



ONCORHYNCHUS

Newsletter of the Alaska Chapter, American Fisheries Society

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In this issue:

[President's Corner](#)

[Student Happenings](#)

[Judy McDonald Paul Passes](#)

[Clement V. Tillion Dies](#)

[Western Seabird Die-Off](#)

[Alaska Chapter Meeting Update](#)

[Environmental Concerns Corner](#)

[Marine Debris Funding](#)

[Meetings and Events](#)

and more ...



Natalie Steinel examines a Threespine Stickleback for fibrosis before removing the head, kidney, and spleen from the fish for further analysis. Photo by James Evans, University of Alaska Anchorage Advancement.

No Tissue Left Behind

Massive Collaborative Ecology and Evolution Project on the Kenai Peninsula

Kelly Ireland

Invasive Northern Pike (*Esox lucius*) are a nuisance to endemic fish populations and can quickly take over waterways, but removal of Northern Pike presents a unique research opportunity. Rotenone, the chemical used to remove Northern Pike, also kills other fish, giving researchers the chance to reintroduce endemic species and do large-scale ecology and evolution experiments in the wild. For example, nine lakes on the Kenai Peninsula that were treated with rotenone are now home to the “greatest ecology and evolution experiment” of all time, as project researchers like to say.

The project is looking at the ecology and evolution of reintroduced Threespine Stickleback (*Gasterosteus aculeatus*). The reintroduced Threespine Stickleback derive from donor

populations of both benthic (bottom dwellers) and limnetic (dwellers of the light penetrating zone) morphs of the species from four lakes on the Kenai Peninsula (Tern, Watson, Spirit, and Wik) and four lakes in the Matanuska Susitna Valley (South Rolly, Finger, Long, and Walby). A mix of both benthic and limnetic ecomorphs were introduced into each recipient lake, allowing researchers to look at how the fish evolve over time and if the two ecomorphs converge, among other ecological and evolutionary questions.

“This is a rare opportunity to test predictions on how evolution proceeds in real time,” said Jesse Weber, an assistant professor at the University of Wisconsin-Madison and one of many professors working on the project. “Most similar experiments look at short lived microorganisms, like bacteria,
Continued on next page

The President's Corner



Sue Mauger,
AFS Alaska Chapter President.

Having spent decades studying how our aquatic systems are — or will likely be — altered by climate change, I'm grateful when a summer goes by without record-breaking stress on our cold-water fish. I feel a great sense of relief that we didn't experience soaring temperatures, low water levels, or wildfires this summer here in Southcentral Alaska.

In the weeks ahead, we will hear news from the climate talks in Glasgow, Scotland, at [COP26](#) – the 26th Conference of the Parties that signed the United Nations Framework Convention on Climate Change. These talks are considered by many to be the last chance to get the world on track to limit the rise in global temperature to only 1.5 degrees. Sounds dramatic – and it is.

In July, the Intergovernmental Panel on Climate Change (IPCC) came out with its 6th assessment. The report was clear and decisive in its message: the climate is changing and we — through our greenhouse gas emissions — are the cause. Gone were the caveats and nuance of previous assessments and which are normally expected in a report reviewed by thousands of scientists. The unequivocal language reflects the weight of evidence and yet is incongruous with the shockingly slow response by world leaders.

Last year, the American Fisheries Society joined 111 other science-based societies calling for urgent action to reduce emissions, highlighting the irreversible impacts to freshwater and marine ecosystems, fish, and fisheries that are projected to occur without swift and resolute action to curtail

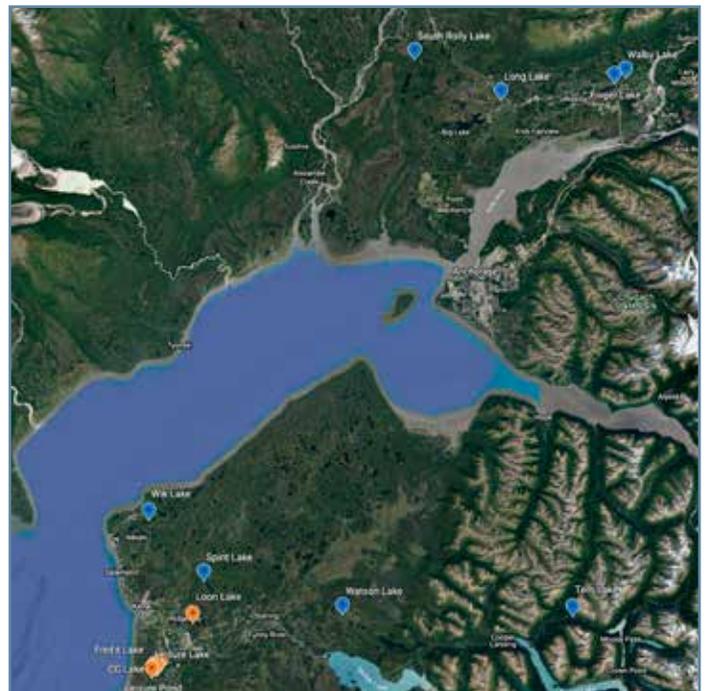
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No Tissue Left Behind, continued

yeast, or small arthropods. In this case, we have a fish with abundant ecological, genetic, and evolutionary data. We can test how ancestry and local environmental conditions interact and constrain or promote evolution across many different traits.”

