on Monday of this week (26 participants from various organizations across the state - funded by AK Sea Grant), the affinity group meetings that occurred throughout the Annual Chapter meeting (40+ participants [+ 20 from the women and underrepresented genders group on Thursday), the mentorship mixer that took place Tuesday, and she highlighted the allyship discussion that is planned for Friday morning. Efforts to increase accessibility and belonging included autogenerated subtitles, gender inclusive restrooms, accommodations for dietary restrictions, remote participation, and affinity stickers). The DEI Travel Award recipient was unable to attend the meeting.

    - Cheryl also thanked everyone who participated in the member survey that the DEIC was conducting during the meeting.
- Professional Development - Sara Miller
    - Sara discussed the three professional development workshops that were held in coordination with the Chapter's annual meeting (fly tying, R, and scientific writing). Sara now has a co-chair (Maggie Chan) and asked the membership to submit any ideas that they would like to see for workshops next year.

● President's Report/Farewell remarks from outgoing President – Megan McPhee

- Megan thanked Sue for all of her work for the Chapter over the past few years, the Meachum family for their endowment donations, Bill Bechtol for his continued work on the Chapter's newsletter, Randy Brown for his work as the Chapter's historian, and the Tamamta Program at the University of Alaska Fairbanks for being such a large part of this year's meeting.

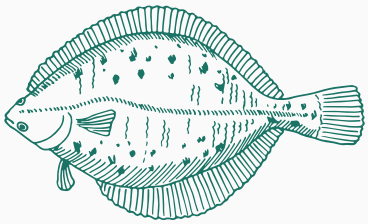
6. Remarks from the new President – Erik Schoen
7. New Business:

- Appointment of new Executive Committee officers.
    - New Vice President: Whitney Critenden
    - New Student Representative: Rebecca (Becky) Shaftel
    - The outgoing 2022-2023 officers are as follows: Sue Mauger (immediate past president), Megan McPhee(president), Erik Schoen(president-elect), Donald Arthur(vice president), Trent Dodson(treasurer), and Scott Ayers (secretary).
    - The incoming 2023-2024 officers are as follows: Megan McPhee(immediate past president), Erik Schoen (president), Donald Arthur (president-elect), Whitney Cridenden (vice president), Trent Dodson (treasurer), and Scott Ayers (secretary).
    - The outgoing Student Representative to the Executive Committee is Jonah Bacon, and the incoming (2023-2024) representative is Becky Shaftel.

8. Open forum
9. Adjourn (1:26 PM)

Motion by Scott Ayers, Second by Cheryl Barnes. Motion passes.

Oral Abstracts



Contributed Talks: Freshwater Ecology
Tuesday AM

Biomagnification of mercury in Lake Trout *Salvelinus namaycush* food webs

Laske, Sarah M., U.S. Geological Survey Alaska Science Center
Bartz, Krista K., National Park Service, Southwest Alaska Inventory and Monitoring Network
Young, Dan, National Park Service
von Biela, Vanessa R., U.S. Geological Survey Alaska Science Center
Carey, Michael P., U.S. Geological Survey Alaska Science Center

Mercury (Hg), a toxic contaminant that threatens the health of aquatic ecosystems and species, is often prevalent in large predatory fish like Lake Trout (*Salvelinus namaycush*). At high Hg concentrations ([Hg]), human consumption of these fish can be harmful and safety advisories may be issued for subsistence and sportfishing. [Hg] of Lake Trout were among the highest measured in western U.S. National Parks, exceeding ecological (>90 ng/g wet weight (ww)) and human health benchmarks (>300 ng/g ww), but concentrations varied widely among individuals and lakes. In this study, we sampled [Hg] and stable isotope tracers from aquatic food web components (i.e., algae, zooplankton, benthic macroinvertebrates, and prey fishes) in 10 lakes across four of Alaska's National Parks and Preserves to reveal trophic pathways that may reduce or enhance Hg biomagnification (i.e., increasing [Hg] with successive trophic levels) among Lake Trout. A sample of 272 Lake Trout averaged (+/- sd) 261 +/- 179 ng Hg/g ww, with mean [Hg] above the human health benchmark in four lakes, one from each of the four park units: Gates of the Arctic, Lake Clark, Noatak, and Wrangell-St. Elias. The Trophic Magnification Factor (TMF), the change in [Hg] per trophic level, varied from 2.95 to 5.25 in six lakes, indicating that Hg is biomagnifying through all lake food webs but at different rates. At the fourth trophic level (i.e., the Lake Trout), [Hg] is 11 times higher in the lake with the highest TMF compared to the lake with the lowest TMF. Further work will investigate the role of varying diet proportions across benthic and pelagic energy compartments and trophic level omnivory in determining the influence of food web structure on Lake Trout [Hg] in Subarctic and Arctic lakes.

Northern Pike Suppression Efforts on Shell, Whiskey, Hewitt & Chelatna lakes.

Heale, Emily. CIAA

Since 2013, Cook Inlet Aquaculture Association (CIAA) has focused efforts on northern pike suppression in Chelatna, Shell, Whiskey, and Hewitt lakes within the Susitna drainage. This presentation will walk through the suppression work completed by CIAA and look towards the future of these lakes. Through grants and partnerships, including from and or with the Alaska Sustainable Salmon Fund, the U.S. Geological Service, the Alaska Department of Fish and Game, the Matanuska Susitna Borough, the Matanuska-Susitna Basin Salmon Habitat Partnership, and the University of Alaska Fairbanks, CIAA has removed over 20,000 northern pike through various methods, as well as provided valuable data for invasive species research. Local landowners have also been valuable partners in these efforts.

Salmon declines coincide with climate mediated increases in consumption by a novel predator

Rich, Benjamin A. UAF
Sepulveda, Adam J. USGS
Falke, Jeffrey A. USGS,UNR
Rinella, Daniel J. USFWS
Schoen, Erik R. UAF
Westley, Peter A.H. UAF

In this research we explored the potential for synergistic effects of warming and invasion to better understand observed changes in a freshwater assemblage of socially-valuable salmonid fishes. Through syntheses of datasets from an introduced population of Northern Pike spanning a decade of warming and declining salmon returns, we quantified changes in population structure and diet composition and used bioenergetics models to estimate predator consumptive demand under high emissions scenarios for the middle and end of the century compared to a baseline from the last twenty years. During the last decade, the population structure of predatory Northern Pike shifted towards younger individuals with increased early-life growth rates and smaller maximum size. Concurrently, the biomass of juvenile salmon consumed decreased across all age classes of Northern Pike while consumption of other resident fish species increased proportionally, suggesting prey switching consistent with declines in the availability of preferred salmon prey. Consumption of Chinook Salmon by age 2+ Northern Pike decreased by 7.9 - 55.4% in the last decade while consumption of Coho Salmon decreased by greater than 75% across all age classes except age 2 (-41.4%). Bioenergetic simulations revealed increases in total per capita consumption of prey by Northern Pike ranged from 6 to 12.5%. Across mid-century and end of century scenarios, the largest increases in consumption occurred in age 3+ Northern Pike. These findings collectively suggest that changing thermal regimes may disproportionately affect the consumptive needs of larger Northern Pike and may increase total consumption enough to appreciably increase mortality of preferred prey, exacerbating changes in species composition and community structure.

Hydropower in Alaska: Creating Energy and Mitigating Risks for Fish

Ellis, Leah M. Alaska Department of Fish & Game

This presentation will provide an overview of current and proposed hydropower and hydrokinetic projects in Alaska that are under the jurisdiction of the Federal Energy Regulatory Commission (FERC). Since hydroelectric projects often overlap with fish habitat, they must be studied and designed with consideration of the surrounding environment. This presentation will discuss some of the ways in which impacts to our fish and aquatic ecosystems can be mitigated through pre- and post-construction studies and hydropower designs.

An overview of beaver effects on fish in Alaska

Samuel, William T, International Arctic Research Center, University of Alaska Fairbanks

Beavers are ecosystem engineers that affect all aspects of stream morphology and ecology, including fish. The amount and robustness of scientific literature about beavers and fish varies widely across North America, and research in Alaska and Canada is limited. In this presentation, we will give a brief overview of our recent research about beavers and fish, with a focus on species distributions across the landscape. Next, we will summarize the other literature in Alaska and compare these emerging patterns to those seen in other regions. Finally, we will discuss the implications of an expanding beaver range in the North American Arctic and prioritize future research needs.

Contributed Talks: Spatial Distribution and Movement of Salmon and Trout-*Tuesday PM*

Run Timing and Spawning Distribution of Copper River Chinook Salmon

Schwanke, Corey J. Alaska Department of Fish and Game, Division of Sport Fish
Piche, Matt J. Native Village of Eyak, Department of the Environment and Natural Resources

A total of 1,975 radio tags were placed in migrating Chinook salmon *Oncorhynchus tshawytscha* in the Copper River from 2019 through 2021 to examine spawning distribution and run timing. Chinook salmon were captured with fish wheels in the Lower Copper River near Baird Canyon and tracked to upriver destinations with 10 fixed-tracking stations and a series of aerial surveys. Spawning distribution was for 6 major spawning tributaries/areas each year using a weighting process. Estimated annual proportions of the escapement ranged from 0.19 to 0.24 for the Upper Copper River area, 0.19 to 0.27 for the Gulkana River, 0.01 to 0.05 for the Tazlina River, 0.10 to 0.19 for the Tonsina River, 0.19 to 0.28 for the Chitina River, and was 0.14 all 3 years for the Klutina River. Estimated annual abundances for the 6 major spawning tributaries/areas from 2019 through 2021 were 3,410–8,369 for the Upper Copper River area, 4,419–6,548 for the Gulkana River, 289–961 for the Tazlina River, 2,171–4,591 for the Tonsina River, 3,535–9,767 for the Chitina River, and 2,608–4,909 for the Klutina River. The annual estimated proportions of the total escapement that returned to 1 of the 9 original aerial index streams ranged from 0.39 to 0.47. The estimated annual proportion of the Gulkana River fish that spawned above the Alaska Department of Fish & Game (ADF&G) counting tower ranged from 0.58 to 0.68. Run timing patterns were similar during all 3 years with the Upper Copper River fish having the earliest run timings, followed by the Gulkana, Chitina, Tazlina, Tonsina, and Klutina Rivers. A secondary analysis was performed weighting each radiotagged fish using adaptive resolution imaging sonar (ARIS) estimates of “large” fish, which were all presumed to be Chinook salmon.

Habitats occupied by Chinook salmon in the Gulf of Alaska and in the U.S. Navy’s Temporary Maritime Activities Area

Seitz, Andrew C. University of Alaska Fairbanks
Courtney, Michael B. University of Alaska Fairbanks

The U.S. Navy conducts training exercises in the Gulf of Alaska (GOA) Temporary Maritime Activities Area (TMAA). The Navy is interested in understanding the overlap of occurrence between populations of Chinook salmon and these training activities. To provide insights into Chinook salmon ocean ecology while occupying waters of the GOA, including the TMAA, we analyzed data retrieved by pop-up satellite archival tags (PSATs) attached to individual Chinook salmon (n = 183, 2013–2022), near Dutch Harbor, AK (n = 30), the central Bering Sea (n =13), Chignik, AK (n = 20), Kodiak, AK (n = 20), Homer, AK (n = 40), Yakutat, AK (n = 20), Sitka, AK (n= 20), and Craig, AK (n = 20). Tissue samples were collected from a subset (n = 148) of tagged fish to determine stock-of-origin of each tagged fish. Of the 183 PSATs deployed, 166 reported to satellites and four were recaptured in fisheries, providing over 7,000 days of Chinook salmon behavioral and habitat data. Reporting locations of tags were widespread across the eastern North Pacific Ocean, ranging as far west as the Bering Sea to as far east as the U.S. Pacific Northwest. Analyses have suggested that while tagged Chinook salmon occupied the TMAA, 52% of the estimated daily locations occurred over the continental shelf, while the remainder of the days occurred over continental slope (24%) and basin (24%) habitats. Genetic analyses suggest that tagged Chinook salmon primarily originated from Southeast Alaska, British Columbia, Washington, and Oregon, making our results pertinent for many populations throughout North America. The information about Chinook salmon gained in this study may be used to provide insights into important management issues in the North Pacific Ocean.

Coastal Cutthroat Trout: The Phantom of Prince William Sound

Taylor Cubbage, Alaska Department of Fish and Game
Arthur, Donald E, Alaska Department of Fish and Game
Blain-Roth, Brittany J, Alaska Department of Fish and Game
Cathcart, Charles N, Alaska Department Fish and Game

Coastal Cutthroat Trout (CCT) (*Onchorhynchus clarkii clarkii*) are an anadromous member of the Cutthroat Trout species complex, occurring in coastal rainforests from Northern California into Prince William Sound (PWS), Alaska. With diverse resident and migratory life histories but a common reliance on headwater streams for spawning, CCT populations have declined in the lower 48 and British Columbia due to habitat fragmentation and climate change. Coastal Cutthroat Trout distribution is well documented in southeast Alaska, but we still do not know their northwestern extent in PWS. This knowledge gap is of interest for CCT management because species are more vulnerable at the fringes of their range and backcountry angling for CCT is increasing in PWS. To better understand the distribution of this anadromous fish, ADF&G staff spent the summers of 2020-2023 sampling waterbodies in PWS for CCT via angling and electrofishing. As PWS contains over 750 waterbodies that may harbor CCT, we collaborated with the angling community and used a CCT intrinsic potential model created by S.J. Hochhalter to inform our sample locations. We will share community outreach methods, results, and future plans for this project as it comes to a close.

Pacific salmon in Alaska's Arctic: Old wine in new bottle?

Westley, Peter. Department of Fisheries, University of Alaska Fairbanks
Lindley, Elizabeth. Department of Fisheries, University of Alaska Fairbanks
McMahon, Julia. Department of Fisheries, University of Alaska Fairbanks
Berdahl, Andres. School of Aquatic and Fishery Sciences, University of Washington
Seitz, Andrew. Department of Fisheries, University of Alaska Fairbanks
Spencer, Joe. Division of Sportfish, Alaska Department of Fish & Game
Scanlon, Brendan. Division of Sportfish, Alaska Department of Fish & Game
Brown, Randy. US Fish & Wildlife Service

The poleward expansion of temperate species is a clear harbinger of global climate change. In the Alaska Arctic, Pacific salmon have been observed by Indigenous hunters and fishers for at least a century, and in the last decade appear to be more commonly encountered by northern residents. What remains unknown, is whether Pacific salmon are in the process of establishing self-sustaining populations in rivers that flow to the Arctic Ocean. This talk presents work aimed to illuminate this question, and highlights recent fieldwork during the fall of 2023 that provides unequivocal evidence of spawning chum salmon (*Oncorhynchus keta*; Iñupiatun, iqalugruaq) in the Anaktuvuk and Itkillik Rivers, tributaries of the north-flowing Colville River that empties to the Beaufort Sea. Spawners were observed using off-channel groundwater/hyporheic sloughs, which is consistent habitat for fall spawning chum salmon throughout their native range. Dolly Varden (*Salvelinus malma*; Iñupiatun, iqalukpik) were observed in large quantities in other portions of the river, but were not observed in the same locations as spawning salmon, raising questions about the potential (or lack thereof) for interspecific interactions. Beyond documentation of spawning, otoliths and tissue samples were taken from 55 spawned out individuals and recovered carcasses that will be invaluable to investigating questions of fish provenance and establishment. Temperature loggers were installed directly into nests, which will allow for calculation of hatching and emergence timing and will directly address whether incubation to the early life history was potentially successful if temperatures remained above freezing. Combined with previous opportunistic observations of western scientists and deep-time knowledge by Indigenous residents, this works provides incontrovertible evidence that that Pacific (chum; iqalugruaq) salmon are spawning in Alaska’s Arctic rivers.

