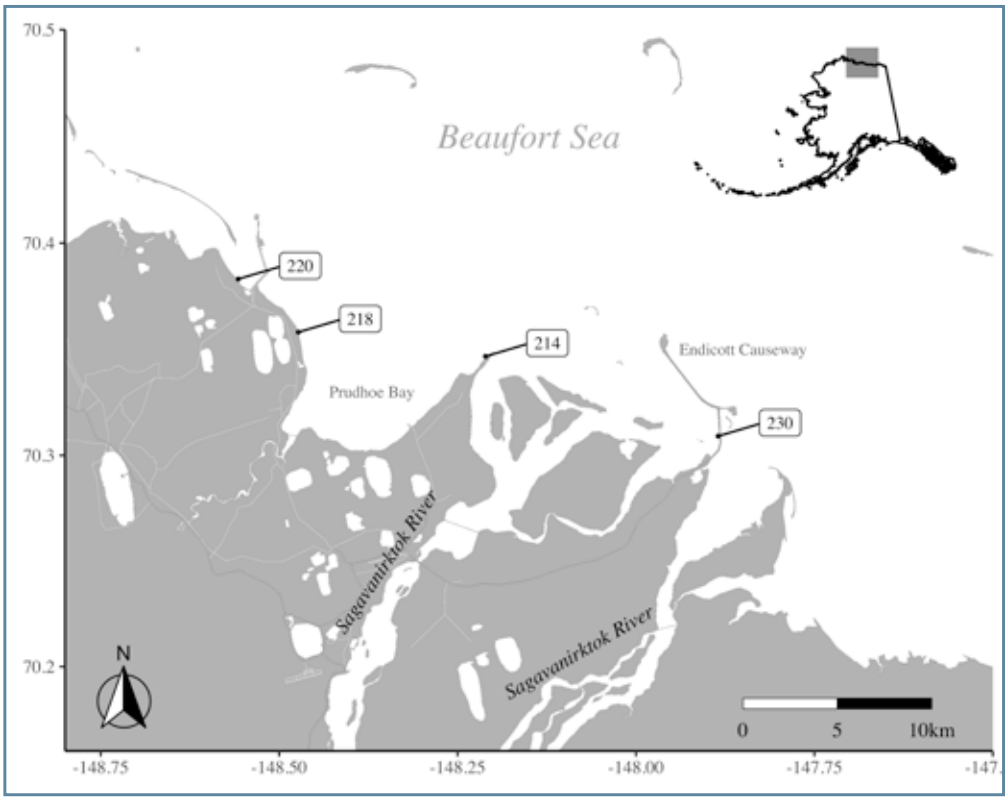
ONCORHYNCHUS

Newsletter of the Alaska Chapter, American Fisheries Society

Vol. XXXXI Spring 2021 No. 2

In this issue:



The Beaufort Sea Long-Term Nearshore Fish Monitoring Program study area and the four sampling sites near Prudhoe Bay, Alaska. Figure by Kyle Gatt

Beaufort Sea Long-Term Nearshore Fish Monitoring: Confronting Data-Limited Stocks in a Changing Arctic

Justin Priest, Duncan Green, Kyle Gatt, Carolyn Hamman, and Trent Sutton

The Beaufort Sea Long-Term Nearshore Fish Monitoring Program is the most comprehensive and continuous sampling effort to monitor the assemblage structure and health of marine, diadromous, and freshwater fishes in nearshore waters of the central Beaufort Sea near Prudhoe Bay, Alaska. This program was initiated in 1981 to monitor and, if necessary, direct mitigation efforts for nearshore fish populations as a result of oil and gas development. Given the 40-year longevity of this program, and the standardized nature of sampling protocols and locations, this program has also allowed for an examination of the impacts of climate change on nearshore fishes in the Alaskan Arctic. Monitoring efforts were historically funded by BP Global and administered by LGL Limited Ecological Research Associates, Inc., and Hilcorp Alaska, LLC. In 2017, the University of Alaska Fairbanks College of Fisheries and Ocean Sciences (UAF; with Trent Sutton as the lead investigator) took over administration of this program with a charge to also develop graduate-level research projects.

Annually, fyke nets (eight total nets, two net pairs per site) are set at four locations along the Beaufort Sea coast as early as sea ice conditions allow, which is typically at the end of June. Sampling occurs daily until late August or early September, with all fish removed from each net, identified to species, measured, and then released alive or euthanized for the collection of additional biological data. In addition to monitoring-related sampling, additional fish samples and data are collected each year as the basis for graduate student

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The President's Corner

Sue Mauger,
AFS Alaska Chapter President.