The rotenone treatments occurred in October 2018, and Threespine Stickleback were reintroduced in May and June of 2019. Two teams of researchers divided and conquered the workload of reintroductions. The first team was responsible for trapping Threespine Stickleback from donor populations and transporting thousands of fish down to the Kenai Peninsula for reintroduction into recipient lakes. The second team responsibly sampled the donor populations prior to donor fish being collected to establish a baseline on the donor populations themselves. The team sampled all aspects of the fish, measuring and weighing the fish before recording the numbers and types of external and internal parasites and the levels of fibrosis. Then the spleens, head, kidneys, liver, stomach, and intestine were removed before the fish had a filet of skin and muscle taken, and a fin clipped for genetic analysis. Finally, the remaining carcass was preserved in formalin. The team

Continued on page 4



The donor and recipient lakes for Threespine Stickleback reintroduction studies. Graphic from Kelly Ireland.

President's Corner, continued

greenhouse gas emissions. This letter was just resent to our national leaders headed to Glasgow to remind them what is at stake. You can read the full statement in Fisheries, September 2021, Special Issue: Climate Change. In fact, I encourage you to read this entire issue if you have access and/or check out <https://climate.fisheries.org/>, which is a hub for resources on how climate change is affecting fish and their habitats.

I applaud AFS' leadership and call to action. And with our climate changing more rapidly here in Alaska than the rest of the country – and most of the world – we as Alaska's fisheries professionals have a critical role and responsibility to keep the climate conversation, research, and call to action going.

I expect many of you think about how our changing climate will impact the fisheries, species, and aquatic habitats you manage, study, rely upon, and enjoy. How do we take that individual focus to a Chapter level? Certainly, our annual meetings have been a productive space to learn and share what we know so far. Is there more we can do? If you have ideas, please let me know. Our Executive Committee will be having a retreat in November to talk about this and other ways for the Alaska Chapter to be a more effective voice in communicating about current fisheries issues.

Related to this, I'd like to give a shout-out to Past President Stephanie Quinn-Davidson and Student Representative Taylor Cabbage for taking the lead on developing an outreach plan for our [Chapter's](#)

[Facebook page](#). They are now posting regularly and sharing articles, profiles of Chapter members, and interesting fisheries tidbits. Please join the conversation!

The 151st American Fisheries Society annual meeting is coming right up (November 6 – 10) in Baltimore...or in the comfort of your own home office. You can register for a virtual experience – save a few tons of carbon - and pick and choose what talks you want to see without the stress of running down hallways looking for Room 1c! Even from afar, you'll have access to amazing content – including a plenary presentation by University of Alaska Fairbanks, Assistant Professor Jessica Black talking about Tamamta: Centering Indigenous Knowledge in Fisheries Governance. And I counted at least 10 symposia with a climate focus.

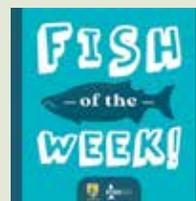
As we move into fall/early winter, I hope you'll find inspiration in this season of data management, reports, and proposals. There is joy in the process of finding trends and stories in past field work that lead you to new questions for future collaborations. We are so very fortunate to work in a state where fisheries are still driving local economies, fish are central to cultural traditions and food security, and fishing is a treasured family activity. With this fortune comes great responsibility. With our collective knowledge and passion for fish and fisheries, the time is now for us to join the call for climate action during this time of rapid change. 🐟

AFS Alaska Chapter Meeting Update

The call for symposia for the 2022 annual meeting is now open! Please submit your symposium proposal at <https://www.surveymonkey.com/r/7WX7V77>. Or, if you prefer, you can email the name and contact information for the chair(s) and the title of your symposium to presidentelect@afs-alaska.org.

We continue to keep an eye on the delta variant situation and intend to make a decision in early November about whether to go fully virtual for the annual meeting. Please let me know if you have questions and/or concerns, and if you have ideas for how to improve a virtual experience I would love to hear them! In the meantime let's all do what we can to alleviate the strain on our hospitals and healthcare workers. 🐟

Fish of the Week!



Join us every Monday for our Fish of the Week podcast! We get to know all the fish — how they live in Alaska, what habitats they use, what they eat, and where they go and why. Everything you need to know to appreciate and conserve these fish and be a successful angler.