Contributed Talks: Community and Tribal Fisheries Knowledge, Management, and Research-*Tuesday PM*

Community-based Mapping of Salmon Habitat in the Kenai Peninsula Borough, Alaska

Benjamin Meyer
Alexa Millward
Trent Dodson

Headwater salmon streams often do not appear on the maps that regulators and managers use to understand wild salmon habitat in Alaska. As a result, many waterbodies that support fish populations intrinsic to the region's culture, economy, and ecology face the threat of being overlooked and harmed in development projects. Improving the map of known anadromous (salmon-bearing) waters can help mitigate this issue. The Alaska Department of Fish and Game (ADF&G) estimates that only fifty percent of Alaskan freshwater salmon habitat is currently documented. The work of documenting salmon habitat falls to an array of agencies, tribal entities, and nonprofits. In the Kenai Peninsula Borough, thousands of "backyard" streams – both documented and undocumented - are individually small, but together they are the nursery grounds for millions of salmon that support fisheries of high cultural and economic value. To address the issue of unmapped salmon habitat in the central Kenai Peninsula Region, in 2021 the Kenai Peninsula chapter of Trout Unlimited initiated a partnership with local nonprofit Kenai Watershed Forum. Together, we worked to train volunteers to conduct juvenile salmon field surveys. With the support of over 25 volunteers who contributed over 300 hours, since 2021 we have nominated 17.5 miles of stream and 1152 lake acres to the Alaska Department of Fish and Game's Anadromous Waters Catalog, and. We will continue our efforts in Summer 2024, and apply experimental mapping technologies to help prioritize our fieldwork. With the knowledge we are generating, local habitat managers can use the updated maps of the extent of salmon habitat to guide decisions about conservation and permitting.

Engaging Rural Communities in Critical Habitat Data Collection: Fish Map App

Russell, Nyssa B. Northern Latitudes Partnerships
Bauscher, Heather, Sitka Conservation Society
Poe, Aaron, Northern Latitudes Partnerships
Garcia, Hannah-Marie, Indigenous Sentinels Network
Reda-Williams, Maya, Indigenous Sentinels Network

The Alaska Fish Habitat Mapping App (Fish Map App) is funded by the U.S. Fish and Wildlife Service and developed in collaboration with Alaska Department of Fish and Game (ADF&G). It uses simple smartphone technology that does not require a cell connection to collect data to enhance and expand the Anadromous Waters Catalog (AWC) with help from Alaskans. Working with local residents who have existing knowledge of the lands and waters helps to broaden capacity to document fish presence data for nominations to the AWC. Only a fraction of fish-bearing waters in Alaska are currently cataloged in the AWC, leaving vast areas of essential fish habitat undocumented. We are pursuing this work in collaboration with The Indigenous Sentinels Network (ISN) which is a program operated by the Aleut Community of St. Paul Island, helping to meet the data collection and management needs of Tribes. Powered by ISN this project helps to "crowdsource" the immense efforts needed to document the numerous rivers, lakes, and streams utilized by anadromous fish species from egg to spawning adult throughout the state. The 2022 pilot season of this project resulted in 13 unique nominations to ADF&G, and 19 nominations were submitted in 2023. More at www.AlaskaFishMapping.org

Unveiling Over a Century of Tribally-Led Sockeye Salmon Escapement with the Native Village of Nanwalek

Lee, Madeline L. Chugach Regional Resources Commission

The English Bay Lakes (EBL) System is located on the Kenai Peninsula near the Native Village of Nanwalek. Salmon that return to this system are crucial to the Sugpiat people of Nanwalek for cultural connection, community health, well-being, and economic well-being which is encompassed by the term subsistence. Since the early 1920s, the community of Nanwalek has collected data on salmon enumeration and escapement of the EBL system with federal and state management using spruce trees and root ties for fish weirs. In 1992, the Native Village of Nanwalek established the Sockeye Enhancement Program due to the growing concern of sockeye salmon returns. A downward trend in escapement of EBL sockeye has led to numerous evaluations by external entities to determine factors that could be impacting the decline. However, these evaluations lacked community integration, Tribal self-determination, and autonomy due to the fishery science and management process. Based on these concerns, in 2017 an interdisciplinary team of project partners, comprised of the Village of Nanwalek, Chugach Regional Resources Commission, Alaska Pacific University, and Alaska Department of Fish and Game, came together in partnership to address community-specific research questions related to the EBL sockeye fishery. As partners in knowledge production, the goal was to conduct Indigenous-led research to guide core initiatives throughout project conception, design, and implementation. As of today, these project partners are actively involved in EBL fishery research and the Nanwalek people continue to monitor EBL escapement with an upgraded video weir system planned for the summer of 2024.

Collaboration between Yukon First Nations and a Biological Consulting Company

Szekeres, Petra
Teslin Tlingit Council
Tr'ondëk Hwëch'in First Nation
Kwanlin Dün First Nation
Reda-Williams, Maya, Indigenous Sentinels Network

Canadian Yukon River Chinook salmon populations undertake one of the longest fish migrations in the world, with the number of Chinook reaching spawning grounds trending downwards. In response, many Yukon first nations have not practiced subsistence fishing for decades and struggle to maintain generational connection to Chinook. Tr'ondëk Hwëch'in (TH), Kwanlin Dün First Nation (KDFN), and Teslin Tlingit Council (TTC) have been steadfast stewards of Chinook salmon and have invested many years and resources into understanding the dynamics of their local populations. From the Alaskan border, Chinook salmon first reach the TH traditional territory surrounding Dawson City, Yukon Territory, over 1,900 km (1,200 mi) from the Bering Sea. As the Chinook salmon approach Whitehorse, they enter the traditional territory of KDFN after traveling 2,500 km (1,500 mi) to reach spawning grounds. One of the farthest spawning populations exists in the traditional territory of TTC near Teslin, a distance of over 2,900 km (>1,800 mi) from the start of their migration. All these first nations share the same vested interest in understanding and restoring Yukon-origin Chinook salmon. In collaboration with Environmental Dynamics Inc. (EDI) based in Whitehorse, Yukon, they have undertaken studies to understand Chinook salmon spawning success and developmental timing to inform future restoration, as far back as 2015. These studies have included elements of instream incubation studies to study egg survival and development timing, adult stress physiology, and aerial surveys and sonar camps to monitor returning spawners. Due to record low returns and cultural and ethical thresholds for actively disturbing spawners, in the past three seasons only aerial surveys and sonar have continued. This presentation will cover the methodologies, results, and learnings from nearly a decade of collaborative research into Yukon Chinook salmon.

Nanutset qit'a ideshni "We Understand Our History": Historical Analysis of Dena'ina Dispossession and Resiliency in Tikahtnu (Cook Inlet) and Kahtnu (Kenai River) Fisheries

Jacuk, Nicholas M. UAF CFOS

In order to know where we are going, we must honor where we came from. Dena'ina relations to Kahtnu (Kenai River, Alaska) and the Tikahtnu (Cook Inlet, Alaska) is a connection represented through thousands of years of stewardship. However, for the last 150 years, the Indigenous communities of Tikahtnu and Kahtnu have experienced dramatic cultural threats as a result of fisheries industrialization. The purpose of this research asserts how Indigenous sovereignty, on an institutional level, has been neglected within the history of western fisheries management, which has greatly limited the ability of access and stewardship of Indigenous communities in this region. This community-based project addresses these barriers of Dena'ina representation and access within Kahtnu fisheries. Specifically drawing on qualitative research methods through source analysis and interviews to: (1) outline the history of Tikahtnu and Kahtnu fisheries industrialization and Dena'ina dispossession, and (2) center Dena'ina values and resiliency across history and the present to better inform a more equitable process forward within fisheries management. Despite all of these current and historical events, the values instilled through generations of Dena'ina knowledge have maintained the necessary connection with the fish and all living beings across the land and water. This research will contribute to a growing area of research identifying inequities within Alaska's fisheries management systems and provide a path forward for greater representation of Alaska's Indigenous fisheries.

Symposium: Western Alaska Salmon-*Wednesday AM*

The Gravel to Gravel Keystone Initiative: Investments in stream habitat restoration and partnerships to create a more resilient future for salmon

Shaftel, Rebecca S. BLM

The Gravel to Gravel Keystone Initiative is one of nine initiatives across the country where the Department of the Interior is investing in ecosystem restoration and habitat resilience to support conservation and stewardship of our public lands. The Gravel to Gravel Initiative is focusing on projects that help Pacific Salmon, building relationships to advance co-stewardship, and responding to ecosystem threats to food security. The focal area of the initiative is the Yukon, Kuskokwim, and Norton Sound regions where salmon populations have been in decline and subsistence fishing closures have severely affected communities. The Bureau of Land Management is engaged in projects to assess stream habitat condition and trend and restore stream habitats affected by historic instream mining. Stream habitat assessments are being expanded across the Arctic Yukon Kuskokwim region on all land ownerships to provide information on current condition and to steer restoration efforts to streams that will have the greatest impact on declining salmon populations. Stream restoration projects are currently underway in BLM Restoration Landscapes – the Fortymile, Birch, and Beaver Creek watersheds. These projects are part of BLM's long-term effort to refine stream habitat rehabilitation techniques to improve restoration success across the state and provide a critical foundation for creating resilient salmon habitats into the future.

Restoring salmon habitat in Coal Creek, Yukon-Charley Rivers National Preserve, as part of the Gravel-to-Gravel Keystone Initiative

Simmons, Trey National Park Service*
Bealer, Steve Salcha-Delta Soil and Water Conservation District
Burger, Paul National Park Service
Coykendall, Shannon National Park Service
Geroy, Ivan Salcha-Delta Soil and Water Conservation District
Harman, Will Stream Mechanics, Inc.
Hults, Chad National Park Service
Rasic, Jeff National Park Service
Sattler, Robert Tanana Chiefs Conference
Wilson, Lori Salcha-Delta Soil and Water Conservation District

Coal Creek is a tributary to the Yukon River between Circle and Eagle. Streams in this area have been shown to support rearing of juvenile Chinook salmon, which genetic studies have shown are largely derived from Canadian spawning populations. Starting in the early 20th century Coal Creek was heavily mined for gold, initially using a dredge and later using bulldozers. The result was significant disruption of the stream and valley for over 7 miles with an accompanying degradation of habitat for fish, including salmon. As part of the Gravel-to-Gravel Keystone Initiative, the National Park Service (NPS) recently received funding to restore salmon habitat in Coal Creek. This project will be accomplished in cooperation with the Salcha-Delta Soil and Water Conservation District, which has extensive experience in planning and conducting stream restorations in Interior Alaska. At present we are planning to employ a combination of Natural Channel Design and process-based approaches to accomplish the restoration, ideas which will be refined at an upcoming conceptual design workshop. The Alaska Interior Stream Quantification Tool (AKintSQT) will be used to assess current conditions in Coal Creek, to estimate the functional uplift that can be achieved from the planned restoration, and to monitor the success of the restoration post-construction. To date we have collected extensive baseline data throughout the proposed restoration reach, including channel geometry and valley-wide LiDAR, as well as water quality and macroinvertebrate samples. Extensive fish surveys will be conducted this summer, both in Coal Creek as well as in nearby reference streams, along with a baseline AKintSQT assessment. In this talk we will summarize existing condition data and outline our plans to restore salmon habitat.

Leveraging lessons learned on placer mined landscapes to springboard stream restoration in support of the new Gravel to Gravel Keystone Initiative

Varner, Matthew S. Bureau of Land Management

Placer gold mining in Alaska began in the 1800s and continues today under the 1872 Mining Law. Repairing streams affected by mining wasn’t a focus until environmental laws and regulations materialized in the 1970s and 80s. Despite a regulatory emphasis on the rehabilitation of fish habitats, rebuilding valleys and stream habitats turned upside down from mining have often fallen short of agency goals. Since 2013, the BLM has been building key datasets to help inform restoration plans. Additionally, the BLM has also been leading the design and construction of stream restoration projects to help refine techniques in sub-Arctic Alaska. These efforts have paved the way for technical publications, the development of diverse restoration stakeholder groups, and major investments in stream restoration within the Gravel to Gravel Keystone Initiative region.

Genetic stock composition of chum salmon harvested in commercial salmon fisheries of the South Alaska Peninsula

Dann, Tyler. Alaska Dept of Fish and Game, Gene Conservation Laboratory, Anchorage AK
Hoyt, Heather. Alaska Dept of Fish and Game, Gene Conservation Laboratory, Anchorage AK
Lee, Elizabeth. Alaska Dept of Fish and Game, Gene Conservation Laboratory, Anchorage AK
Gilk-Baumer, Sara. Alaska Dept of Fish and Game, Gene Conservation Laboratory, Anchorage AK
Fox, Elisabeth K.C. Alaska Dept of Fish and Game, Division of Commercial Fisheries, Kodiak AK
Foster, M. Birch. Alaska Dept of Fish and Game, Division of Commercial Fisheries, Kodiak AK

The South Alaska Peninsula commercial salmon fishery occurs in the Alaska Peninsula Management Area and is regulated by multiple management plans approved by the Alaska Board of Fisheries. Relatively large harvests of chum salmon in South Alaska Peninsula fisheries in recent years corresponding with small returns of chum salmon to Western Alaska raised concerns among stakeholders about the stock-specific harvests in South Alaska Peninsula fisheries. Estimates of stock-specific harvests provide important information for fishery managers within the Department as well as for Western Alaska stakeholders, the fleet and industry, and policy makers on the Board of Fisheries. We designed a robust analysis program to answer policy-specific questions regarding stock-specific harvests among gear types, areas and time periods. For analysis years 2022-2023, June fisheries tended to be dominated by Asia, Coastal Western Alaska, and East of Kodiak groups, with variation by gear type and fishery location. July and August fisheries were more likely to be comprised of local stocks, such as South Peninsula and Chignik/Kodiak groups. These results are part of an ongoing study and provide the most current and comprehensive estimates of stock-specific harvest of chum salmon in the South Alaska Peninsula area. They supplement previous studies and should inform fishery management and regulatory process.

Divergent responses of western Alaska salmon to a changing climate

Schoen, Erik R. International Arctic Research Center, University of Alaska Fairbanks
Howard, Kathrine G. Division of Commercial Fisheries, Alaska Department of Fish and Game
Murphy, James M. Auke Bay Laboratories, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration
Schindler, Daniel E. School of Aquatic and Fishery Sciences, University of Washington
Westley, Peter A. H. College of Fisheries and Ocean Sciences, University of Alaska Fairbanks
von Biela, Vanessa R. Alaska Science Center, U. S. Geological Survey

Salmon populations in western Alaska have responded differently to recent climatic changes, with Chinook and chum salmon reaching record low abundance levels (81% and 92% below the 30-year mean, respectively), while sockeye salmon have attained record high abundance levels (98% above the 30-year mean) since 2020. Why these species have responded differently has important implications for the future of Pacific salmon in a warming Arctic. Here, we report evidence of these changes primarily through the lens of western science, focusing on a few well-studied stocks, and we acknowledge this talk does not convey the breadth of perspectives or the complexity of ecological changes across the region. Salmon are maturing at smaller sizes across the region. Since the 1970s, for example, Yukon River Chinook salmon have decreased an estimated 6% in mean adult body length and 15% in fecundity, likely exacerbating population declines. Changes in abundance and size are associated with climatic changes in freshwater and marine ecosystems and competition in the ocean. Changes in predators, food supply, and disease are also likely important drivers. Salmon population declines have led to fishery closures, worsened user conflicts, and had profound cultural and food security impacts in Indigenous communities that have been tied to salmon for millennia. While the rapidly changing climate appears to be an important driver of salmon abundance, more work is needed to understand the causal mechanisms and to develop policy actions that are responsive to changing salmon abundance and demographics. Actionable research at the science-policy interface is needed to understand how decisions at local, regional, and global levels can most effectively support salmon recovery, sustainable fisheries, and the well-being of people in a warming world.