Hello Alaska Chapter! My name is Sue Mauger and I am pleased to serve as Chapter President this year. I believe Alaska's fish and fisheries are at the heart of what makes our state great. I look forward to getting to know more of you who are similarly committed to maintaining high standards for the fisheries profession and ensuring conservation of Alaska's fisheries.

I live in Homer on the traditional lands of the Dena'ina and am the Science & Executive Director of Cook Inletkeeper, a community-based non-profit organization. I've focused my field research on understanding how our changing climate will alter freshwater habitat and what those changes will mean for our salmon populations and local communities.

Although I have been at Inletkeeper now for two decades, I took a circuitous path to get here. I only found the right job by exploring random opportunities and paying attention to what inspired me.

After graduating from Duke University and before I became enamored by the aquatic world, I radio collared pangolins in Zimbabwe. It was my first exposure to the complexity of conservation and balancing the needs of local communities. I then worked in Chesapeake Bay studying blue crabs, a resilient species considered impervious to habitat and overfishing pressures until… the population crashed. Here I saw the value of long-term datasets and the need to question assumptions. When I switched coasts, I found a

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Beaufort Sea, continued

research projects. Three M.S. students (Justin Priest, Duncan Green, Kyle Gatt) recently completed their research at UAF as part of this program, and one project (Carolyn Hamman) is currently in progress. The remainder of this article provides an overview of each of these research projects within the context of a changing Arctic.

Environmental conditions influence the presence, species composition, abundance, and growth of fish species in the nearshore Arctic ecosystem. With ongoing shifts in Arctic conditions due to climate change such as warming water temperatures and less sea ice, nearshore fish communities and individual species responses to their environment are unknown. Such shifts in the fish community were assessed by M.S. student Justin Priest using daily abundance data, which included 1.78 million fish caught since 1982. Beginning in 2001, species richness has increased by approximately one species per decade ($P = 0.004$), during which time the water temperature warmed by approximately 1.4°C. Multivariate metrics of species composition were assessed using non-metric, multi-dimensional scaling, and Permutational Analysis of Variance models. These models indicated that biweekly species composition significantly changed across years with distinct variations among the four sample locations and throughout the season. The most important variables affecting the multivariate species composition were salinity and water temperature. These variables were investigated further in univariate species models of species abundance which showed that five species changed significantly over time, with changes associated with differences in water temperature and salinity. The species positively associated with observed changes in the aquatic environment appear to be eurythermic and/or euryhaline generalist, species such as Broad Whitefish *Coregonus nasus* and Saffron Cod *Eleginus gracilis*. Such patterns of altered species compositions demonstrate that continued long-term changes in environmental conditions will likely favor generalist species, potentially causing substantial shifts within the Arctic nearshore ecosystem.

Understanding species-level effects of climate

Continued on page 4

President's Corner, continued

merry band of benthic ecologists studying aquatic insects in Oregon. On the wings of their enthusiasm, I helped run a citizen monitoring program to assess local stream health. And this was the best lesson I learned: working with people who are passionate about what they do is a good as it gets.

After I got my M.S. in fisheries science at Oregon State University, I headed north. I realized that my fisheries interest was centered in how science and communities connect and I wanted to be in a place where these things were still intertwined and focused on conservation not restoration.

It is with that lens that I'm excited to take on the President's role and find ways to bring us together – regardless of our disparate career paths – to learn from each other during this time of rapid climate and societal change.

For those of you who were able to attend our virtual meeting in March, I hope you caught the plenary talks by Barbara 'Wáahlaal Gíidaak Blake, Dr. Erika Eliason, and Dr. Ivan Arismendi. Each was thought provoking and reinforced that curiosity and our capacity to learn from new information, and diverse voices might be our greatest contribution to our field. If you registered for the meeting, the attendee hub is open until June 22 and you can watch or download any of the talks. If you did not register, we will be making the plenary talks available to watch on our chapter website.

We had 175 people register for the meeting. including 40 students. Considering all the zoom fatigue we're experiencing, I was thrilled so many of you made the time to engage with the Chapter and connect with each other. Thanks to all of you who shared your work with us. Preparing pre-recorded videos certainly requires more work ahead of time, but I thought the results were excellent.