[We've got lots of fish stories.](#)

No Tissue Left Behind, continued

returned in 2020 and 2021 to collect the same samples from the recipient lakes to look at how the fish are changing over time.

The parasite load and fibrosis scores will help both Weber's lab and Daniel Bolnick, a University of Connecticut professor, study the immune system of the fish. "My group is working on changes in the parasite community in each lake, how they get different parasites (diet changes in the different lakes), and how this drives evolution of their immune system," said Bolnick. "My lab is particularly focused on the evolution of an immune defense involving fibrosis, the buildup of scar tissue from inflammation. Fibrosis also happens in people and contributes to about 40% of deaths in the U.S. (including contributing to heart disease and cancer). So, not only can we learn about fish adaptation, but in doing so we hope to better understand the genetics and function of an immune pathology also found in humans."

Weber on the other hand is more interested in the genetics and gene expression behind immune response and predicts, "fish from different lakes will quickly converge on the same immune profiles when placed in similar environments...genetics doesn't have a strong influence on short-term responses, but the long-term extent of immune convergence/divergence will be governed by: a) how much genetic variation any given population possesses for a specific immune trait; and b) which traits are most likely to allow fish to survive and reproduce across different lakes. I hope that there will be a disconnect between how fish respond in the short term (i.e., plastic changes) versus how they evolve in the long term."

In addition to the work that Weber and Bolnick are doing, assistant professor Natalie Steinel at the University of Massachusetts Lowell is also investigating the immune system. Steinel is using spleen samples to make histological sections and study the development of immune cells in the fish.

The parasite load, fibrosis scores, and immune cells also can impact other aspects of the fish and will lend more information to the other researchers on the project, including Dr. Kathryn Milligan-Myhre, assistant professor at the University of Connecticut, who is investigating the composition



Daniel Bolnick displays a reproductive male Threespine Stickleback. Reproductive males usually have a red chin, blue eyes, and often bluish body pigmentation during the summer breeding season. Photo by Andrew Hendry.

of the microbes in the gut, the gut microbiota. Milligan-Myhre is interested in how host genetic background and environment drive the gut microbiota composition. "I predict that the change in the microbiota is driven by the diet," said Milligan-Myhre, "and as the populations come together that the diet will drive the microbiota more than the host genetic background."

Outside of Weber, Bolnick, Steinel, and Milligan-Myhre's work, numerous other researchers are examining other various questions about the reintroductions including Andrew Hendry, Alison Derry, Milan Malinsky, Kiyoko Gotanda, Alison Bell, Blake Matthews, Katie Peichel, Rowan Barrett, and Matt Walsh. Hendry acts as the project lead, Derry studies zooplankton and copepods, Malinsky - evolution and recombination rates and roles in adaptation, Gotanda and Bell - behavioral adaptation and evolution, Matthews - ecosystem dynamics, Peichel and Barrett - genome evolution,

Continued on next page

No Tissue Left Behind, continued

and Walsh - evolution of *Daphnia* in response to Stickleback introductions.

“This is a new experience for many of us to work on such a large team. Logistics, communication, and openness are paramount, so this is a great exercise for many of us,” said Bolnick. “Physicists often form huge consortiums of research groups to do a single particle accelerator experiment that takes years of engineering and planning and analysis to do one experiment. Biologists, in contrast, are more often lone wolf researchers - a single lab group working on a unique problem. Or even competitors, racing each other for a solution. We are taking a more physicist mindset to biology, forming a large collaborative network that will draw lessons and inspiration from this experiment for decades to come. This requires careful coordination, so we don’t overly draw on landowner’s goodwill, and openness with each other about what our plans are (to minimize overuse of fish) and sharing data. Often sharing our data adds additional insights because the different things we study are interconnected.”

Weber also agrees with Bolnick about the collaboration involved in a project of this scale. “A project this size would be impossible without a huge group of collaborators, each providing diverse skills, perspectives, and resources such as supplies and funds. We were very lucky to be able to gather an extraordinarily good group of international labs,” said Weber. “Although the first few years of the project landed during difficult times, including heat waves, fires, and pandemics, the long-term hope is that all our lab groups, including undergraduate and graduate students, postdocs, and other professionals and community members, will be able to convene in Alaska each year to bond and learn about the amazing attributes of the fish and lakes in this region.”

The recipient lakes from this project have also been studied heavily by other researchers outside of the “greatest

ecology and evolution experiment.” Patrick Tomco, assistant professor at the University of Alaska Anchorage, and his M.S. student Jordan Couture, looked at the rotenone degradation rates in the lakes as no previous work had examined how quickly the compound degrades in Alaska. It was previously thought that the colder temperatures might slow degradation. “The majority of the rotenone degraded rapidly over the first 14 days. It was completely gone, less than one part per billion, at 60 days,” said Tomco, who also noted that rotenolone, a less toxic transformation product of rotenone, was detected over 250 days.