Western Alaska Chinook salmon heat stress assessment during and after summer 2019 heatwave

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Regish, Amy R. U.S. Geological Survey, Eastern Ecological Science Center, S.O. Conte Research Laboratory, Turners Falls, MA
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Spaeder, Joseph. Kuskokwim River Inter-Tribal Fish Commission, Bethel, AK
Whitworth, Kevin. Kuskokwim River Inter-Tribal Fish Commission, Bethel, AK
Leon, Justin. Kuskokwim River Inter-Tribal Fish Commission, Bethel, AK
Gillikin, Daniel. Native Village of Napaimute, Aniak, AK
Liller, Zachary. Alaska Department of Fish and Game, Anchorage, AK
Ivanoff, Renae. Norton Sound Economic Development Corporation, Unalakleet, AK
Bell, Jennifer. Alaska Department of Fish and Game; Larson, Sean D. Alaska Department of Fish and Game; Carey, Michael P. U.S. Geological Survey, Alaska Science Center, Anchorage, AK; Zimmerman, Christian E. U.S. Geological Survey, Alaska Science Center, Anchorage, AK

Chinook salmon population declines span their entire range. Warming freshwater temperature concerns in their northern range gained urgency in 2019 when a heatwave coincided with observations of premature mortality. This study includes heat stress sampling as a response to mortality observations, describes water temperature conditions in historical context, and builds on heat stress evidence in Yukon Chinook salmon by expanding to adjacent Western Alaska populations. Prevalence of heat stress was estimated using the heat shock protein 70 (HSP70) biomarker from non-lethal muscle biopsies opportunistically collected during summers 2019–2022 from four Kuskokwim River tributaries, two Norton Sound rivers, and one location in the Yukon River. In the Kuskokwim region, two of the tributaries were sampled during the year of salmon mortality reports (2019) and resampled in a cooler subsequent year. Our sampling captured the widest range of recent water temperature experiences (12 to 21°C) for Chinook salmon returning to the Kwethluk River (Kuskokwim tributary) and demonstrated a distinct HSP70 increase near 18°C. Heat stress prevalence ranged across all locations and years from 8% to 90% across the ten groups of samples where a group is a batch of samples from the same location and year. Three groups of Chinook salmon with prevalent heat stress (>50%) all occurred in the Kuskokwim region (Kwethluk River 2019 and Taktona River 2019, 2020). Review of existing water temperature data sets revealed that 2019 was universally warm, but only broke records in some rivers (e.g., Kuskokwim River record is 24°C set in 2004 vs 22°C in 2019). Summer-run Kuskokwim salmon populations experienced water temperatures ≥18°C in at least half of the last 40 years (1985–2023). This study justifies expanded efforts to monitor water temperatures, heat stress, and mortality outcomes in northern Pacific salmon populations that can inform climate adaptive fishery management strategies.

Blood-based biomarkers of cardiac health in Pacific salmon

Clinton, Morag University of Alaska Fairbanks
Chadwick, Chris Life Diagnostics
Ferguson, Jayde Alaska Department of Fish and Game

In recent years, numbers of migrating adult Pacific salmon returning to drainages such as the Yukon River have seen marked reductions. Recent evidence points to both marine and freshwater challenges to fish health that influence numbers of adults returning to spawn, including involvement of in-river stressors during spawning migration. An emerging body of research highlights the importance of Pacific salmon cardiac function and tissue integrity during these spawning migrations, with documented negative impacts from stress on cardiovascular performance and overall survival of migrating fish. For Yukon River Chinook salmon (Kings), in-river stressors with proposed links to reduced migration success include elevated water temperature and infection of fish by the organism *Ichthyophonus*, acquired in the marine environment but apparently amplified during freshwater migration. Both stressors impact cardiac tissue, potentially compounding strain on the heart from the long migration distance fish travel. Altered health of Chinook salmon within the Yukon River drainage is of serious concern to Indigenous fishing communities and management agencies in both Alaska and Canada that rely on Chinook salmon as part of their subsistence lifestyle. Study of the heart-health of Yukon River Chinook salmon is therefore a research area of clear importance towards understanding factors that negatively affect spawning migration success and mechanisms of altered fish health. This study utilized varied tools to assess the cardiac health of migrating adult Yukon Chinook salmon alongside exploration of factors that impact cardiac health. Here we present preliminary findings from the use of clinical biomarkers obtained via blood sampling alongside histological assessment of heart tissue to understand the cardiac health of returning adult Chinook salmon. By contrasting the findings of clinical pathology to the *Ichthyophonus* infection status in fish, we also explore the usefulness of tested biomarkers as indicators of infection status. For Yukon River Chinook salmon, in-river stressors with proposed links to reducing migration success include elevated water temperature and infection of fish by the organism *Ichthyophonus*, acquired in the marine environment but apparently amplified during freshwater migration. Both of these stressors impact cardiac tissue, potentially compounding strain from the long migration distance fish travel. Altered health of Chinook salmon within the Yukon River drainage is of serious concern to Indigenous fishing communities and management agencies in both Alaska and Canada that rely on Chinook salmon as part of their subsistence lifestyle. Study of the heart-health of Yukon River Chinook salmon is therefore a research area of clear importance towards understanding factors that negatively affect spawning migration success and mechanisms of altered fish health.This study utilized varied tools to assess the cardiac health of migrating Yukon Chinook salmon alongside exploration of factors that impact cardiac health. Here we present preliminary findings from the use of clinical biomarkers obtained via blood sampling alongside histological assessment of heart tissue to understand the cardiac health of returning adult Chinook salmon. By contrasting the findings of clinical pathology to the Ichthyophonus infection status in fish, we also explore the usefulness of tested biomarkers as indicators of infection status.

Heartbeat of the Yukon: Examining Ichthyophoniasis in Chinook Salmon cardiac tissue and potential link to en route mortality

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Walter, Scott T. United States Fish and Wildlife Service
Clinton, Morag. University of Alaska Fairbanks
Black, Jessica. University of Alaska Fairbanks
Carothers, Courtney. University of Alaska Fairbanks
Carroll, Holly. United States Fish and Wildlife Service
Westley, Peter A.H. University of Alaska Fairbanks

Research that assesses overall salmon health with relational accountability to the Peoples and communities of the Yukon River is urgently needed. In this talk, we describe work that utilizes a two-eyed seeing approach to meld multiple knowledge systems (Indigenous, local, and western) to tackle pressing issues currently facing Yukon River fisheries management. This research focuses on the health of adult upstream migrating salmon, with an emphasis on the parasitic pathogen *Ichthyophonus*, and the impacts of ichthyophoniasis disease on Yukon River Chinook Salmon. To determine current trends in ichthyophoniasis during freshwater migration of adult Yukon River Chinook Salmon and explore an association of *Ichthyophonus* infection and en route mortality, this research partnered with Tribal Governments, Indigenous and local fishers, and state and federal fishery management agencies to collect and analyze samples. In addition to quantitative *Ichthyophonus* assessment, this research centers an inclusive approach to research by co-interpreting, and co-developing research outcomes from multiple perspectives. Here we focus on gross visual identification of ichthyophoniasis disease on cardiac tissue of infected Chinook Salmon, and the accuracy of gross visual identification compared to histological and qPCR confirmation at multiple locations within the Yukon River drainage. Based on results that show strong concordance between methods, we finish the talk with exploration of historical trends of disease based on data collected by a subsistence fisher in the middle Yukon River over the last two decades to put into perspective current rates of infection and disease burden.

Linking Climate and Early Life History to Recruitment of Yukon River Chum Salmon

Peterson, Maranda

Chum salmon (*Oncorhynchus keta*) have been a keystone species in the North Pacific since time immemorial. As a vital part of the ecosystem and fisheries, it is important to build upon our understanding of their life history and how the changing environment could impact recruitment success. By focusing on fall chum salmon that emigrate from the Yukon River to the Bering Sea we plan to characterize changes occurring during the late freshwater and early marine phases while also investigating environmental indicators that could relate to fish growth and population success during that early life stage. For this study, we will focus on two objectives. Firstly, we will quantify variability in size and energetic condition of chum salmon fry as they exit the Yukon River delta and compare to our chosen environmental variables that indicate relevance during our study time frame, 2014 – present.
Secondly, we will utilize back-calculated measurements from otoliths collected from fall chum salmon juveniles caught in the Northern Bering Sea (NBS) surveys and compare the calculated mean size of juveniles at marine entry to the mean size of fry sampled in the delta. This process will allow us to test the hypothesis that larger individuals are overrepresented in the NBS survey, which would suggest that smaller individuals exiting the Yukon River suffer higher mortality. Understanding how environmental variation links to the size and survivalof juvenile chum salmon could help with anticipating years of low return for chum salmon in the Yukon River.

Comparison of qPCR, histology, and explant culture for assessing *Ichthyophonus* infection in Yukon Chinook salmon

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Davis J. Stewart Richard M. Kocan Toshihide Hamazaki
Franklin R. Woitel Elizabeth Lee Fred Weast

Yukon River Chinook salmon abundance has declined and been insufficient for achieving full subsistence harvest since the 2000's and record low returns since 2021 have resulted in the first-ever closures of the subsistence fisheries. Studies in the early 2000's demonstrated that heavy infections with the fungal-like parasite, I*chthyophonus*, may impact the survival of adult salmon returns during their long upriver migration. *Ichthyophonus* infection prevalence and severity resurged again since 2020 and resulting riverine en route mortality is a concern because nearly 30-50% fewer fish have arrived at the U.S.-Canada border than estimated by lower river sonar counts. We are investigating whether severe infections with *Ichthyophonus* are associated with en route mortality and the associated Chinook salmon population decline. Addressing this question requires a rapid, sensitive, and high-throughput screening platform to inform fishery managers. We compared results from qPCR to the gold standards of explant culture and histology for assessing *Ichthyophonus* infections in these fish. Hearts from returning adult salmon at Pilot Station in 2021 (n = 198) and 2023 (n = 75) were sampled and processed using all three techniques. Infection prevalence did not differ significantly between analytical tests and ranged by test from 44-49% (2021) and 47-48% (2023). There was a high concordance (k) of parasite detection between qPCR and culture with ^{3}93% agreement. qPCR was ^{3}97% accurate and had high analytical sensitivity (^{3} 98%) and specificity (^{3} 91%). Infection density by qPCR was linearly correlated with histology results for both datasets with an adjusted R2 value of ^{3}0.55. The results indicate that qPCR may be a more desirable primary surveillance tool in this field application, owing to its ease of sample collection in remote locations, high specificity and sensitivity, and ability to provide a quantitative assessment of parasite density.

Reconstructing migratory histories and age of Chinook salmon from the Yukon River and northern Bering Sea with oxygen isotopes and trace elements in otoliths.

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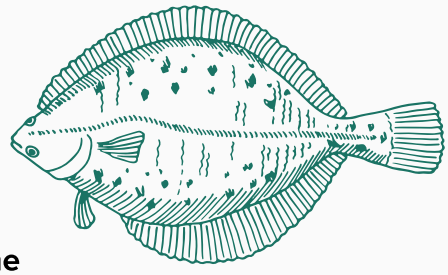
Otolith chemical constituents were used to describe, validate, and reconstruct the migratory history and age of Yukon River Chinook salmon. High resolution spatial maps of zinc (Zn), strontium (Sr), and the crystalline structure of Chinook salmon otoliths were constructed with synchrotron-based hard X-ray microprobe analysis of fluorescence and diffraction. These maps reveal the complex and highly asymmetric spatial distribution of Zn that stems from its association with otolith proteins. Asymmetry in Zn is tied to the asymmetry in crystalline structure and emphasizes the importance of otolith mineralization in the distribution of Zn. Zn varies seasonally within the central plane of growth and this is believed to reflect the dual role of carbonic anhydrase as an enzyme used in the formation of calcium carbonate and as a structural protein in otolith mineralization. Molar ratios of Zn and Ca (Zn:Ca) measured with Laser Ablation Inductively Coupled Mass Spectrometry (LA-ICPMS) covaried with the seasonal temperature fractionation of δ18O measured with Secondary Ion Mass Spectrometry (SIMS) and validates the use of Zn:Ca in age assignments of Chinook salmon.Life-history profiles of Zn:Ca and Sr:Ca from adult and juvenile otoliths were used to assign freshwater and marine ages of Yukon River Chinook salmon. Approximately 6% of Yukon River juveniles were identified to exhibit a subyearling migration (migrate to sea during the same year of hatching); whereas 55% of adult otoliths from the Teslin River (a tributary in the Upper Yukon River drainage) exhibited a subyearling migration behavior. Differences in these proportion identify stock diversity in the expression of this migratory behavior within the Yukon River. The relatively high proportion of subyearling Chinook salmon in the Teslin River was unexpected as this migratory behavior is not thought to be present in the Yukon River based on scale age assignments.

Symposium: Groundfish in Alaska
Wednesday AM



The Complexities of Lingcod Management in Southeast Alaska

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Whether targeted directly or caught as bycatch in commercial and sport fisheries, lingcod (*Ophiodon elongatus*) supports many fishing opportunities in Southeast Alaska. Given lingcod's unique life history and lack of a formal stock assessment, managing lingcod presents several complexities for Alaska Department of Fish and Game fishery managers. Lingcod is currently managed using a combination of guideline harvest ranges (GHRs), allocations, fishing season and area restrictions, and gear limitations. Even with these management tools, the fast-paced lingcod fisheries must be closely monitored in season. This presentation will review the history of lingcod management in Southeast Alaska and highlight a few tricks managers use to stay within harvest limits.

Characterizing Pacific Halibut Movements Within the Bering Sea

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Pacific halibut are widely distributed across the Bering Sea shelf, ranging from Unimak Pass to the Bering Strait. Across this area they are targeted in a directed commercial longline fishery, in which they are currently managed as a singular biological region. As such, fine-scale spatial dynamics within the Bering Sea are not currently incorporated into management procedure. While Pacific halibut are known to forage in relatively shallow waters during the summer months and spawn in deeper waters during the winter, knowledge of their spatial dynamics in the Bering Sea is limited to a small number of localized tagging studies. To better understand their movements, and to assess if the current management paradigm is reflective of those movements, satellite telemetry data were aggregated from Pacific halibut tagged at six locations across the Bering Sea. These data were analyzed using Hidden- Markov modeling techniques, where joint likelihoods were generated by tagging region to identify the scale of fish movements across the Bering Sea. Results indicate that fish are segregated by tagging region during the summer months, and that they show fidelity to these regions across years. During the winter, all fish were seen migrating towards the Bering Sea shelf edge, where individuals from multiple tagging regions occupied common spawning grounds. These results suggest that Pacific halibut in the Bering Sea display foraging contingent behavior, where they are a singular population that exhibits variable foraging behavior. This finding supports the current management approach of the Bering Sea being a singular biological region; however, with commercial fishing occurring during the summer when Pacific halibut are segregated into foraging contingents, there is the potential to overharvest localized contingents. As such, Pacific halibut may benefit from spatially-explicit management within the Bering Sea.