At our virtual Business Meeting, we took time to appreciate those who have served the Chapter. We thanked Joel Markis as he stepped off the Executive Committee having completed his four years of service. As Past-President, Joel spent a lot of time upgrading and improving our Chapter website. And I look back very fondly at the Sitka meeting Joel hosted in 2019, especially now knowing that it would be a few years before we could be back together again.

Stephanie Quinn-Davidson, received the coveted gavel plaque and extra kudos for serving as Chapter President during such a challenging year which included having to cancel the Fairbanks meeting in March 2020. I am very glad to have her experience and creativity on the Executive Committee for another year as she serves as Past-President. Megan McPhee is now our President-Elect and we'll keep our fingers crossed that her Juneau meeting will be in person! Erik Schoen is our new Vice President and I look forward to his contributions and new ideas for the Chapter.

Elizabeth Hinkle did an excellent job as our Student Representative last year and pulled off a great student auction – virtually – bringing in over $2,000 in funds to support student travel. Taylor Cubbage was elected the new Student Representative and we look forward to her help getting us more social on our Facebook page. We have lots to share so please follow the Alaska Chapter *https://www.facebook.com/AlaskaAFS* and engage with us there.

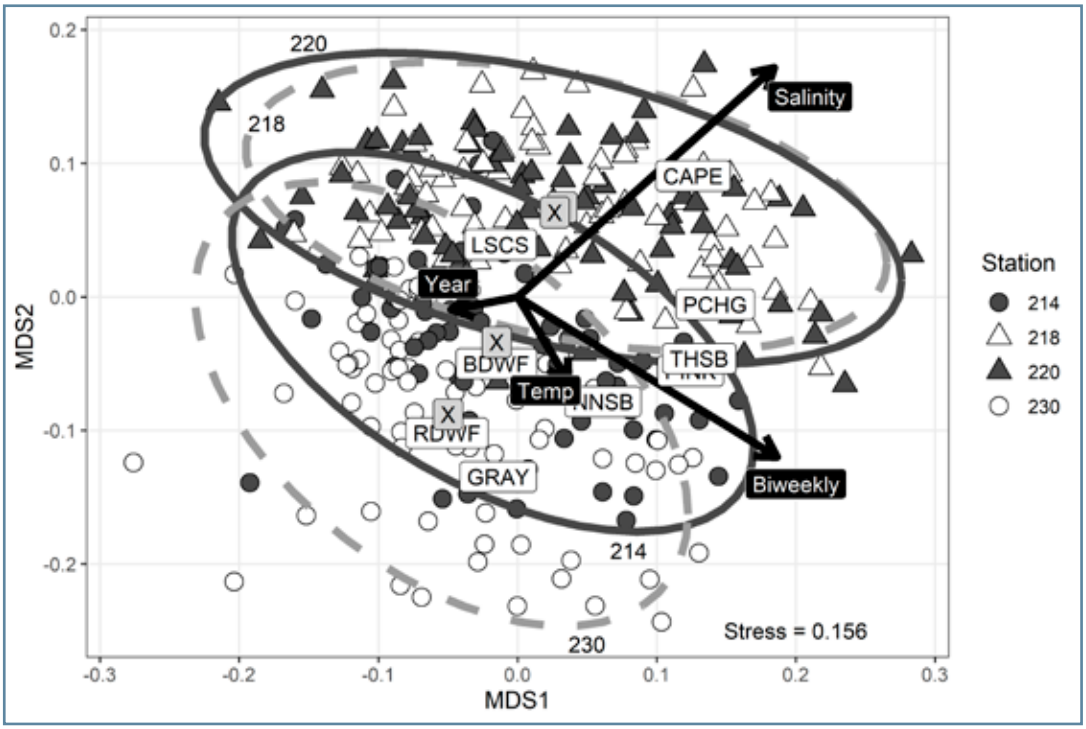
I will continue to explore the theme of "Coming Together for the Love of Fish" throughout the year with workshops and other virtual gatherings, so that when we finally do meet in Juneau next year we'll have lots to talk about. Not just talk about how certain fisheries are doing, what new technical challenges we are facing, or new skill sets we are bringing to our work, but also to talk about our evolving mindset and creative ways that the Chapter can better serve all of us.

As a professional organization that is made up of curious minds, I think we have a lot of fascinating and valuable learning to do together. I look forward to the opportunity to create the spaces for these conversations!