While Tomco and Couture examined the degradation of the rotenone, Brandon Briggs, assistant professor at the University of Alaska Anchorage, and his M.S. student Jake Bozzini, took samples of the lakes to determine how rotenone treatments impacted the microbial communities in the water. Bozzini found that the rotenone did not significantly alter the microbial community

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The 2019 Stickleback sampling team. Back row: Natalie Steinel, Rachael Kramp, Elsa Diffo, Christopher Peterson, Trey Sasser, Jesse Weber, Kelly Ireland, and Kathryn Milligan-Myhre. Front row: Daniel Bolnick, Ana, and Roscoe. Photo by Andrew Myhre.

No Tissue Left Behind, continued

structure or function in any of the lakes. However, certain microbial genes were detected that may aid in the degradation of rotenone.

Overall, the research done on the rotenone treated lakes has been a large collaborative effort spanning across research labs, agencies, universities, and even countries. All of this research would also not be possible without the generous landowners that have provided access to the lakes via their properties, as well as their useful firsthand observations of what's happening

at the lakes day to day. It is sure that many exciting research papers will emerge from the project and many of the researchers are also hopeful that this will bolster support for effective and safe removal of Northern Pike using rotenone.

Kelly Ireland has been a part of the Stickleback reintroduction project since 2019. Ireland is a University of Alaska Fairbanks Ph.D. student in Brandon Briggs' lab at the University of Alaska Anchorage and has been actively involved in field gear preparation, coordination, and sample processing for this project.

Environmental Concerns Corner

Waters of the United States

In April 2019, the Alaska AFS Chapter submitted comments on the revised definition of "Waters of the United States" (WOTUS) under consideration by the U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers. The Alaska Chapter opposed the proposed rule because it removes existing regulations and fails to adequately protect functionally-significant wetlands and thousands of miles of headwater streams in Alaska. The Alaska Chapter agreed with the position of our parent organization, the American Fisheries Society, in strongly supporting the 2015 definition of WOTUS according to the 2015 Clean Water Rule. Nonetheless, the definition was changed in the 2020 Navigable Waters Protection Rule.

In June 2021, EPA and the Army Corps announced their intent to rescind the 2020 Rule and revise the definition of WOTUS to better protect our nation's water resources. Since then, the agencies announced their intent to host ten regionally-focused roundtables and, just recently, outlined a process for stakeholders to potentially be selected for one of these roundtables. Each roundtable will allow stakeholders with a range of perspectives to engage and discuss their experiences with definitions of WOTUS, including challenges and opportunities within their geographic areas. If you or someone you know with WOTUS expertise is interested, submit a self-nomination letter via email to WOTUS-outreach@epa.gov no later than November 3, 2021.

Upcoming Opportunities for Public Comment

Pebble Mine – On September 9, the EPA announced it will use Section 404(c) of the Clean Water Act to halt the proposed Pebble mine. Keep your eyes open this winter for a public comment period once there is a "Notice of Proposed Determination." The Chapter will discuss submitting comments and encourage you to forward the public notice details to your networks.

Oil & Gas Lease Sale 258 – The Bureau of Ocean Energy Management (BOEM) released the draft Environmental Impact Statement (EIS) for oil and gas leases in federal waters of Lower Cook Inlet on October 22. There will be a 45-day notice and comment period starting October 29 – including public hearings November 16-18. These are the same waters where federal managers closed the Pacific Cod fishery in Lower Cook Inlet last year – citing, for the first time ever, climate change as the reason behind low population numbers. For more details, go to <https://www.boem.gov/ak258>.

If you have an issue in your region or related to your fisheries work where the Chapter could be impactful, please reach out to Sue Mauger (president@afs-alaska.org) and Joel Markis (jamarkis@alaska.edu). As chairs of the Environmental Concerns Committee, we want to bring our Chapter into conversations where our expertise has the greatest value.

Back issues of *Oncorhynchus*
can be found online

<http://www.afs-alaska.org/newsletter>

Marine Debris Funding

Marine Debris Art Contest Open

This NOAA Marine Debris Program Art Contest is officially open to submissions for the 2023 Marine Debris Calendar/Planner. Original artwork from students in grades K–8 across the United States and U.S. Territories should answer the questions: (1) how does marine debris impact the oceans and Great Lakes; and (2) what are you doing to help prevent marine debris? Entries are due December 12, 2021. For complete contest rules or to download the 2022 calendar, visit the art contest [website](#).