Multi-species analysis of geochemical biomarkers suggests island group compartmentalization of Aleutian Island marine ecosystems

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Analyzing body tissue geochemistry can reveal hidden aspects of a marine species' life histories and ecosystem connections that can inform the management of associated fisheries. While these biomarkers are often considered in the context of a single species' foraging ecology, identifying geochemical patterns across multiple community members can provide broader ecosystem insights (e.g., spatiotemporal variation of ecosystem dynamics or oceanographic controls on overall productivity). To investigate the broader ecosystem dynamics of the remote western and central Aleutian Islands of Alaska, we analyzed variation in three geochemical biomarkers (carbon and nitrogen stable isotope ratios and total mercury concentrations) in muscle tissues from ten groundfish and two cephalopod species (n = 1461). Our analysis identified multiple species-specific relationships with age and foraging behavior on each biomarker. Moreover, our analysis revealed that dividing samples by island groups described biomarker variation better than broader spatial resolutions, suggesting deep-water "oceanic passes" restrict the movement of our study species and the connectivity of other biological and chemical properties in the ecosystem. Carbon and nitrogen stable isotope ratios decreased from east to west, with Amchitka Pass and Buldir Pass acting as stark breakpoints in the enrichment of both isotope ratios. In a marked contrast to isotope ratio patterns, total mercury concentrations were highest in the Rat Islands and decreased with distance from this island group. These same spatial patterns were shared among most of the species we sampled, suggesting environmental geochemistry and trophic interactions within this ecosystem are spatially compartmentalized at remarkably fine scales.

What forage-size fish should a predator consume in the nearshore Beaufort Sea?

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Arctic cod (*Boreogadus saida*), also called polar cod are considered the single most important Arctic forage fish due to their high abundance and nutritional quality. Yet, they are no longer consistently available to nearshore predators due to reductions in sea ice and warmer water temperatures that make cooler, offshore waters more suitable. To consider the nutritional quality of alternative prey, we measured the energy density and estimated whole body energy of forage-sized (39-200mm) fishes collected during summers 2021-2023 (n = 147). Fishes comprised 14 potential prey species and were sampled from two regions in northern Alaska, Foggy Island Bay (near Prudhoe Bay) and Lion Bay (near Flaxman Island). Dry weight energy densities ranged from 16.2 to 25.8 kJ/g (mean ± SD = 22.0 ± 1.73 kJ/g) across individuals. Arctic cod had the highest mean energy density (24.1 ± 0.93 kJ/g, n = 20) while fourhorn sculpin (*Myoxocephalus quadricornis*) had the lowest (19.6 ± 1.91 kJ/g, n = 18). Given that these two species are central to the prey-switch associated with dramatic declines in the productivity of an Arctic predator, Mandt's black guillemot (*Cepphus grille mandtii*), it is notable that they represent energy density extremes in our data set. When whole-body energy was estimated to account for differences in the species-specific size of fishes available to predators, juvenile ciscoes and whitefishes (*Coregonus*) provided the most energy per individual (~100–200 kJ depending on species) given the combination of moderate energy densities (~21-23 kJ/g) and larger average length (~150 mm) among forage-size fishes. Whole-body energy of juvenile ciscoes and whitefishes was at least four-fold that of Arctic cod (~25 kJ) due to their smaller size (~90 mm). Thus, the sensitivity of nearshore predators to changes in Arctic cod availability may depend on their gape. Predators that can easily consume juvenile ciscoes and whitefishes may be more resilient to shifts in Arctic cod distribution.

ADF&G Statewide Rockfish Initiative – The Next Chapter

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ADF&G Statewide Rockfish Initiative Members

The Alaska Department of Fish and Game's (ADF&G) Statewide Rockfish Initiative (SRI) group has been working together for eight years, making significant inroads toward better understanding of rockfish to help with management. Black (*Sebastes melanops*) and yelloweye rockfish (*S. ruberrimus*) comprise the largest proportion of rockfish species harvested in Alaska and have been prioritized in focusing research and improving management policies. There were three pillars defined for the SRI: research and assessment, management and policy, and communications. For research and assessment, one of the biggest tasks was to standardize historical harvest information for use in stock assessment. With the data aligned, work has progressed on several stock assessments, including Kodiak black rockfish, North Gulf Coast black rockfish, Prince William Sound Inside Waters yelloweye rockfish, and Southeast Outside Waters yelloweye rockfish. Also, moving forward, the Divisions and regions have worked together to align rockfish data collection methods and ensure that all data are collected using consistent metrics for comparison and integration in analyses. For management and policy, regulations have already been proposed and adopted by the Board of Fisheries based on research conducted by the SRI.The SRI is also developing a rockfish sustainable management policy that would provide a management framework to guide ADF&G, both divisions. Communications is the third pillar guiding the group. A stakeholder engagement workshop was conducted with help from Anne Beadreau (UW). In addition, public outreach events in the communities of Juneau, Sitka, and Homer have helped educate the public about rockfish while distributing free Rockfish Playing Cards and deepwater release mechanisms (for sportfishing). Our presence on social media and ADF&G website has been a focus for the last three years. The SRI continues to complete stock assessments, craft regulations and policy, and work together to ensure the future of rockfish populations in Alaskan waters.

The fish that saw the 20th Century – A 121 year old yelloweye rockfish

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Yelloweye rockfish, *Sebastes ruberrimus*, is a long-lived, slow growing species found from the Aleutian Islands to Baja California. The dominant member of the demersal shelf rockfish (DSR) species grouping, yelloweye has historically been the target of valuable commercial fisheries throughout most of their range. In recent years, declining stocks in Southeast Alaska have resulted in closures of the directed DSR commercial fishery and restrictions on retention in sport fisheries. A critical aspect of fisheries conservation efforts has been increasing public awareness of these fish and those life-history characteristics that make them vulnerable to depletion. In 2021 the Alaska Department of Fish & Game Age Determination Unit reported the discovery of a yelloweye rockfish aged 121 years old at time of harvest. This fish was born around the year 1900 and lived throughout the entire 20th Century and first two decades of the 21st. The otolith of this rockfish was chosen to be photographed for a public outreach display. Modeled after the famous redwood tree "Cross-Section of Time" exhibit in Muir Woods National Monument, this display shows a cross-section of this otolith with significant historical events that occurred during the lifetime of this fish.

Deepsea Packraft Fishing in Alaska: A budding artisanal fishery or just abnormal?

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The way people access Alaskan fisheries range from our own humble feet to the largest commercial trawlers in the seafood fleet, exceeding 100 m in length. Human-powered craft such as kayaks have been increasingly adopted to chase saltwater fishes. However, the emergence of inflatable packrafts has created new opportunities to exploit marine fisheries. In a 4-year program that overruled the objections of my mom, I demonstrated the efficacy of deepsea packraft fishing as a productive approach to enter localized hook-and-line fisheries. There were two objectives: 1) Follow safe boating practices to maximize fish-catching while minimizing risk; 2) catch fish. From 2020 to 2023, including every month in the calendar, I fished 65 packraft days in Alaskan waters. Effort occurred in Kachemak Bay (5 days), Prince William Sound (6 d), and Resurrection Bay (54 d). Launches were accessed via road, foot, and water-taxi. I used an array of safety mechanisms that avoided any major disasters while enabling year-round fishing in Alaskan coastal waters up to 180 m deep. Fishing gear involved a variety of jigs from 85-455 g, with soft plastics and tipped with bait. Catches from 9-160 m depths included 23 species of saltwater fishes and 1 species of squid totaling an estimated 190 kg (0.2 metric tons, MT), of which, non-dressed weights spanning 13 species of fish and 1 species of squid retained for consumption were estimated at 100 kg (0.1 MT). Deepsea packraft fishing lacks some aspects of safety, comfort, and performance desired by certain anglers. Nonetheless, it allows for fishing habitats that can produce diverse and abundant catches, including many delicious species. More effort, new techniques, and expanding effort to other locations will refine the utility of deepwater packraft fishing in Alaskan waters while continually setting new bars for what is possible by the intrepid angler.

Symposium: Changing Shellfish Fisheries in Alaska
Wednesday PM

Building a spatially explicit framework to quantify the role of predation and climate change on the collapse of snow crab in the Bering Sea

Comeau, Samuel UAF CFOS*
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Eastern Bering Sea (EBS) snow crab (*Chionoecetes opilio*) support one of the most valuable fisheries in Alaska and the United States, worth $132 million in 2020. Despite snow crab abundance reaching historical highs in 2018, abundance plummeted to historical lows alongside a northward contraction in 2021. Past studies on snow crab declines and distribution shifts linked increased Pacific cod (*Gadus macrocephalus*) predation and rising bottom temperatures to snow crab declines, whilst recent studies have identified increased snow crab density coupled with high bottom temperatures as the main drivers. Our objective for this study was to develop a spatially explicit framework to quantify the relationship between snow crab, predation, bottom temperature, and female biomass in the EBS through past abundance fluctuations and within the context of the recent collapse. Using the NOAA EBS summer bottom trawl survey dataset and the NOAA stomach contents database, generalized additive models (GAMs) were used to quantify relationships between snow crab, predation, female biomass, and bottom temperatures throughout the shelf. Spatially explicit GAMs were implemented using the sdmTMB package in R to assess how these factors have impacted snow crab abundances across size and sex classes. Preliminary results suggest that increases in bottom temperature were associated with declines in snow crab abundance, particularly in the southern areas of the EBS shelf. Furthering our understanding of how these factors influence the recruitment of snow crab across the EBS will be critical in the restoration of the fishery under a rapidly changing climate.

Highs and Lows! – Managing the Southeast Alaska Golden King Crab Fishery

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The Alaska Department of Fish and Game (department) golden king crab (*Lithodes aequispinus*, GKC) fishery in Southeast Alaska is a data-limited fishery that is managed based on a 3-S management system (sex, size, and season). The management system has been further developed by limiting the number of participants and gear, establishing guideline harvest levels (GHLs) that are set within guideline harvest ranges (GHRs) for each management area (Table 1), and closing of management areas if there are stock health concerns. A GHL is a preseason estimated level of allowable harvest that will not jeopardize the sustained yield of the stock. The department annually evaluates stock status and establishes GHLs for each management area using fishery dependent data. A GKC Harvest Strategy has been developed and updated in the last 3 years with the purpose of establishing a framework for a consistent and transparent inseason and postseason GHL development and to close fisheries areas when warranted. It is a guideline for managing GKC and not a prescriptive step by step approach. The primary goal is to stabilize fishery performance using transparent and repeatable metrics, and their rationale, by evaluating stock health and measuring fishery performance for more consistent inseason and postseason management. The objectives are to (a) maintain various size and age compositions of stocks to sustain long-term reproductive viability and reduce dependency on annual recruitment, and (b) reduce the risk of overexploitation at low abundance when golden king crab are more vulnerable to overharvest. The harvest strategy uses reference points (historical CPUE from logbooks) and a monitoring strategy which includes inseason and postseason rules that are included in management decisions. GKC fishery management has been challenging, hopes are that in the future, fishery independent information can be collected to aid in this management.

Changes through the Years - Southeast Commercial Tanner Crab Management and Stock Assessment

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The commercial Tanner crab fishery management has changed over the last 30 years from more passive management to using survey results and permit holder effort to determine season length. The Southeast Alaska Tanner Crab Harvest Strategy, which was adopted in 2009, includes many provisions to help with management. In addition, mature male abundance estimates from a stock assessment survey are used to determine additional days for the fishing season in conjunction with the quantity of pots registered for the fishery. The core and noncore areas were defined in regulation in 2003 and in 2012, weather delay criteria regulations were added. This fishery operates under 3-S management (as all Alaskan crab fisheries), avoiding the mating or molting season, no harvest of female crabs, and male size limit to allow at least one to two years of reproducing prior to entering the fishery. Tanner crab stock assessment has evolved over the past 27 years. Prior to 1997, stock assessment analyses consisted of simple summary statistics and trends based solely on fishery-dependent data from dockside sampling, logbooks, and fish tickets. Using Tanner survey results from 1997 through 2006, relative abundance was determined using catch per unit effort (CPUE) surveys. A catch-survey analysis (CSA) from survey data began in 2005. Along with commercial logbook data, this model estimated mature Tanner crab biomass for the 2006/07 season and continues to this day. Tanner crab have been harvested in Southeast Alaska since the early 1960s and were incidentally caught during the red king crab commercial fishery. In the early 1980s, conservation concerns were raised because of the pace of the fishery and in 1984, the Commercial Fisheries Entry Commission (CFEC) made the fishery limited entry in the 1985/86 season, the first Tanner crab fishery to be limited, this limit has helped control effort.

Evaluation of Paralytic Shellfish Toxins in Subsistence Harvested Sea Otters

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Harmful Algal Blooms (HABs) are a concern in coastal communities throughout the state of Alaska. HABs consist of a myriad of phytoplankton, with two species of high concern in coastal Alaskan waters– *Alexandrium* spp. and *Pseudo-nitzschia* spp. These algae can produce dangerous biotoxins, such as saxitoxin (STX), and domoic acid (DA), which are absorbed in shellfish and other filter feeding organisms, as they consume algae in their regular diet. HAB events can occur when sunlight, nutrients, temperature, and turbidity conditions combine to create ideal conditions for bloom production. HAB events are expected to increase as ocean temperatures continue to rise. HABs pose a risk to wildlife as well as rural Alaskan residents. Molluscan shellfish have the potential to store paralytic shellfish toxins (PSTs) in their tissues, which can accumulate and be passed through the food chain. Sea otters (*Enhydra lutris kenyoni*) offer insight as a sentinel species, as their diets closely mirror that of many rural coastal Alaskan community residents. Sea otter diets include a wide array of mollusks, such as clams and mussels. This project evaluates the concentrations of paralytic shellfish toxin congeners in sea otter stomachs contents, and their body fluids, using high-performance liquid chromatography (HPLC). These samples are from subsistence harvested sea otters from Gustavus, Alaska (Icy Strait), a region that includes Alaskans who are regularly engaging in community subsistence shellfish harvesting. Toxin levels are being compared by prey species and by congeners. The predominant stomach content species identified include horse clams (*Tresus capax*), horse mussels (*Modiolus modiolus*), pink neck clams (*Mactromeris polynyma*), softshell clams (*Mya arenaria*), and butter clams (*Saxidomus gigantea*). This project will increase knowledge and understanding of toxin congener profiles in food webs and provide insight for rural communities to support safe subsistence activities.

East Cook Inlet Razor Clam Trends in Natural Mortality and Recruitment During the Sport Fishery Closure

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Siegert, Danielle M. ADF&G

Pacific razor clams (*Siliqua patula*) in east Cook Inlet historically supported the largest sport razor clam fishery in Alaska. Effort peaked in the 1990s, drawing about 35,000 people annually to dig for clams, and declined beginning in the mid-2000s. Following declining adult clam abundance estimates, the Alaska Department of Fish and Game annually closed the fishery in east Cook Inlet from 2015 through 2022. Despite the fishery closure, the stock has failed to recover to historical abundances of adult clams. Immediately following the closure in 2015, the largest-ever observed recruitments of juvenile razor clams were documented, but these strong cohorts failed to survive and grow at the historic rate, ultimately producing very few adult sized razor clams. Other east Cook Inlet razor clam stock indices that reflect productivity have continued to indicate overall poor health of the stock, including below average recruitment of razor clams to the adult size class, high rates of annual natural mortality, poor growth, and truncated age compositions. The continued annual assessment of east Cook Inlet razor clam productivity indices will continue to help understand the recovery of east Cook Inlet razor clams.

Annual Growth of Cook Inlet Razor Clams

Danielle Siegert
Mike Booz
Holly Dickson

Pacific razor clam (*Siliqua patula*) growth can be assessed using growth rings, or annuli, on their shells. In Cook Inlet, the Alaska Department of Fish and Game has collected razor clams annually since 1966 to assess age and length compositions. This assessment included an aging method that measured the length of every annulus to calculate annual growth increments. Growth in the first three years (up to the third annulus) is crucial for a clam to reach its potential maximum size. Studies have not directly assessed what factors affect growth in this region, but biotic (primary productivity, harvest, density) and abiotic (circulation, temperature, substrate) factors are known to affect bivalve growth. Despite differences in growth rates between Cook Inlet razor clam beaches, recent studies have not found genetic differences in Cook Inlet razor clams. Clam growth in recent years has generally been below average, with the biggest differences seen in growth to the third annulus. However, this pattern is not consistent and there have been years of above-average growth for some cohorts.Continued annual growth assessments are being used to evaluate razor clam productivity and understand recovery of East Cook Inlet razor clam stocks.