Fish of the Week!

Join every Monday for Fish of the Week! 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. *https://www.fws.gov/alaska/pages/fish-of-the-week*.

Beaufort Sea, continued



*Non-metric multidimensional scaling (nMDS) ordination of fish species composition from Prudhoe Bay, Alaska, 2001–2018, showing 95% confidence ellipses and centroids (X) for each station. Environmental vectors (direction and magnitude arrows) are shown for salinity, water temperature, biweekly period, and year. Weighted scores are shown for nine species strongly associated with nMDS axes 1 and 2: BDWF = Broad Whitefish, CAPE = Capelin **Mallotus villosus**, GRAY = Arctic Grayling **Thymallus arcticus**, LSCS = Least Cisco **Coregonus sardinella**, NNSB = Ninespine Stickleback **Pungitius pungitius**, PCHG = Pacific Herring **Clupea pallasii**, PINK = Pink Salmon **Oncorhynchus gorbuscha**, RDWF = Round Whitefish **Prosopium cylindraceum**, and THSB = Threespine Stickleback **Gasterosteus aculeatus**. Figure by Justin Priest.*

change, specifically warming-induced alterations, is critical to recognizing impacts on food security. To understand how an important subsistence fish species may respond to a warming Arctic under variable climate change scenarios, M.S. student Duncan Green parameterized and corroborated a juvenile Broad Whitefish bioenergetics model to project potential changes in growth and prey consumption. Laboratory-based investigation into metabolic rate, energy density, and growth rate of juvenile Broad Whitefish trials were used to inform the model, and rearing trials allowed testing of model performance. Warming simulations based on currently estimated feeding conditions supported projected increases in future consumption rates of up to 4% required to maintain historically observed summer growth. In contrast, simulations in which prey energy density was reduced by 50% resulted in projected consumption need increases of up to 107% in order to maintain historic growth. Simulations in which prey energy density was increased by 50% indicated an ability for Broad Whitefish to reduce consumption rates by up to 32% and maintain current growth rates. These results suggest that, although the physiological effects of rising water temperatures have the potential to increase growth rates of juvenile Broad Whitefish, climate-induced shifts in prey availability or prey quality will likely regulate factors that determine the magnitude and direction of changes in growth rates.

Master's student Kyle Gatt used otolith sclerochronology and linear mixed-effects models to reconstruct the growth history of Arctic Cisco *Coregonus autumnalis*. This biochronology spanned 23 years (1996–2018) and revealed significant interannual growth rate variation that was associated with abiotic environmental conditions (salinity and water temperature) and Arctic Cod *Boreogadus saida* abundance during the ice-free summer feeding period (June to late August). Growth rates were faster in years with higher salinity waters (R^2 = 0.47), in agreement with a benefit from the onshore movement of productive marine waters via upwelling. Water temperature was also positively associated with growth (R^2 = 0.31) and likely mediated through metabolic influences or bottom-up trophic effects. Arctic Cod abundances showed a weak, negative association with growth (R^2 = 0.22), attributed to differences in habitat selection among species. These results suggested Arctic