Ocean Exploration Education Mini Grants

The program NOAA Ocean Exploration, in cooperation with the National Marine Sanctuary Foundation, has announced the launch of the Ocean Exploration Education Mini-Grants. These grants, ranging from \$10,000 to \$25,000, are intended to support Diversity, Equity, Inclusion, and Accessibility (DEI&A) efforts that advance ocean literacy, stewardship, and workforce development related to ocean exploration. Proposals must be submitted by November 15, 2021. More information is at the [Mini Grants website](#).

2021 Projects Awarded in Alaska

The NOAA Marine Debris Program recently announced funding of two projects in Alaska:

(1) The Alaska Department of Fish and Game received \$143,000 to remove, study, and recycle marine debris on Lowrie, Forrester, and Petrel islands in Southeast Alaska during 2022–2023. The Forrester Island complex suffers from a high

density of marine debris, more than half of which is derelict fishing gear, but supports North America's largest breeding and birthing grounds for Steller sea lions. After being collected and counted suitable debris will be diverted for recycling or reuse, and remaining debris transferred to a landfill. Collected debris will be backhauled by Alaska General Seafoods' vessel(s) to Ketchikan, Alaska, and then transported by Alaska Marine Lines to Seattle. The project will also educate commercial harvesters and school groups about marine debris to help reduce future debris accumulations. For example, the project will partner with six schools in the Ocean Guardian Program to conduct cleanups and data collection.

(2) The City & Borough of Yakutat received \$371,300 funded through the United States Mexico Canada Agreement to document, remove, and dispose of marine debris along the shoreline of Yakutat in the Gulf of Alaska during 2021–2023. This project, a multi-partner collaboration led by the City & Borough of Yakutat, will focus on over 50 miles of shorelines spread across five operational areas. This debris will be transported to Yakutat, sorted, categorized, and weighed to better understand debris composition and patterns in the region, and to allow for recycling or reuse as appropriate. Debris information will be used to engage local community members in learning about marine debris and to enhance efforts to prevent marine debris from entering the environment. 🐻

AOOS Awarded \$4.2 Million for Ocean Observing

The Alaska Ocean Observing System (AOOS) was awarded a five-year, \$4,176,512 grant, as part of NOAA's efforts to support continued growth, expansion, and modernization of the nation's climate, coastal, ocean, and Great Lakes observing capabilities.

The AOOS effort will focus on maintaining and enhancing the Ocean Data Explorer data portal, as well as supporting initiatives responding to Alaska's needs, such as the Alaska Ocean Acidification Observing Network, the Alaska Harmful Algal Bloom Observing Network, the Regional Ocean Data Sharing Initiative, and the

Alaska Water Level Watch. A major focus is also supporting innovative technologies such as underwater gliders, high-frequency radars, and new sensors on ecosystem moorings to cover Alaska's vast and remote coasts. 🐻

ONCORHYNCHUS

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Deadline for materials for the next issue of *Oncorhynchus* is Dec. 10.

Student Subunit Happenings

Taylor Cabbage, Student Subunit Representatives

Greetings AFS Alaska Chapter members! As we say hello to fall, let us congratulate the students that have graduated from University of Alaska's College of Fisheries and Ocean Sciences this past summer: Talia Davis (B.S. Fisheries and Ocean Sciences); Jesse Gordon (M.S. Fisheries) – "Bridging expert knowledge and fisheries data to inform assessment and management of rockfish in the Gulf of Alaska;" Julia McMahan (M.S. Fisheries) – "Comparing the ecology and life history of wild and stray hatchery salmon in PWS, Alaska;" Amy Neff (M.S. Fisheries) – "A nonlethal, whole oocyte approach to determining spawning readiness in Pacific sand lance, *Ammodytes personatus*, in Southeastern Alaska;" Patrick Barry (Ph.D. Fisheries) – "Spatio-temporal genetic structure, effective population size, and parentage simulations from contemporary genetic samples, and historic demographic data from sockeye salmon (*Oncorhynchus nerka*) in Auke Lake, Alaska;" Kelly Cates (Ph.D. Fisheries) – "Current and novel tools in the rapid health assessment of large whales;" and Jason Leppi (Ph.D. Fisheries) – "Broad whitefish (*Coregonus nasus*) ecology and habitat use in Arctic Alaska; spawning habitat suitability, isotopic niches, life-history variations, and climate change risks to subsistence fisheries." We wish you well in your future endeavors!

The Student Subunit of our Chapter held their first meeting of the school year on September 30, with virtual attendance from across the state. President Madeline Lee invited CFOS faculty to discuss their current research topics and how to get involved in their labs, as well as answer questions from students regarding graduate programs in fisheries. The subunit also introduced a plan to start a mentoring program, pairing motivated undergraduates with more experienced M.S. and Ph.D. students to help one another navigate the rollercoaster of higher education. Contact Student Subunit President Madeline Lee at mlee132@alaska.edu if you would like to be involved.