"Weak meat" condition of Alaska weathervane scallops, *Patinopecten caurinus*, linked to a recently identified pathogenic parasite, *Merocystis kathae* (Apicomplexa: Aggregatidae)

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The weathervane scallop, *Patinopecten caurinus* is the largest scallop species in the world that is only commercially harvested in Alaska. The fishery is considered well managed by ADF&G and the federal government, with many precautionary measures in place to avoid overharvest. However, there have been episodic declines in some management areas due to unknown causes. Fishermen also encounter scallops with abnormal adductor muscles referred to as "weak meat", characterized by muscle retention when shucked, a darkened discoloration, and/or an abnormal texture impacting marketability. A similar syndrome in the Atlantic sea scallop, *Placopecten magellanicus*, described as "gray meat", occurs in the eastern U.S. and Canada. More recently the collapse of Iceland scallop, *Chlamys islandica*, stocks with gray meat was associated with a severe apicomplexan infection that was later detected in similarly affected Atlantic sea scallops. The parasite was identified as *Merocystis kathae*, previously described from the common whelk, *Buccinum undatum*, in 1911. In 2015 Bering Sea fishermen reported weak meat in their catch and submitted samples to ADF&G for diagnosis. Adductor muscles from all affected scallops had many large foci of an apicomplexan associated with necrosis, fibrosis, and muscular atrophy. We performed a survey to estimate prevalence, density, and geographic distribution of this parasite in Alaskan weathervane scallops. We sampled 180 scallops, from individual beds within each of the three major geographically broad scallop areas. Overall prevalence was about 82%, ranging from 69 to 100% by district. Overall mean infection density, based on the number of parasite foci/section, was about 9 (range of 5–29, by location), where scallops from the Bering Sea and Southwest Kodiak Island were most severely infected. Molecular analyses confirmed that the Alaskan parasite is M. kathae, i.e., the same apicomplexan that caused the collapse of Icelandic scallops and a suspected cause for gray meat and mass mortality of Atlantic sea scallops in northeast North America.

Abundance, Distribution, And Habitat Associations of the Giant Red Sea Cucumber (*Apostichopus Californicus*) In Prince William Sound, Alaska

Wilkins, Ben; Fisheries, Aquatic Science, and Technology (FAST) Lab, Alaska Pacific University
Harris, Bradley
Wolf, Nathan
Rumble, Jan

The Giant Red Sea Cucumber (*Apostichopus californicus*) is a benthic echinoderm that has a range extending from Baja, Mexico to the Aleutian Islands of Alaska. They are sexually dimorphic broadcast spawners and play important ecological roles in marine environments as both a prey species and as sediment oxygenators and bioturbators. A successful cucumber harvest has existed in SE Alaska since the late-1980s, and management of this fishery is renowned for its comprehensive area-rotation design and sustainability. As such, state resource managers are looking to adopt a similar management model in Prince William Sound. This new resource would give local fishermen an additional species to target, taking pressure off other invertebrate fisheries (e.g. shrimp and crab), and provide residents with an important economic asset. However, information on the abundance, distribution, habitat associations, and available biomass of cucumbers is both currently lacking and central to the potential establishment of this fishery. We are conducting research that aims to fill this knowledge gap using field surveys and species distribution models. The Alaska Department of Fish and Game, in conjunction with the FAST Lab, initiated surveys in May 2021, and we have successfully completed 239 transect survey dives thus far. Data analysis is currently underway, and preliminary results are available.

Contributed Talks: Alaska Kelp and Mariculture Science-*Wednesday PM*

Spatial and temporal variability of carbohydrate composition in cultivated alaskan kelp

Cameron Jardell
Schery Umanzor

Carbohydrates derived from kelp in the form of polysaccharides and sugar alcohols present significant market opportunities to nascent mariculture industries. These unique sugars can provide value to crop biomass as fiber in edible products and active components in agricultural supplements, while extractive processes have applications in medicine, manufacturing, health supplements, and bio-plastics. The relative abundance and composition of carbohydrates in kelps vary dependent on species, life history, tissue type, season, and environmental conditions. In Alaska, kelp mariculture focuses on three species: sugar kelp (*Saccharina latissima*), ribbon kelp (*Alaria marginata*) and bull kelp (*Nereocystis luetkeana*). There is a lack of published data on the variability of carbohydrate composition in Ribbon and Bull kelp, while the spatial variability observed in sugar kelp limits the application of existing research from Europe to Alaskan populations. Therefore, this study aimed to assess the relative abundance of carbohydrates (glucan, mannitol, alginate, and fucoidan) in cultivated sugar, ribbon, and bull kelp. Samples were collected from five commercial kelp farms between April and June of 2023, in SE and SC Alaska. Carbohydrate composition was analyzed using high-performance anion-exchange chromatography with pulsed amperometric detection. Preliminary results indicate that ribbon kelp contains significantly higher alginate and fucoidan than sugar kelp (6.0% and 2.0% dry mass, respectively) and significantly higher glucan and fucoidan than bull kelp (3.2% and 1.6% dry mass, respectively). The relative abundance of each carbohydrate was variable over the study period and between locations. These results suggest ribbon kelp may be a more valuable crop for carbohydrate extraction based on relative abundance, although further investigation of chemical quality metrics (i.e. alginate uronic acid composition and fucoidan degree of sulphation) are needed to confirm this.

Control of farmed bull kelp biomass via novel seeding and cultivation approaches

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Pryor, Alf. Alaska Ocean Farms
Umanzor, Schery. University of Alaska Fairbanks, CFOS

The use of *Nereocystis luetkeana* (bull kelp) in commercial markets relies on wild harvesting, limiting a scaled economy based on this species while also posing potential risks to wild populations. Existing infrastructure and methods typically used for kelp farming were designed for non-buoyant kelps and are not efficient for cultivating bull kelp, a floating canopy – attempts to do so highlight significant economic and ergonomic challenges during farming and processing. Additionally, most cultivation attempts have yielded high densities of individual fronds, where overcrowding may encourage “skinny” stipes that do not align with the preferred needs of commercial buyers. To address this, we proposed (1) switching from a surface-oriented grow array to a bottom-based array and (2) a novel seeding methodology to control sporophyte density in effort to enhance thalli size. Our approach involves reducing initial kelp meiospore inoculation densities to produce seed lines that will be planted continuously and intermittently (every 1 and 1.5 m) on grow lines to achieve a lower density of fronds conducive to robust growth. We aim to evaluate this methodology's success by monitoring phenotype data throughout cultivation, focusing on size, weight distribution, and yield estimates. We will compare the experimental approach with conventional farming methods to assess improvements in frond size and quality. Our research aims to promote sustainable cultivation practices by reducing reliance on wild harvesting while meeting industry standards for bull kelp used in food products.

Symposium: Fisheries Genomics: Forging Fisheries Solutions using the Building Block of Life
Wednesday PM

Leveraging eDNA Metabarcoding for Fish Biodiversity Assessment in Kachemak Bay, Alaska

Goodwin, Maris R. University of Alaska, Fairbanks.
Tusten, Jennifer L. University of Alaska, Fairbanks.
Glass, Jessica R. University of Alaska, Fairbanks.

As global climate change rapidly impacts Arctic and subarctic marine ecosystems, scientists need tools that will rigorously quantify changes in biological communities. Long-term biodiversity monitoring is essential in glacially influenced estuaries, where the dynamic convergence of freshwater and marine environments supports diverse ecological communities impacted by glacial recession. Cutting-edge tools are enabling scientists to understand and describe the impacts of climate change on biological communities with increasing precision. Genomic sequencing tools such as environmental DNA (eDNA) metabarcoding complement conventional fisheries approaches (e.g., netting) by providing in-depth, rapid, and non-invasive assessments of species composition. We are piloting the use of eDNA metabarcoding as an ecological monitoring tool in five estuarine sites in Kachemak Bay, Alaska with differing degrees of glacial influence. We analyzed (n=100) eDNA samples from April and September 2022. The objectives of this study are to compare eDNA fish detections to a conventional fisheries sampling method (beach seine) and to compare fish assemblages between April and September. The results of this study will build on existing baseline data to document changes in a region heavily impacted by climate change and exemplify how eDNA metabarcoding can be used as an ecological monitoring tool in glacially influenced estuaries.

Macroinvertebrate diversity in burned and unburned streams measured using eDNA

Muehlbauer, Jeffrey D. U.S. Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit
Samuel, William T. University of Alaska Fairbanks, International Arctic Research Center
Zavoico, V. Sebastian. University of Alaska Fairbanks, Department of Biology and Wildlife

The advent of environmental DNA (eDNA) metabarcoding using next-generation sequencing methods holds exciting potential for broad-scale assessments of freshwater biodiversity. In this study, we use eDNA metabarcoding samples to assess wildfire influence on freshwater biodiversity at a regional scale within Interior Alaska. We take advantage of an opportunistic dataset of 122 water samples collected for fish eDNA in summer 2022 throughout ~50 sites across a gradient of wildfire disturbance. We re-analyzed these samples for macroinvertebrate eDNA using both freshwater specific EPTDr2n and generalized invertebrate ArthCOI primers. We will explore the extent to which a freshwater-specific invertebrate primer set amplifies DNA from more aquatic organisms relative to a generic primer, and potentially reduces the chance of non-detection for focal taxa. We will also compare taxonomic bias across primers in terms of the OTUs they return. We will discuss spatial patterns in OTU richness throughout the sampled streams in Interior Alaska and their ability to resolve community differences post-wildfire disturbance. Finally, we will comment on the viability of eDNA samples for species biodiversity assessment in this region.

Novel passive eDNA device enables cost-effective aquatic biodiversity monitoring

Glass, Jessica R. University of Alaska Fairbanks, Department of Fisheries*
Deal, George. University of Alaska Fairbanks, Department of Mechanical Engineering
Wilson, Andrew J. University of Alaska Fairbanks, Department of Mechanical Engineering
Goodwin, Maris R. University of Alaska Fairbanks, Department of Fisheries

The ability to monitor marine and freshwater biodiversity rapidly and cost-effectively is critical for detecting invasive species, tracking animals' range shifts, and for understanding the plants and animals that comprise and distinguish healthy versus disturbed ecosystems. One way to monitor aquatic biodiversity is by identifying taxa present in the environment by sequencing the DNA from cells suspended in water, a process called environmental DNA (eDNA) metabarcoding. Traditionally, eDNA studies involve manually collecting and filtering water. However, this process can be cumbersome, requires specialized equipment and risks sample contamination. A new collaboration between students and faculty in the University of Alaska Fairbanks' Departments of Fisheries and Mechanical Engineering has led to the design and development of novel eDNA passive sampling technology called PESCA: Passive eDNA and Sediment Collection Apparatus. The PESCA device is designed and tested to align with ocean or riverine currents while suspended in the water column to maximize eDNA retention. It also contains modular components that allow for sediment collection. The novel passive sampling device can accommodate a variety of filter types and sizes and is designed to minimize contamination. Importantly, this device is 3D-printable and cost-effective (<$5/unit for materials). A 2023 pilot study indicated this device collects similar concentrations of DNA as other passive collection techniques. Cost-effective tools such as the PESCA device will enable citizen science engagement for rapid and affordable biodiversity monitoring using eDNA.

A molecular showdown in eDNA quantification: dPCR or qPCR?

Maggie A.B. Harings
Erik Schoen
Brandi R. Kamermans
Andres Lopez

As environmental DNA (eDNA) applications evolve, there is growing interest in methods that produce quantitative measurements from eDNA analyses. Real-time PCR (also known as quantitative PCR, qPCR) is currently the most widespread technology for quantification of targets in eDNA studies. Digital PCR (dPCR) is an alternative technology for quantification of target nucleic acid molecules that offers some advantages and unique challenges when compared to qPCR. dPCR has been used conventionally in the medical field, leaving much to be explored regarding its suitability for eDNA quantification. We conducted a comparison of qPCR and dPCR applications, including their ability to quantify synthetic chum salmon (*Oncorhynchus keta*) mitochondrial DNA targets. Each technique offers advantages related to cost, time, samples analyzed per run, protocols, and training requirements. dPCR assays follow a simpler protocol. Alternatively, qPCR is far less costly, though the performance of both techniques is limited by a specific assay's performance, which in turn is dictated by amplification efficiency, sensitivity, and target specificity . As eDNA research continues to evolve, dPCR may play an increasingly important role, offering promising avenues for precise and robust quantification of eDNA across diverse ecosystems.

An updated coastwide baseline for genetic stock identification of chum salmon: a key resource for examining stock-specific marine migration and harvest

Barclay, Andy Alaska Department of Fish and Game, Gene Conservation Laboratory
Dann, Tyler Alaska Department of Fish and Game, Gene Conservation Laboratory
Gruenthal, Kristen Alaska Department of Fish and Game, Gene Conservation Laboratory
Gilk-Baumer, Sara Alaska Department of Fish and Game, Gene Conservation Laboratory

Interannual variation in ocean survival among important chum salmon stocks has been observed in recent years across the Pacific-wide range of the species, leading to questions about the mechanisms driving these changes. Genetic stock identification is the premier method for distinguishing among stocks in fishery mixtures. The method requires a baseline representing all potentially contributing stocks screened for genetic markers that have adequate levels of variation in allele frequencies among stocks. We present a new single-nucleotide polymorphism (SNP) baseline containing genetic data from over 42,000 fish and 91 loci that builds on previous baselines. The baseline was assembled using genetic data from tissue collections sampled over the past 37 years, with contributions from Korea, Japan, Russia, U.S., and Canada made possible through organizations like the NPAFC and PacSNP. In the baseline analysis, we assessed the identifiability of each reporting group by analyzing up to 100 mixture samples with varying compositions drawn from the baseline without replacement and used leave-one-out cross-validation and novel visualization methods to interpret correct allocations to stock and directionality and magnitude of incorrect allocations for individual assignments of fish. The baseline can distinguish 23 fine-scale and 7 broad-scale reporting groups making it a useful tool for estimating the contribution of stocks present in mixtures of fish caught on the high seas. The baseline is also capable of individually assigning fish to 5 reporting groups making it useful when pairing individual fish data with stock of origin. Due to these capabilities, this baseline is a key resource for examining stock-specific patterns of migration, harvest, and mortality in the northern Pacific Ocean and will be made publicly available for use by other researchers.

Evaluating the effects of hatchery supplementation on the second generation of a sockeye salmon population

Commins, Mary E. UAF
McPhee, Megan V. UAF

Sockeye salmon *Oncorhynchus nerka* is an ecologically important species that plays a central cultural and economic role in many communities. In transboundary rivers, which originate in Canada and flow through Southeast Alaska, sockeye salmon are jointly managed and enhanced by the U.S. and Canada through the Pacific Salmon Treaty. In an effort to further evaluate the enhancement program, three years (2011-2013) of experimental hatchery supplementation were conducted in Auke Lake, Juneau, using a model similar to the Pacific Salmon Treaty's sockeye salmon enhancement program. A permanent weir on Auke Creek has allowed all returning sockeye to be genetically sampled since 2008, enabling the construction of a genetic pedigree that includes the original parents and returning adult offspring of both hatchery and natural origin sockeye. Results from the first generation have been analyzed, showing that hatchery-spawning females had much greater productivity (adult offspring/spawner) than did naturally spawning females. However, we wish to know what is the reproductive success of those hatchery-born fish when they return and spawn naturally, relative to that of wild spawners. This presentation will discuss the overall approach we'll use to evaluate effects of supplementation in the second generation and present some preliminary results from the earlier brood years. The research objectives are to determine (1) if there are differences in relative reproductive success between hatchery-origin, natural-origin, and mixed origin (hatchery-natural) fish in the second generation, (2) if there are phenotypic differences including run-timing, size, and age, between these same groups, and (3) what effects hatchery supplementation might have on the effective population size (Ne).