While many of us feel privileged to be fisheries students and professionals, any occupation can be overwhelming at times. In today's particularly stressful climate, occasional decompression is

necessary to help us return to work refreshed and reinvigorated. My favorite relaxation tool has always been creating art, from doodling in the margins of notebooks to painting and carving a variety of subjects. However I've only recently begun to understand how deeply intertwined my interests in fisheries and visual arts are, and how science communication can be enhanced through art.

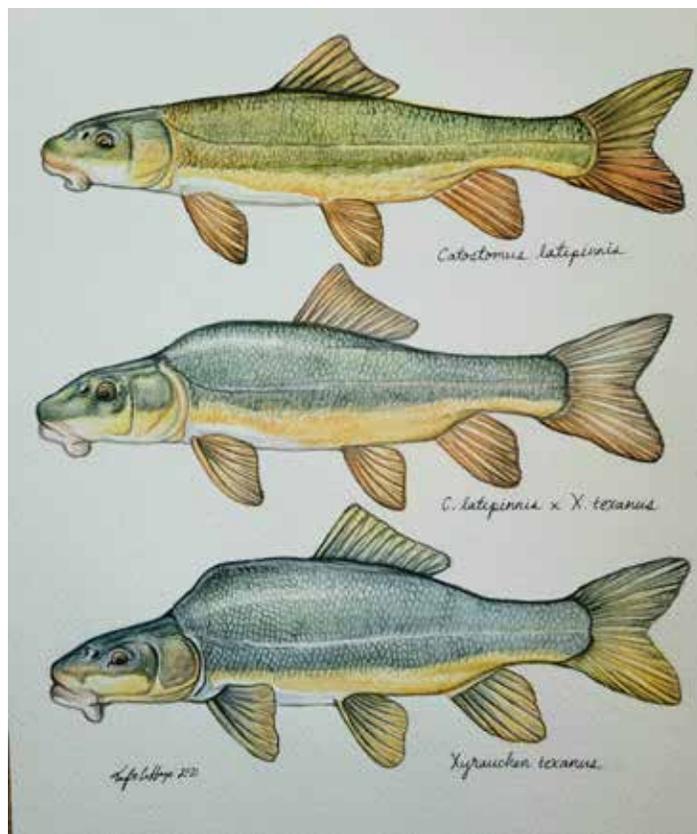


Illustration of a Flannelmouth Sucker (*Catostomus latipinnis*; top), Razorback Sucker (*Xyrauchen texanus*; bottom), and their hybrid (middle). Photo and art by Taylor Cabbage. Photo and art by Taylor Cabbage.

Imagine sitting in your first ichthyology lab: the unfamiliar smell of ethanol and formaldehyde filling your nostrils as you stare into the milky eyes of a fish preserved for decades, fins a-splay. At first you aren't really sure what you are looking at. Then, the teaching assistant hands out booklets with illustrations that explicitly highlight the defining characteristics of each representative specimen, such as fin rays, lateral line scales, and toothy tongue patches. These accurate illustrations of fishes began as tools for early naturalists to bring fishes back for study in the absence of modern

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Student Subunit Happenings, continued

photography or preservation methods, and to introduce the public to the diversity of fishes. These drawings still persist today because scientific illustrators include what is objectively true while removing distracting elements. Artists are able to tailor graphics to a specific audience and convey the scientific information in an elegant and engaging way ([Hodges 1989](#)), similar to a well written scientific article. I had the pleasure of illustrating three catostomids for a colleague in the Arizona Game and Fish Department to tell such a story. As the population of endangered Razorback Suckers declines in the Colorado River due to dam construction, spawning opportunities with conspecifics are rare and hybridization with non-threatened Flannelmouth Suckers is on the rise ([Wolters 2019](#)). Photos that highlight the differences among all three catostomids are lacking, so I illustrated the two species and their hybrid to help both agencies and the public become more familiar with, and monitor, this threat to Razorback Suckers.

While we often think of naturalists as the first people to illustrate fishes in a meaningful way, fish art has been present for thousands of years in many cultures, such as Chinese pottery and Tlingit tapestries. These depictions are often accurate enough to identify species and visualize relative abundance, or provide an understanding of what species were important commercially, culturally, and recreationally ([Begossi and Caires 2015](#)). We can observe changes in the importance of species over time by analyzing these illustrations, which often support the unfortunate truth that our baselines of fish abundance are shifting (Begossi and Caires 2015). Another combination of fisheries and art is found in the 19th century Japanese technique of gyotaku, or fish printing ([Ramirez 2016](#)). This method involves covering a fish with non-toxic sumi ink, and then pressing a sheet of washi paper



An illustration used to introduce Northern Pike (*Esox lucius*) research. Mountains in the Alaska Range prevented Pike from spreading into Southcentral Alaska, but anthropogenic introductions have led to invasive establishment in the region. “Native” and “invasive” are hidden in the spot patterns of each fish. Photo and art by Taylor Cabbage.