Whole genome sequencing contextualizes mito-nuclear discordance in Pacific herring

Timm, Laura E. University of Alaska, Fairbanks & NOAA AFSC REFM
Spies, Ingrid B. NOAA AFSC REFM
Glass, Jessica R. University of Alaska, Fairbanks

Pacific herring (*Clupea pallasii*) is an incredibly important species ecologically, culturally, and economically. Management of this species can be greatly aided by an improved understanding of the genetic population structure in the region. In an effort to begin providing a whole genome perspective of genetic diversity and population structure at the eastern end of Pacific herring's range, we sequenced 40 individuals from the Gulf of Alaska and the eastern Bering Sea. Previous research into genetic structure identified different numbers of populations, depending on the molecule (nuclear microsatellites vs mitochondrial markers). This discordance was localized to the Gulf of Alaska. Our results agreed: analyzing the nuclear genome, we identified an eastern Bering Sea population and a Gulf of Alaska population, while analysis of the mitochondrial genome revealed three populations (an eastern Bering Sea population and two Gulf of Alaska populations). Leveraging data spanning the mitochondria, we contextualize this disagreement in terms of geography and evolutionary history. Our results have direct utility informing management.

Genomic population structure of Pacific Herring in the eastern Bering Sea

Almgren, Sydney A. University of Alaska Fairbanks
Glass, Jessica R. University of Alaska Fairbanks
López, J. Andrés. University of Alaska Fairbanks

Pacific Herring (*Clupea pallasii*) is a vital species to the environment, economy, and culture of Alaska. Despite its importance, the genetic diversity and population structure of Pacific Herring in western Alaska are not well understood. We are conducting a fine-scale genetic assessment of herring spawning aggregations throughout the eastern Bering Sea with modern genomic techniques. Using reduced representation sequencing, we will analyze the genetic population structure and genomic diversity of five spawning populations and three additional coastal locations. Further samples from NOAA surveys and NMFS observers will be incorporated to create an informative genetic marker panel to distinguish potential population structure from mixed stock aggregations. This research will provide the first genomic assessment of eastern Bering Sea Pacific Herring populations and will establish valuable baseline genomic information on Pacific Herring in Alaska. This dataset will help inform key decisions for the management of both federal and state marine fisheries, as well as provide a reference for future genetic monitoring efforts.

Population Structure of Pacific Herring in the Bering Sea and Gulf of Alaska

Isabelle Nicolier
Sydney Almgren
Andres Lopez
Jessica Glass

Pacific Herring *(Clupea pallasii*) are a crucial component of the marine ecosystem throughout the Pacific Ocean, including coastal regions of Alaska. To inform sustainable management practices, an extensive understanding of genetic population structure and diversity is needed. This project builds on previous work to further analyze the population structure and genetic diversity of regional Pacific Herring aggregationsin Alaska. We compared 96 herring samples from the eastern Bering Sea and the northern Gulf of Alaska by analyzing the control region 1 (CO1) gene in the mitochondrial genome. While previous studies have shown genetic differentiation between herring populations in these locations, this work will analyze these differences on a finer geographical scale, providing additional genetic information for fisheries managers. If subpopulations are found and verified using mitochondrial DNA, management of this fishery could be improved. Using genetic sequencing can help reduce genomic erosion of the smaller populations as well as keep sustainable fishing regulations as to not over harvest. If we can understand our fisheries more thoroughly we can aid in keeping our ecosystems balanced and healthy. This work is being conducted with a full genome sequencing project; which would help identify genomic regions of adaptation.

Symposium: Celebrating success and looking towards the future: The next decade of stream and lake temperature research and management in Alaska
Thursday PM

Overwintering Habits and Habitat of Arctic Grayling

Stuby, Lisa. Alaska Department of Fish and Game

Overwintering habitat is critical for the survival of freshwater fish in Alaska. During 2021-2023, a radiotelemetry study on Arctic grayling (*Thymallus arcticus*) was conducted in Beaver Creek with the primary objectives of describing seasonal movements and identifying spring spawning, summer feeding, and overwintering areas. A project task was to collect seasonal habitat and water quality data, in particular during the winter. The water quality parameters were taken during March and early April and included: temperature, dissolved oxygen (DO), conductivity, pH, alkalinity, and flow. In addition, channel width, ice thickness, and water flow were noted. During the summer months, Arctic grayling are territorial as they compete for optimal feeding areas in order to put on enough fat to survive the 7 to 8 months of winter. However, with decreasing ambient air and water temperatures, their summer territoriality wanes, and fish will have to aggregate into less available overwintering habitat. Over the two-year study, the radiotagged Arctic grayling showed varying degrees of fidelity to particular overwintering areas. Post-spawning movements to overwintering areas varied from early September to late November. In general, by mid-December, the radiotagged Arctic grayling were at their overwintering areas and major movements were not noted until the mid-May ice out prior to spring spawning. The habitat data was collected over a 66 km section of Beaver Creek. Average water quality values were: temperature was near 0oC, conductivity was 196.8 µs/cm, pH was 7.3, DO was 9.7, and total alkalinity was 61.7. River depths at our sample sites varied from 0.2 to 0.5 m, ice thicknesses varied from 0.18 to 1.33 m, and flow from 0 to 0.7 to m/s.

Patterns of Aquatic Insect Emergence in Warm and Cold Urban Streams in Anchorage

Legg, Molly Alaska Pacific University
Bogan, Daniel Alaska Center for Conservation Science
Shaftel, Becky Alaska Center for Conservation Science
Dustin Merrigan Alaska Center for Conservation Science
Larson, Erin Alaska Center for Conservation Science

Aquatic insects are vital food resources for juvenile salmon. Recent research suggests that land use and stream temperature may act jointly to influence the timing and duration of insect emergence during the summer months. As climate change and urbanization shift stream temperatures, insects may shift emergence timing, causing changes in food abundance and quality for juvenile salmon. Using floating emergence traps, insects were collected weekly in a cold stream (North Fork Campbell Creek) and a warm stream (South Fork Chester Creek) in Anchorage from June - October 2022, and May – October 2023. In 2022 the warm stream averaged 11.3°C and the cold stream was 7.6°C. 2023 had slightly cooler averages, 10.1°C in the warm stream and 7.2°C in the cold stream. We predicted that in the warm stream, the timing of emergence would occur earlier in the season and the duration of emergence would last longer. Insects were identified to the genus level and then compared between streams and years. The timing and duration of emergence differed among insect genera without a consistent pattern when comparing each stream within a single year and between years. For example, in 2022 the mayfly genus *Acentrella* emerged earlier in the warm water stream with a seven-week longer duration in the cold stream. *Brachycentrus*, a caddisfly genus, and *Alloperla*, a stonefly genus, followed our predictions when comparing both sites and years, with earlier emergence timing and longer duration at the warm site. Future studies could expand on this work to collect emergence data across land use and temperature gradients in the greater Cook Inlet region to better understand the phenology of salmon food resources in their freshwater habitats.

Spatial and decadal-scale temporal changes in water chemistry and macroinvertebrates in central Alaska

Robbins, Caleb J. University of Alaska Fairbanks
Simmons, Trey. National Park Service, Central Alaska Inventory and Monitoring Network
Muehlbauer, Jeffrey D. U.S. Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit

Northern latitudes are disproportionately warming due to climate change, with potential consequences cascading to aquatic life. We explored a data set of water chemistry and macroinvertebrate communities collected by the National Parks Service between the years2004 and 2022, at ~225 sites in the Central Alaska Inventory and Monitoring Network (parks and preserves: Denali, Wrangell-St. Elias, and Yukon-Charley Rivers). Carbon (C) and nitrogen (N) analyte concentrations typically decreased with increasing elevation. Although we detected site-specific trends in several water chemistry variables, totaldissolved N consistently increased in almost all repeat visit sites, often from near detection limits (<0.005 mg/L) to 0.2 - 0.4 mg/L within two decades. Elevation was the dominant spatial driver of invertebrate richness. Site-specific richness trends ranged from 0 to a doubling of taxa (e.g., from ~20-40) within two decades. Further analysis will characterize community-level responses to spatial and temporal environmental gradients. Theseanalyses establish baselines for monitoring in a rapidly changing Alaskan climate, as well as inform research priorities for understanding and forecasting future change.

Grow with the Flow: Influence of Hydrologic Mosaics on Juvenile Salmon Growth in Proglacial Watersheds

McCulloch, Lindsey C. College of Fisheries and Ocean Sciences, University of Alaska Fairbanks
Bellmore, Ryan. Pacific Northwest Research Station, USDA Forest Service
Fellman, Jason B. Alaska Coastal Rainforest Center, University of Alaska Southeast
Boyles-Muehleck, Naomi. Alaska Coastal Rainforest Center, University of Alaska Southeast
Bruch, Elizabeth. Alaska Coastal Rainforest Center, University of Alaska Southeast

Riverscapes can support diverse foraging and growth opportunities for mobile consumers. In proglacial watersheds, neighboring glacier-, snow-, and rain-fed streams provide starkly contrasting habitats on small spatial scales due to differences in light penetration, temperature, discharge, biogeochemistry, and flow event timing. Streams fed by glacial melt are cold, turbid, and frequently considered unproductive; however, these harsh environments provide habitat for many fishes, including robust salmon populations in Alaskan watersheds. Glacial streams may benefit fish by providing foraging opportunities when food sources in snow- and rain-fed streams are low, generating spatiotemporal asynchronies in growth potential across hydrologically heterogeneous watersheds. Seasonal variation in resource availability across stream types will diminish as glaciers melt; thus, it is important to understand how the presence of glacial streams within habitat mosaics impacts fish growth. Our study investigates how juvenile salmonid growth rates differ between a glacial mainstem and three adjacent rain- or snow-dominated tributaries in Southeast Alaska. We collected individual growth histories of juvenile coho salmon using mark-recapture at three paired sampling sites representing a glacial mainstem and adjacent tributary, as well as a diverse set of physicochemical hydrologic parameters. Monthly samples of aquatic invertebrates, periphyton, and fin tissue were also collected for isotopic food web reconstruction. We found that tributary and mainstem habitats displayed seasonally asynchronous trends in temperature, flow, and dissolved oxygen with higher daily volatility and seasonal extremes in tributaries and relatively steady records in the glacial mainstem. Despite these contrasting physicochemical regimes, seasonal patterns of fish growth did not differ drastically between habitat types. Further research is necessary to determine whether similar growth patterns are due to undetected fish movement or varying food web phenologies. Describing fish growth within hydrologic mosaics and identifying driving factors will aid future research in navigating climate change in proglacial drainages.

Exploring climate change impacts on juvenile sockeye salmon and threespine stickleback in Iliamna Lake, AK.

Eberhardt, Elena R. University of Alaska Fairbanks
Quinn, Tom P. University of Washington
Westley, Peter A.H.. University of Alaska Fairbanks
Cunningham, Curry J. University of Alaska Fairbanks

Iliamna Lake, the largest lake in the Bristol Bay watershed and in Alaska, has been increasing in surface temperature over time, influencing winter ice coverage and consistency. These environmental shifts may affect the growth, survival, and life history of juvenile sockeye salmon (*Oncorhynchus nerka*). At the same time, threespine stickleback (*Gasterosteus aculeatus*), a potential competitor for zooplankton prey with juvenile sockeye salmon, are resident in the lake, abundant, and can adapt their life history to warmer climate regimes. Considering these traits, the potential for interspecific competition between these two species may increase under a warming climate. We propose to explore responses by juvenile sockeye salmon and threespine stickleback to a warming climate by first developing a standardized index of Iliamna Lake ice-off date by integrating gridded satellite data with community observations, to better quantify interannual variation in lake conditions and growing seasons. Next, we will investigate whether growth patterns in threespine stickleback and juvenile sockeye exhibit coherence across years, utilizing long-term surface trawl data collected in late summer. Finally, utilizing this ice-off Index alongside in situ climate and temperature we will quantify the impact of climate change on the growth, relative abundance, and potential trophic interactions between juvenile sockeye and threespine stickleback. Examination of how growth and relative abundance of stickleback and juvenile sockeye have responded to changing thermal and ice off conditions is a crucial first step in understanding how these two species may respond to future changing climate.

Loss of meltwater from glaciers and snowpack will increase synchrony of river habitats and resources in Southeast Alaska

Dunkle, Matthew R.
Bellmore, J. Ryan
Fellman, Jason B.
Hood, Eran W.
Caudill, Christopher C.

Stream biogeochemical regimes can vary over relatively short distances in physically complex landscapes. In many mountainous and high-latitude regions, meltwater streams from glaciers, icefields, and seasonal snowpacks co-occur within individual watersheds. The distinct physico-chemical regimes associated with meltwater and rain-fed streams have the potential to decrease the spatial synchrony (temporal correlation among sites) in such meta-systems that may promote ecological heterogeneity and stability. Here, we measured the physico-chemical conditions and biomass dynamics of three components of stream food webs (detritus, periphyton, and aquatic invertebrates) in streams fed predominantly by glacial-melt, snowmelt, and rainfall, as well as in a stream transitioning from glacier- and snowmelt to a rainfall signature. These streams had distinct temperature, flow, and nutrient regimes over the year-long study, with asynchronous cycles of detritus, biofilm, and aquatic invertebrate biomass. The strongest differences were associated with the meltwater season, when patterns of temperature, flow, water chemistry, and resource biomass in the glacial stream diverged from the other streams. Our findings suggest that the loss of meltwater contributions from the global cryosphere, the parts of the Earth's surface influenced by snow, ice sheets, and glaciers, will synchronize the seasonal resource dynamics of meltwater and non-meltwater streams during the primary growing season within and across watersheds. Increasing synchrony of abiotic processes that drive instream production could reduce ecological stability within watersheds as seasonal conditions converge, especially for mobile consumers that will lose the opportunity to integrate resource waves across complex landscapes.

Poster Session and Tradeshow

9:00 AM - 11:45 AM, Gateway Hotel and Event Center

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Understanding Climate Change Impacts on Subarctic Lakes: Insights from Long-Term Monitoring in Katmai and Lake Clark National Parks, Southwest Alaska	Dunkle, Matthew R	73
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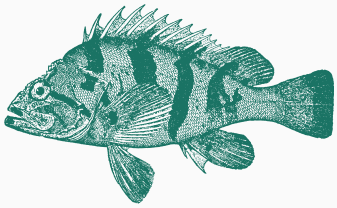
Poster Abstracts



Nick Dudiak (Homer Spit) Fishing Lagoon

Hauser, **Willliam (Bill)**
Booz, Mike
Dickson, Holly

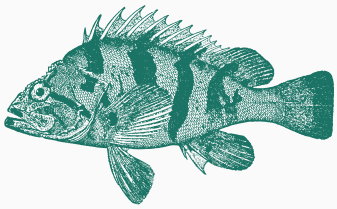
This presentation is a "DRAFT" or "Prototype" for information that is intended for public, or lay, education and communication about the Nick Dudiak/ Homer Spit Fishing Lagoon. Final products will include a poster for display in the ADF&G Office and signage near the lagoon. It will include details about Homer Spit, salmon life history, salmon harvest, as well as “who is Nick Dudiak”, and the cadre of people behind the project. A feature will include a description of how salmon returning to the Fishing Lagoon are different; and why total harvest is appropriate here. Your critique, suggestions, and comments are appreciated. Contact: Bill Hauser – billj4fish@gmail.com or 907 717 6989; or, any co-author.