over the fish. As the paper is peeled back, a perfect mirror image of the fish is revealed on the paper. Gyotaku originated as a way to preserve accurate images of auspicious or trophy sized fish that could be remembered, but also eaten (Ramirez 2016)! This technique continues to document extraordinary fishes. For instance, a local gyotaku artist was recently invited to make prints of a rare anglerfish species that washed up on a beach in Los Angeles, CA. The original specimen will be inducted into the ichthyology collection at the Natural History Museum of Los Angeles County for careful preservation, while the prints of the anglerfish can be shared with a broader audience at the museum and beyond ([Portner 2021](#)).

Fisheries and art have a long history, and that relationship is now more important than ever as scientists must effectively communicate our messages to diverse audiences with limited attentions. Now, art relating to fisheries science can help others visualize complex scientific studies through graphical abstracts, encourage people to click an article link with an eye-catching graphic on social media, or better understand an interesting

AFS Alaska Chapter Meeting

February 28 – March 3, 2022

Continued on next page

Student Subunit Happenings

biological process with a step-wise illustration such as the semelparous salmonid life cycle. Many have observed that scientific inquiry and creating art are similar processes: gathering important background information, taking meticulous observations, and then synthesizing both new and old information into a final product that contributes to our current and future knowledge. So, if you are trained in science, you might also be good at art and visual media!

I often incorporate my artistic abilities when putting together presentations, creating schematic diagrams of methods and complex results to allow the audience to better understand and connect

with the research. If you are a professor, invite your students to illustrate concepts learned in class or practice creating graphical abstracts as more journals start to require them. If you don't consider yourself artistically inclined, consider commissioning an illustrator to create scientifically accurate media for upcoming publications. As aquatic students and professionals, we work on serious problems that can be difficult to explain to the public and even our fellow scientists. I've gone from using my art solely to take a break from my studies, to using art as a tool to share fisheries concepts and my research in a more engaging way. I encourage you all to try your hand at both! 🐟

Judy McDonald Paul Passes



Researcher Judy McDonald Paul shows a king crab egg clutch at the UAF Institute of Marine Science in Seward.

Photo from A.J. Paul.

Judy McDonald Paul, long-time University of Alaska Fairbanks employee and contributor to marine science and education, died on September 6 following a fall at her Texas home. While born in Silver City, NM, to a cowboy and farrier father and a ranch wife mother, much of Judy's youth was spent on large ranches in southern California. She obtained a Marine Biology B.S. from San Diego State University in 1973, and in 1974 went to work for Dr. Howard Feder at the University of Alaska Fairbanks Institute of Marine Science, where she met

A.J. Paul whom she married in 1975. Judy and A.J. worked at the Seward Marine Center (initially called Seward Station), a division of the Institute of Marine Science, from 1975 to 2001. As a resident scientist, Judy collaborated on a variety of projects to study life histories of planktonic and benthic invertebrates and fishes, resulting in numerous publications to inform better management. Judy also participated on numerous University and NOAA research cruises, and provided guidance to high school, undergraduate, M.S., and Ph.D. students. Judy was a driving force to create the Alaska Region National Ocean Sciences Bowl, also known as the Alaska Tsunami Bowl, and served as Alaska Regional Coordinator from 1998 to 2001. Judy was also an avid promoter of the Alaska SeaLife Center, a Civil Air Patrol volunteer, and a Marine Science 4-H leader. Judy and A.J. hosted an annual July 4th picnic at their 6th Street home in Seward for students, staff, and community members. After retiring in 2001, Judy and AJ moved to the YO Ranch in Junction, TX, where Judy took on new volunteer activities and new hobbies, including silversmithing. Judy will be missed for her infectious laugh, her knowledge, her willingness to ask questions, and just to be a friend. 🐟

Clement V. Tillion Dies at Age 96



Alaska State Library - Historical Collections

*Senator Clem Tillion. Photo from Alaska State Library
– Historical Collections.*

Alaska's former "Fish Czar," Clem Tillion, died at his home in Halibut Cove, AK, on October 13, 2021. Born July 3, 1925, in Brooklyn, NY, Tillion was the only child of an architect father who helped design U.S. Navy facilities during World War II. Tillion's mother died when he was 15, and when Tillion wanted to join the military at age 17, his father agreed provided that Tillion enlist with the U.S. Navy Civil Battalion, or Seabees; Tillion served from 1940 to 1945, including service in the Solomon Islands of the South Pacific. During the war, Clem contracted malaria and public health officials at the time suggested people with malaria avoid areas where they could spread the disease, so Clem worked his way to Alaska where the mosquito species don't spread malaria. Tillion initially lived in Fairbanks, then migrated to Kachemak Bay where he lived in Homer and Seldovia and took his first commercial fishing job. Clem married Diana Rutzebeck in 1952 and they raised 4 children. They initially lived in a small shack on the isthmus of Ismailof Island,

then bought most of the land west of the isthmus and helped develop the area into a fishing and artist community known as Halibut Cove.

Tillion found his way into politics, serving as a representative for the Kachemak Bay area during 1963–74, as senator during 1975–78, and Senate President during 1979–80. As Senate President, Clem helped then Governor Jay Hammond put into law the Alaska Permanent Fund, with annual dividends paid to Alaska residents. While supporting the dividend, Tillion was also the lone legislative vote against repealing a state income tax in 1980.

Involvement with commercial fishing continued during and after his legislative involvement as Clem pursued strong support of Alaska's fisheries, but also the fish stocks supporting those fisheries. After salmon returns crashed in the early 1970s, Tillion was one of the strongest supporters of a State constitutional amendment and subsequent laws limiting access to the salmon fisheries. In 1976, Clem was appointed to the North Pacific Fisheries Management Council, one of eight regional councils newly established by the Magnuson-Stevens Fishery Conservation and Management Act. The act clarified federal fisheries management beyond waters of State jurisdiction. Tillion served on the council through 1983, including as chairman from 1978 to 1983, and was reappointed from 1991 to 1997. Clem was a life member of the American Fisheries Society, having been a member since 1979. Based on his long-term commitment to fisheries, Clem was awarded the AFS Alaska Chapter's highest honor, the Wally Noerenberg Award, in 1989.

Throughout his life, Tillion remained a renowned story-teller and historian. With a background of sincerity, historical insight, and humor, Clem continued to provide input on both legislative and fisheries issues into his 90s. Tillion was buried on Ismailof Island next to his wife of 58 years; Diana, an artist particularly know for painting with octopus ink, died in 2010. 🐙

Western Seabird Die-Off Continues

Gay Sheffield, a marine mammal biologist and Alaska Sea Grant's Marine Advisory Program agent in Nome, has been investigating seabird deaths in Western Alaska in collaboration with Bering Strait residents, Kawerak, Inc., the U.S. Fish and Wildlife Service, and others. The region has continued to experience unexpected seabird die-offs since 2017. Species of adult birds occurring on shore in 2021 include shearwaters, murre, puffins, gulls, kittiwakes, cormorants, and loons. Seabird die-offs occur sporadically in Alaska, but were rare in the Bering Strait region until 2017, and the increased frequency, geographic extent, and number of species involved is of increased concern. Community members and researchers have also found fewer eggs and chicks at breeding colonies. The primary observation is that the dead birds are emaciated with empty stomachs and little or no body fat. Testing confirmed that infectious diseases or harmful algal toxins are not the cause.

Researchers are trying to determine why seabirds are starving, with climate change likely a factor. With the ongoing reduction in sea ice quality, extent, and duration, the thermal barrier of cold water that separates the northern and southern Bering Sea ecosystems has transitioned northwards, shifting the distribution of large-bodied predatory fish, such as Pacific Cod and Alaska Pollock. Large fish moving north may be consuming the small forage fish that the birds had relied on, the smaller fish moved further north to remain in cold water, or the smaller forage fish might be migrating north to cooler waters earlier than in the past, meaning that breeding birds arriving at the usual spring migration might be finding less abundant prey.

Another possibility is the recently reduced sea ice. Sea ice is like a greenhouse window, but with algae growing on the ice underside all winter and spring. With less sea ice, fewer algae could feed zooplankton, and fewer zooplankton feed small fishes, stressing the entire food chain.

While not just the birds are hungry, many seabirds and their eggs are harvested by coastal residents for subsistence, an important source of nutrition for the seasonal summer months. Thus seabird die-offs are an indicator of the health of Alaska's ocean ecosystems, and also a serious food security concern for coastal residents throughout the Bering Strait region. 🐾

Meetings and Events

American Fisheries Society AFS2021



November 6–10, 2021. The 151st meeting of the American Fisheries Society will be in Baltimore, MD. More information is available at <https://afsannualmeeting.fisheries.org/>.

Alaska Marine Science Symposium

January 25–27, 2022. This conference will be a virtual event. More information will be posted at <http://www.alaskamarinescience.org>.



American Fisheries Society Alaska Chapter Annual Meeting



February 28–March 3, 2022. The 48th annual meeting of the AFS Alaska Chapter will be in Juneau, AK. More information will be posted at <https://afs-alaska.org/>.

American Fisheries Society Western Division Annual Meeting

August 21–25, 2022. The next AFS Western Division meeting, cohosted with the Society meeting, will be in Spokane, WA. More information will be posted at <https://wdaafs.org/meetings/annual-meeting/>. 🐾



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