What happens on the Yukon River leaves genetic traces; analysis of eDNA samples from a thousand mile canoe expedition

Nelson, Lillian S. UAF CFOS, BLaST
Lopéz, Andrés J. UAF CFOS, Museum of the North

As the third longest river in North America, the Yukon River is a vital indicator of aquatic health in the Arctic and Subarctic. With many interest groups, including indigenous communities and commercial fisheries, reliant on resident and seasonally present fish species, it is vital to know and monitor species distributions. Along a 1000 mile canoe expedition beginning at Marsh Lake, Yukon, and taking out at the Dalton Highway Bridge at Yukon Crossing, Alaska, eDNA samples were collected. eDNA filters were sampled by filtering replicate river water at twelve sites primarily focused around the dams in Whitehorse as well as at seven of the main tributaries along this upper section of the river. DNA was extracted from the samples in the fall of 2022. Samples were processed using different techniques. Standard pcr and touchdown pcr were used for the future purpose of metabarcoding to create a fish assemblage of fish species present from the samples collected in the field. One important factor playing a role in Yukon River eDNA work, as well as other Alaskan Rivers, is sediment load. Sediment clogging allowed for smaller volumes of water to be filtered through some field samples. This causes differences in DNA concentrations that I will show by results of Qubit testing. Processing different concentrations of DNA impacts sequencing and analysis.

Poster Abstracts



Genomic sex determination of Pacific Herring

Almgren, Sydney A. University of Alaska Fairbanks
Glass, Jessica R. University of Alaska Fairbanks
López, J. Andrés. University of Alaska Fairbanks

Pacific Herring (*Clupea pallasii*) is a vital species for the environment, economy, and culture of Alaska and the Pacific Northwest. Despite its importance, critical genomic features of this species remain poorly examined. While the genomic architecture underlying sex determination has been identified in Atlantic Herring, a closely related species, it remains undescribed in Pacific Herring. We generated low coverage, whole genome sequences from 40 Pacific herring of known sex (twenty female and twenty male). To identify genomic variants associated with sex phenotype, we used a newly released bioinformatic pipeline that leverages observed differences in sequencing coverage between male and female samples to detect potential sex chromosomes. We are creating a simple genomic assay for identifying sex in Pacific Herring. Our results will provide a genomic alternative for sexing Pacific Herring, can require laborious histological preparation for juveniles and non-spawning adults. The addition of a genomic method to sex herring will aid in the ability to monitor sex ratios of spawning populations, as well as highlight sex-specific differences in movement and distribution. Additionally, comparing the genomic mechanisms of sex determination between Pacific and Atlantic Herring will shed light on the evolutionary history of these species. This bioinformatic tool and associated genomic approach have not yet been utilized for any species in Alaska, and our work will enable the use of similar methods for other important fishery species.

Environmental Drivers of Production Across Gulf of Alaska Mariculture Sites

Greene, Sierra L. UAF College of Fisheries and Ocean Sciences
Eckert, Ginny L. Alaska Sea Grant

To better support the developing mariculture industry within Alaska, a localized focus on farm site selection and quantification of environmental drivers of crop production is needed. Globally, the suitability range of environmental conditions for optimal commercial mariculture has been well documented; however, it is not known to what scale differences in these environmental drivers occur throughout the Gulf of Alaska. Over the course of a year, this study will determine the spatial variability to which water quality parameters differ, by comparing nine kelp and oyster farm sites spread throughout Kodiak, Kachemak Bay, and Prince William Sound. To do this, an array of 3 in-situ sensors was deployed directly within participating kelp and oyster farms. Data measurements include hourly samples of; salinity, temperature, dissolved oxygen, photosynthetically active radiation (PAR), turbidity, chlorophyll a, and flow rate, measured at crop growth depths (surface, 1m, and 3m). Determining this scale of effect among sites and regions will inform our understanding of small and large scale variability in the water column. Results may be used to cite future farms and allow potential farmers to have a more accurate perception of where to expect optimal growth, given local data available.

Poster Abstracts

How do the life history traits of black rockfish (*Sebastes melanops*) vary from central California to the Gulf of Alaska?

Bargas, Madison P. Oregon State University*
Barnes, Cheryl L. Oregon State University

It is imperative that we examine how important life history traits, such as those that influence ecosystem health, are impacted by changing environments. For species with broad geographic ranges, we must understand the effects of spatial variation before we can begin to effectively quantify changes through time. Recreational, commercial, and subsistence groundfish fisheries are extremely valuable in the California Current and Gulf of Alaska. Several rockfish species hold great economic and ecological importance within these ecosystems, black rockfish (*Sebastes melanops*) being particularly valuable. Currently, we are lacking region-specific information necessary to effectively manage this species. My master's thesis will address this informational void by quantifying variation in the life history traits of black rockfish across the biogeographic regions within their natural range. This study will provide a baseline for studies focused on climate impacts for this species and the ecosystems in which black rockfish are a key component. Study regions encompass sites spanning four well-established biogeographic breaks, including the Gulf of Alaska: Point Arena, Cape Blanco, Columbia River, and Cape Flattery. Our study area also includes four different assessment areas that have been identified by the Pacific and North Pacific Fishery Management Councils: California, Oregon, Washington, and Alaska. I will use macroscopic and histological methods to estimate the maturity stage and commonly used techniques for quantifying the fecundity of female black rockfish. To obtain a broad observation of the population in each region the samples will be taken from hook-and-line fishing from the recreational fishery, commercial fishery landings, and agency directed surveys. This is a highly collaborative project between local stakeholders, academic scientists, and state and federal agencies to facilitate project design, data collection, and the interpretation of results.

Two-Eyed Seeing in Fisheries Workshop: Lessons Learned

Lee, Madeline L. Chugach Regional Resources Commission

Key take aways from our Two-Eyed Seeing in Fisheries Workshop as a kick-off to this conference. Stop by to see our visual note-takers artwork and learn more about how the workshop went.

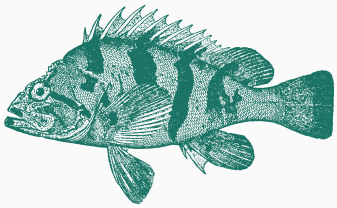
Poster Abstracts

Understanding Climate Change Impacts on Subarctic Lakes: Insights from Long- Term Monitoring in Katmai and Lake Clark National Parks, Southwest Alaska

Dunkle, Matthew R.
Bartz, Krista K.
Collins, Sarah M.
Gabriel, Paul W.C.
Textor, Sadie R.
Muehlbauer, Jeffrey D.

Global climate change is having widespread, and often nuanced, impacts on aquatic ecosystems around the world, necessitating comprehensive understanding through long-termmonitoring studies. For example, lakes in Katmai and Lake Clark National Parks in southwestern Alaska are nestled in a landscape with glaciers and active volcanoes and are in watersheds largely devoid of human development. Despite this, climate change is impacting their water quality and, in turn, their capacity to support iconic species, such as brown bears and sockeye salmon. Subarctic lakes in this region are influenced by local conditions, such as watershed characteristics, meltwater contributions from glaciers and snowmelt and regional shifts in air temperature and weather patterns. Here, we present over a decade of monitoring which show substantial variation in critical water quality parameters. We use ordination and regression-based approaches to evaluate the links between watershed characteristics andregional conditions with lake water quality dynamics at both individual lake and park-wide scales. This study highlights the need for intensive local case studies to fully grasp the nuanced impacts of climate change on aquatic ecosystems. This work not only enhances our understanding of subarctic ecosystem dynamics but also serves as a valuable foundation for informing adaptive management strategies. Data such as these provide an important knowledge base for adaptation and management of subarctic ecosystems in this and other regions.

Resurrection Creek Stream Restoration



Pearson, David, E. USFS
Cross, Adam, USFS
Thamm, Heather, USFS
Palombo, Alex, USFS

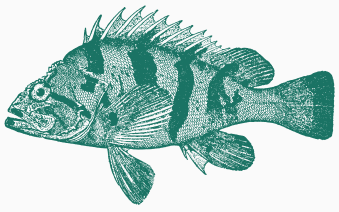
Overview of a larger scale stream restoration project on Resurrection Creek in Hope, Alaska.

Poster Abstracts

Effects of climate and fish abundance on the condition of juvenile steelhead trout

Srebnik, Emma Rudy University of North Carolina at Chapel Hill
Waters, Charlie D. Alaska Fisheries Science Center

A comprehensive understanding of how fish populations respond to changing environmental conditions is important for implementing future management and conservation strategies. However, it can be difficult to assess the impacts of climate variability on anadromous fish, such as Pacific salmonids (family Salmonidae), which have both freshwater and oceanic life histories. Long-term studies that pair biological and environmental data can be particularly valuable for addressing such knowledge gaps. Located on Baranof Island in Southeast Alaska, the National Oceanic and Atmospheric Administration's Little Port Walter Research Station recorded the lengths and weights of 4,557 juvenile steelhead trout (*Oncorhynchus mykiss*) out-migrating from Sashin Creek for over 20 years. Furthermore, Little Port Walter started collecting numerous environmental data in 1936. By combining these two long-term data sets, we used generalized linear mixed effects models to quantify the effects of multiple environmental variables on juvenile steelhead body condition, which in turn may affect marine survival and overall population productivity. We also incorporated total counts of steelhead smolts out-migrating from Sashin Creek, steelhead adults entering the creek, and regional pink salmon abundance to quantify possible effects of intra-and inter-specific competition on juvenile steelhead body condition. Preliminary results suggest that body condition is negatively affected by warmer spring freshwater temperatures. In contrast, body condition is positively affected by increased precipitation in spring. The final results of this work will be useful in determining the resiliency of steelhead trout and other salmonid populations in Southeast Alaska to climate change.

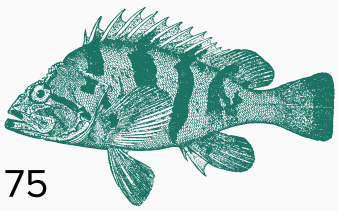


Poster Abstracts

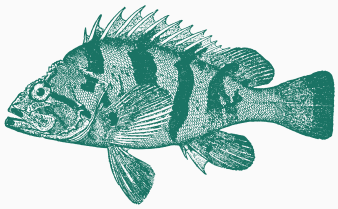
Applying an integrated population model to understand marine processes affecting Western Alaskan Chum salmon productivity

Genoa Sullaway
Curry Cunningham
Lauren Rogers

Western Alaska Chum salmon (Oncorhynchus keta) typically monitored using the spawning populations of the Arctic, Yukon, and Kuskokwim rivers (hereafter, AYK), have been declining in the Kuskokwim since 2019 and in 2021 both the Yukon and Kuskokwim River Chum salmon runs collapsed below 90% of the long-term average. This resulted in closed subsistence harvest fisheries which have a significant detriment to food security and cultural tradition for Wester AK Indigenous peoples who are facing a multi-species salmon. Historically, Chum have been able to supplement for other salmon species, such as Chinook salmon, as they have declined but this is no longer the case. A better understanding of what is leading to salmon declines in this region is crucial to the ecosystems and native peoples of Western Alaska. Early marine processes are often a bottle neck for salmon lifecycle (Beamish & Mahnken, 2001). While there are likely multiple cumulative processes that are related to the Chum salmon decline, better understanding how much bottom-up processes contribute to declines in Chum salmon abundance can inform a piece of this puzzle. Previous work has suggested that Chum abundances most likely influenced by areas where Yukon and Kuskokwim fish share a common environment, and synchronous 2021 declines indicate this may still be the case. We plan to test the hypothesis that changes to the marine environment, and specifically the zooplankton prey field, has contributed to relative changes in AYK Chum salmon abundance. This poster will present preliminary research results.



Poster Abstracts



Elders Warnings

Catherine Moncrieff
Katie Turner
Millena Jordan

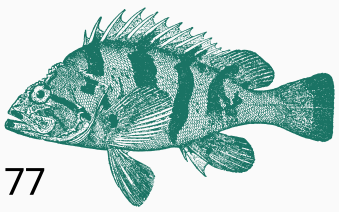
For decades researchers have documented traditional ecological knowledge (TEK) from Yukon River Elders, describing conservation practices and revealing warnings of potential declines in salmon. TEK has become accepted as a best available science, research practice, and a way of knowing that parallels Western science. With Chinook salmon declines on the Yukon River today, the teachings and warnings of Yukon River Elders need renewed attention and effective application in fisheries management. Our team joined to review, catalog, and analyze the teaching of their Elders and discuss how to develop an effective application of TEK in Yukon River fishery management. This project met the NPRB mission by improving understanding of Yukon River salmon, seeking effective, sustainable salmon management, and incorporating perspectives of the Yukon River. The Yukon River Drainage Fisheries Association (YRDFA) partnered with Tanana Chiefs Conference's (TCC) Emerging Leaders Youth Council (EL) and examined messages of Yukon River Elders about their concerns for their salmon. Archival materials housed at University of Alaska Fairbanks (UAF) and other sources were reviewed and compared to interview materials across the region. UAF staff provided training on accessing the archives and conducting qualitative interviews. Ethnographic interviews with contemporary Elders focused on salmon size, conservation practices, changes observed, and cultural implications. The team presented results to Elders gatherings, fishery meetings, and developed outreach products. Our target audiences were river stakeholders, researchers, managers, and policy makers. Outcomes include expanded capacity by Yukon River young adults and YRDFA and a process for cataloging, analyzing, and applying TEK to fisheries management.

Poster Abstracts

Effects of Watercraft Wakes on Shoreline Erosion, and Potential Impacts for Salmon at Big Lake, Alaska.

Wilson, Elias E. College of Fisheries and Ocean Sciences, University of Alaska Fairbanks, Alaska USA
Muehlbauer, Jeff D. U.S. Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit, Fairbanks, Alaska, USA
Dekker, Franklin J. U.S. Fish and Wildlife Service, Southern Alaska Fish and Wildlife Field Office, Anchorage, Alaska, USA
Keith, Kevin D. Alaska Department of Fish and Game, Division of Sport Fish, Habitat & Restoration, Anchorage, Alaska, USA
LaBarre, Amy L. Alaska Department of Fish and Game, Division of Sport Fish, Habitat & Restoration, Anchorage, Alaska, USA
Mazzacavallo, Michael G. Alaska Department of Fish and Game, Division of Sport Fish, Habitat & Restoration, Anchorage, Alaska, USA

This poster will describe the initial stages of a study that aims to quantify boat wake-caused erosion in Big Lake, Alaska. The study arose from concerns raised by community members and resources managers about large boat wakes affecting shorelines around the lake. Starting in summer 2023 and continuing into summer 2024, we are measuring the rate of erosion, boat wake frequency and boat wake size at various sites around the lake, in addition to collecting an array of water quality data. Sediments suspended in the water column during the erosion process, by boat wakes or otherwise, can settle on top of spawning gravel and can smother incubating eggs and reduce access to that habitat in the future. Thus, this study will also look to supplement past Sockeye Salmon (*Oncorhynchus nerka*) spawning survey data with new surveys to provide an accurate picture of current habitat use and provide stakeholders with knowledge of areas where erosion may be impacting spawning habitat. Our goal is to provide information to better manage erosion at Big Lake and to identify key areas where human impacts may be impacting Sockeye spawning and incubation.

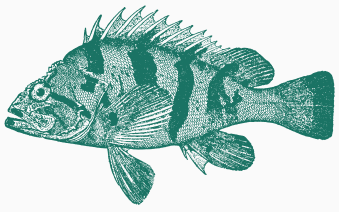


Poster Abstracts

Are we measuring the right things to inform stream restoration in Interior Alaska?

Keller, Dakota E. University of Alaska Fairbanks, Department of Biology and Wildlife
Muehlbauer, Jeffrey D. U.S. Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit
Mcgee, Chandra. U.S. Fish & Wildlife Service, Northern Alaska Fish & Wildlife Field Office
Buffinton, Christina. University of Alaska Fairbanks, International Arctic Research Center

This project will be an assessment of the stream restoration on lower Cripple Creek, located near the city of Fairbanks, in Interior Alaska. Cripple Creek is a tributary to the Chena River, which has the second largest annual run of Chinook Salmon in the Alaska portion of the Yukon River; restoration within the Chena Watershed has the potential to increase availability of juvenile rearing habitat to support dwindling Yukon River Chinook and Chum population. Restoration work to date has included the placement of fish passage culverts, retrofitting existing culverts, and re-routing flow from a mining drain to the original stream channel through diversion structures. However, in Cripple Creek and other stream restoration projects, there may be limited monitoring and quantitative assessments to determine how the project is improving ecosystem function. To remedy this, the Stream Quantification Tool (SQT) has recently been developed for Interior Alaska as a tool to assess stream function improvement. The SQT will be used in Alaska on Cripple Creek and serve as one of the first tests of the tool before it is used on a broader level within the state. Sampling will take place with an interdisciplinary team of professionals, interns, and public volunteers who will collect data on stream temperature, water chemistry, channel dimensions, biologic communities of fish and macroinvertebrates, and other metrics as required by the SQT in the summer of 2024. Data will be compared to reference site conditions similar to Cripple Creek's natural channel to determine in what ways the restoration is showing measurable improvement. This project will provide feedback on the SQT to federal agencies, such as U.S. Fish & Wildlife Service, Bureau of Land Management, and the National Park Service. Additionally, it will provide insight on potential future restoration of Cripple Creek further up and downstream.



Poster Abstracts

Current State of Environmental DNA (eDNA) Research in Alaska

Maggie A.B. Harings
Rachel M. Lekanoff
Brandi R. Kamermans

Environmental DNA (eDNA) has seen a significant increase in application in aquatic ecosystems. Previously published systematic reviews of eDNA research on a global scale have determined that there was the greatest diversification of eDNA methods beginning in 2021 underscoring a need to standardize eDNA methods. This is only possible with an in-depth overview of the technological advancements and a discussion of the available methods of recent and ongoing eDNA projects. In Alaska, the use of eDNA science is gaining momentum for both marine and freshwater species identification and quantification. In response, we are conducting a literature review to investigate how eDNA is being used by researchers in the state of Alaska. We are using descriptive statistics to summarize trends in the following: (1) project types (e.g. biodiversity assessments), (2) institutional oversight (e.g. federal, state, tribal, or nonprofit), (3) funding sources, (4) ecosystem type (e.g. lake, river, or ocean), (5) region, (6) study design (e.g. descriptive), (7) study type, (8) sampling method (e.g. syringe and filter), (9) sample analyses (e.g. statistical approaches), and (10) availability of established workflows for disseminating eDNA results to partners and stakeholders. In turn, we are comparing and contrasting trends in these Alaska-specific findings with those of the global systematic reviews. Best practices have been unevenly applied in Alaska, and these findings could be used by researchers and managers alike to help identify data gaps, direct future eDNA efforts, and guide future standardization of eDNA methods in Alaska.

Western Division American Fisheries Society and You!

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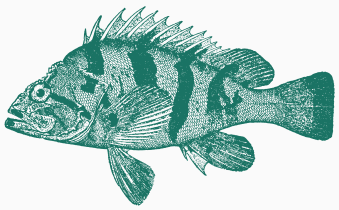
What can the Western Division of the American Fisheries Society (WDAFS) do for you? This poster is the starting point of a conversation with chapter members about how WDAFS can benefit you and you can benefit WDAFS. Division members represent a tremendous array of fisheries workers involved in all aspects of the fisheries profession. The collective diversity and expertise of our members is the basis of an intimate and unparalleled familiarity with fisheries resources and issues within our geographic region. The Western Division hosts a regional annual meeting; supports our ten chapters; sponsors committees that address issues important to chapter members; helps students and early career professionals through travel grants, scholarships, and continuing education opportunities; presents awards that recognize the hard work and dedication of peers across the western US and Pacific Islands; awards small grants; and, publishes a newsletter. By engaging with WDAFS you can get broader exposure for your work, grow your professional network beyond your state or chapter, enhance your leadership skills, expand your impact, and give back to the fisheries profession at a larger scale. Visit with us to learn more about WDAFS and how you can help!

Poster Abstracts

Synthesis of Ancient and Ongoing Hybridization of Whitefish Species in Beringia

Fraley, Kevin M. Wildlife Conservation Society
Campbell, Matthew A. University of Alaska Museum of the North
Brown, Randy J. U.S. Fish and Wildlife Service
Whiting, Alex. Native Village of Kotzebue
Carter, William K, III. Selawik National Wildlife Refuge*
López, J. Andrés. University of Alaska Museum of the North
Robards, Martin D. Wildlife Conservation Society

Hybridization, the production of offspring by mixing genetically distinct ancestries, occurs in nature under extremely varied circumstances. Parental populations reach varying degrees of genetic differentiation as a result of a diverse set of processes ranging from temporary geographic isolation to local adaptation. In addition, the prevalence, timing and spatial distribution of hybridization may vary along with other attributes of the hybridizing stocks. In this context, hybridization may preserve, reduce or increase biodiversity from population to species levels and from local to global scales. All of these outcomes are of conservation concern and may have played important roles in the evolution and diversification of life. We synthesize knowledge of hybridization in whitefishes (Salmonidae: Coregoninae) in Beringia to help establish its contributions to extant diversity. We draw information from northern Alaska subsistence fishers and fisheries biologists to catalog the extent of hybridization of whitefishes in Beringia. We find hybridization in whitefishes has contributed to species diversity in the past and is ongoing at a low prevalence between several lineages, particularly in watersheds where spawning areas overlap in time and space between multiple species. Despite past attempts to artificially crossbreed and propagate hybrid whitefishes, hybrid lineages do not appear to be increasing. We propose several mechanisms why hybridization is or is not observed between whitefish species, why ongoing hybridization does not appear to lead to loss of species diversity, and describe methods of identifying hybrid whitefish relying on anatomical traits. Targeted study of hybridization among coregonines can provide insight into the significance of hybridization in fish evolution. Genomic analyses may determine the specific contributions from different lineages to hybrid and unmixed gene pools, which may serve as a critical baseline as an ecological monitoring tool given that increased frequency of hybridization is predicted to occur along with habitat disruption under changing environmental conditions.



Poster Abstracts

Burbot Population Assessments in Lakes of the Upper Yukon/Tanana River Drainages

Sarafin, David R. Wrangell-St. Elias National Park and Preserve

Several lakes of the Upper Tanana/Yukon River Drainages within Wrangell-St. Elias National Park and Preserve (WRST) are known to support, or have potential to support Burbot Lota lota populations. During 2016 through 2023, we studied Beaver, Black Hill, North Braye, Carden, Grizzly, Ptarmigan, and Rock lakes. Some of these lakes were sampled in collaboration with staff of Alaska Department of Fish and Game. In these select lakes of WRST, the objectives of this project are to: 1- investigate for presence and estimate abundance of adult Burbot in selected lakes; 2-Estimate Burbot catch per unit effort (CPUE) from standardized sampling methods; 3- establish baseline length-frequency data for all Burbot captured; and 4- opportunistically record bathymetry data for producing lake depth profile maps and document presence of fish species by lake. Findings and inferences include:• Burbot present in Beaver, Grizzly, Ptarmigan, and Rock lakes • Unexpectedly, Burbot not found present in Black Hill, North Braye, or Carden lakes• 2018 Grizzly Lake Burbot population estimated (N=991 fish) to be 54% below baseline 2011 estimate of 2,147 fish• Size selective gear bias potentially influenced by density of larger (predatory) Burbot in lake • Burbot captured in higher altitude lakes may be more susceptible to barotrauma from capture at depth • Presence of additional species in some lakes studied included: Arctic Grayling *Thymallus arcticus*, Lake Trout *Salvelinus namaycush*, and whitefishes *Coregonus* sp.

Abundance and Run Timing of Adult Salmon in Tanada Creek

Sarafin, David R. Wrangell-St. Elias National Park and Preserve

The Tanada Creek salmon weir is located at the historic Athabascan village site of Nataełde, now known as Batzulnetas. The Fisheries Program of Wrangell-St. Elias National Park and Preserve (WRST) has operated this weir for over 20 years since 1997 and continues to build on a long-term salmon escapement data set. Tanada Lake Sockeye Salmon Oncorhynchus nerka are the largest known spawning group in the uppermost Copper River Drainage and serve as a key indicator stock for uppermost tributary spawning locations. These stocks add to harvest from commercial, personal use, and subsistence fisheries during migration to Tanada Creek. Specific objectives include counting by day the number of salmon migrating past the weir throughout the season and obtaining age estimates of the Sockeye Salmon escapement from otolith samples collected from post-spawn fish. Throughout the decades of project operation, various challenges have influenced the quality of data collected. Issues created by environmental conditions, duration of operation, and discrepant methods reveal that not all annual escapement estimates are of comparable meaning. In addition to acquiring data from escapement of future years, the investigator is in progress of reviewing historical escapement data through all years of weir operation, with intent to identify issues with each season's estimate. This project remains ongoing with funding to operate through the 2025 season.

Poster Abstracts

The Fish Barrier Hunter: A rapid culvert assessment survey

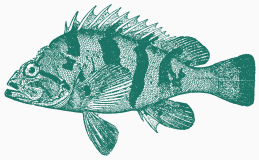
Stevens, Andy, . U.S. Fish and Wildlife Service
Ericson, Tim, U.S. Fish and Wildlife Service

Alaska has many undocumented road-stream crossings, some of which can lead to infrastructure failure and fragment access to valuable cold water refugia, spawning, and rearing habitat. To help tackle a massive statewide effort to catalog thousands of undocumented crossings, USFWS created The Fish Barrier Hunter - a user-friendly ESRI Survey123 tool for rapidly assessing culverts and facilitating photo, location, and data management and sharing. This will help managers make decisions and better direct technical assistance and funding to replace fish passage barriers in Alaska.

Ocean Acidification Monitoring in Alaska's coastal communities through community sampling

Cora McKean
Jacqueline Ramsay
Jacob Cohen
Jeff Hetrick
Alutiiq Pride Marine Institute a division of the Chugach Regional Resources Commission

The Alutiiq Pride Marine Institute (APMI), a division of the Chugach Regional Resources Commission (CRRC), has optimized a land-based monitoring platform to conduct marine carbonate research in the Ocean Acidification Research Laboratory (OAR Lab). Among a network of laboratories along the North American Pacific Coast, the OAR Lab utilizes a pCO2/TCO2 analyzer known as the Burke-O-Lator (BoL). Through APMI's Chugach Regional Ocean Monitoring Program (CROMP), community sampling for ocean acidification (OA) monitoring in south-central Alaska has provided data since 2013 that can be used to observe local carbonate systems. Weekly sampling, performed by a community sampler, has yielded meaningful information to observe data over time and to inform community residents of the nearshore oceanographic conditions in their regions.

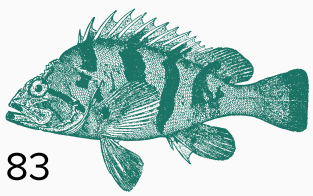


Poster Abstracts

Use of multi-step serial sectioning histology for assessing Ichthyophonus infections in Yukon R. Chinook salmon *Oncorhyncus tshawytscha*

Woitel, Franklin R. ADF&G
Ferguson, Jayde A. ADF&G
Kocan, Richard M. UW School of Aquatic and Fishery Sciences
Liller, Zach W. ADF&G
Meyers, Theodore R. ADF&G

Yukon River Chinook salmon have declined since 1998 and have been insufficient for subsistence since 2007. Record low returns occurred since 2021 resulting in the first ever closure of the subsistence fishery. Studies in the 2000's showed that heavy infections by the fungal-like protozoan, Ichthyophonus (mesomycetozoea) coincided with low salmon returns where the parasite has resurged since 2020. Additionally, almost 50% fewer fish have arrived at the U.S.-Canada border than estimated by sonar projects, possibly indicating en route mortality. The resultant unprecedented harvest restrictions for subsistence users have significantly impacted food security and traditional culture. We are investigating the causes of the decline with severe Ichthyophonus infections as a leading hypothesis for high en route mortality and used histology as one component. Sampled hearts from returning adult salmon at Pilot Station were fixed and processed with standard histological techniques. Six 5µm sections (100µm apart) were stained with Hematoxylin and Eosin (H&E) for histopathology or Periodic Acid-Schiff (PAS) for enumerating parasites. Selected samples were stained with a chromogenic in situ hybridization (CISH) for parasite confirmation. PAS highlighted Ichthyophonus better than H&E for enumeration, but also stains polysaccharides from similar appearing parasites (e.g., Dermocystidium), potentially leading to false positives. CISH had the highest specificity by hybridizing with the parasite's rRNA sequence. H&E highlighted the parasite less, but better assessed disease and co-morbidities. Each stain provided unique information for a more comprehensive assessment of infection and disease. Histology is the gold standard for assessing parasite density and disease but can underestimate prevalence of low-level infections. However, histology is labor intensive, and less sensitive than explant culture and qPCR for low-level infections, due to variably sized schizonts that are randomly distributed within tissues. However, this was addressed by using multi-step serial sectioning. Histology should be included in fish health investigations that may be paired with additional tests depending on study objectives.

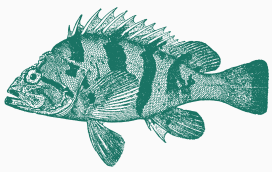


Poster Abstracts

The effects of water temperature and heat stress on juvenile Chinook Oncorhynchus tshawytscha and Coho Salmon Oncorhynchus kisutch growth in the Deshka River watershed

Hermus, J.H. (1)
J.D. Muehlbauer (1, 2)
D.J. Rinella (3)
V.R. von Biela (4)
J.A. Falke (5)
1.College of Fisheries and Ocean Sciences, University of Alaska Fairbanks, Fairbanks, Alaska, USA
2.U.S. Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska Fairbanks, Fairbanks, Alaska, USA
3.U.S. Fish and Wildlife Service, Southern Alaska Fish and Wildlife Field Office, Anchorage, Alaska, USA
4.U.S. Geological Survey, Alaska Science Center, Anchorage, Alaska, USA
5.U.S. Geological Survey, Nevada Cooperative Fish and Wildlife Research Unit, University of Nevada, Reno, Reno, Nevada, USA

Warming climate and several declining salmon returns across the state of Alaska have led to an increased concern about the future of Alaskan salmon populations. This study considers sublethal effects of warm freshwater temperatures during juvenile rearing of two co-occurring Pacific Salmon species by linking water temperatures to growth rates. Juvenile growth of Pacific Salmon plays a key role in their success because individuals that enter the ocean at larger sizes and have higher survival rates. We hypothesized that Alaska's warmest freshwater temperatures already impair the growth of juvenile Pacific salmon due to direct effects of heat stress or indirectly via increased metabolic rates that exceed consumption. We sampled juvenile Chinook and Coho Salmon in the Deshka River, one of the warmest rivers in Alaska, where summer water temperatures routinely exceed 20°C. During the summers of 2019 to 2022 juvenile salmon were trapped at pre-established temperature monitoring stations throughout the Deshka River watershed. Of these fish, a subset was lethally-sampled to obtain otoliths for daily growth analysis, stomachs for fullness, and muscle tissue for heat stress determination. These data provide a natural experimental window into juvenile salmon growth in some of Alaska’s warmest waters. Such information will allow us to identify key water temperature thresholds associated with low habitat suitability to help inform future management and conservation efforts in a warming world.



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Thank you!