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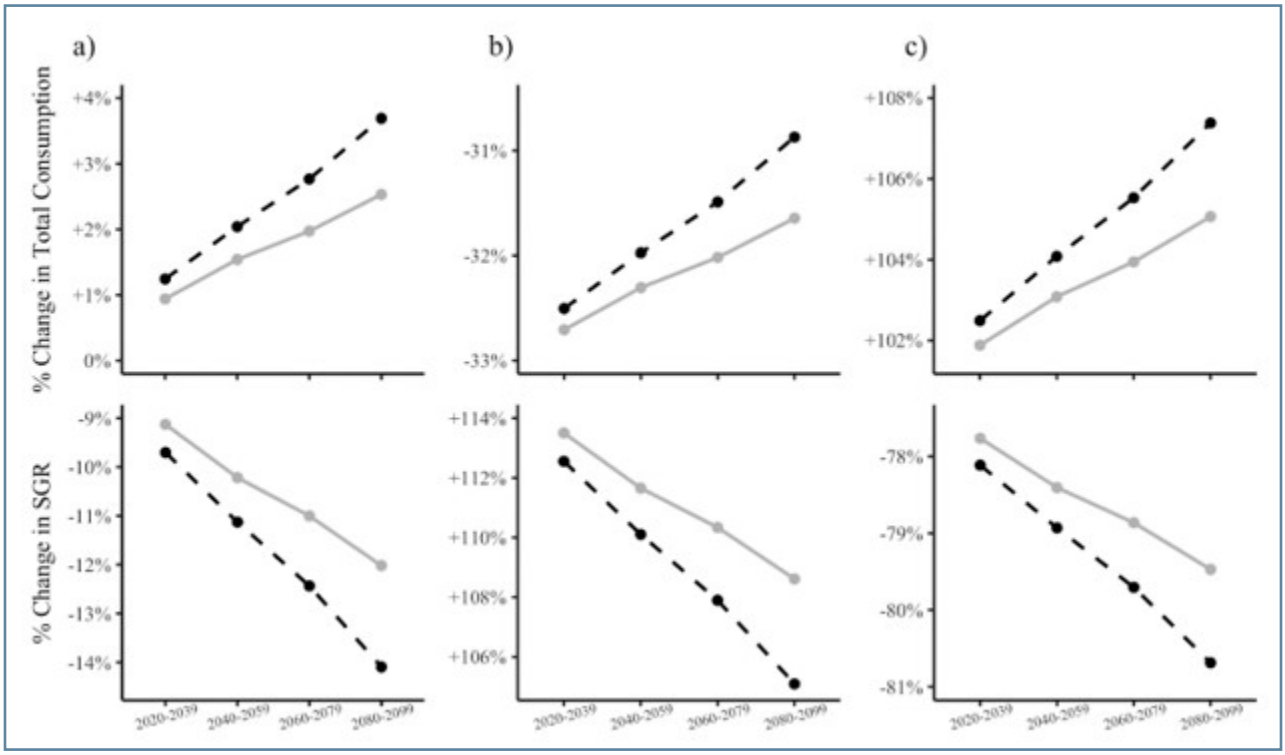
Beaufort Sea, continued



(a) Percent change in projected prey consumption (upper plot) during 2020–2099 required for an age-1 Broad Whitefish to maintain mean growth that was observed from 2001 to 2019 at RCP (representative concentration pathway) 6.0 (solid, gray line) and RCP 8.5 (dashed, black line) during future growing seasons, and percent change in projected specific growth rates (SGR, specific growth rate; lower plot) for an age-1 Broad Whitefish feeding at estimated ration levels observed from 2001 to 2019 (6.59% fish mass/d). Simulations assumed a 100% chironomid larvae diet (2,856 J/g wet mass). (b) Percent change in consumption required to maintain constant growth (upper plot), and percent change in SGR at constant feeding rates under 50% increased prey energy density scenarios. (c) Percent change in consumption required to maintain constant growth (upper plot), and percent change in SGR at constant feeding rates under 50% decreased prey energy density scenarios. A value of 0% in all plots would indicate no change from mean estimated historical rates. Note variation in y-axes. Figures by Duncan Green.

Cisco benefitted from recent warming of water temperatures. Gatt also compared age estimates using fin rays, scales, and otoliths of Arctic Cisco, Least Cisco *Coregonus sardinella,* Broad Whitefish, and Humpback Whitefish *Coregonus pidschian* from the Beaufort Sea nearshore. Fin rays and scales provided similar age estimates as otoliths until sexual maturity, but underestimated otolith age for mature individuals. Scales underestimated ages more often and were more difficult to assign ages than the other two structures. Fin rays and scales provided similar age estimates as otoliths for all age and size classes of Arctic Cisco because most individuals were immature. These results suggest that dorsal fin rays may be used to estimate age in Least Cisco <300 mm, Broad Whitefish <450 mm, and Humpback Whitefish <350 mm, and that otoliths should be used for larger individuals.

An additional way to quantify the influence of climate change on fish is through understanding tolerance to temperature variation. Fish have an optimal temperature that maximizes physiological functions; however, mechanisms exist that allow the same fish to survive at temperatures above and below this optimal temperature, a term known as thermotolerance. The ability of an individual or a population to acquire and shift its thermotolerance is due to a suite of proteins called heat shock proteins (HSP), with HSP70 being the predominant heat shock protein involved in teleost thermotolerance. Master's student Carolyn Hamman is currently working on a laboratory-based project to quantify the thermotolerance of two Arctic teleosts (Broad Whitefish and Arctic Cisco) by measuring the HSP70 expression that occurs at the highest temperature for the thermotolerance of each species (known as critical thermal maximum; CTmax).

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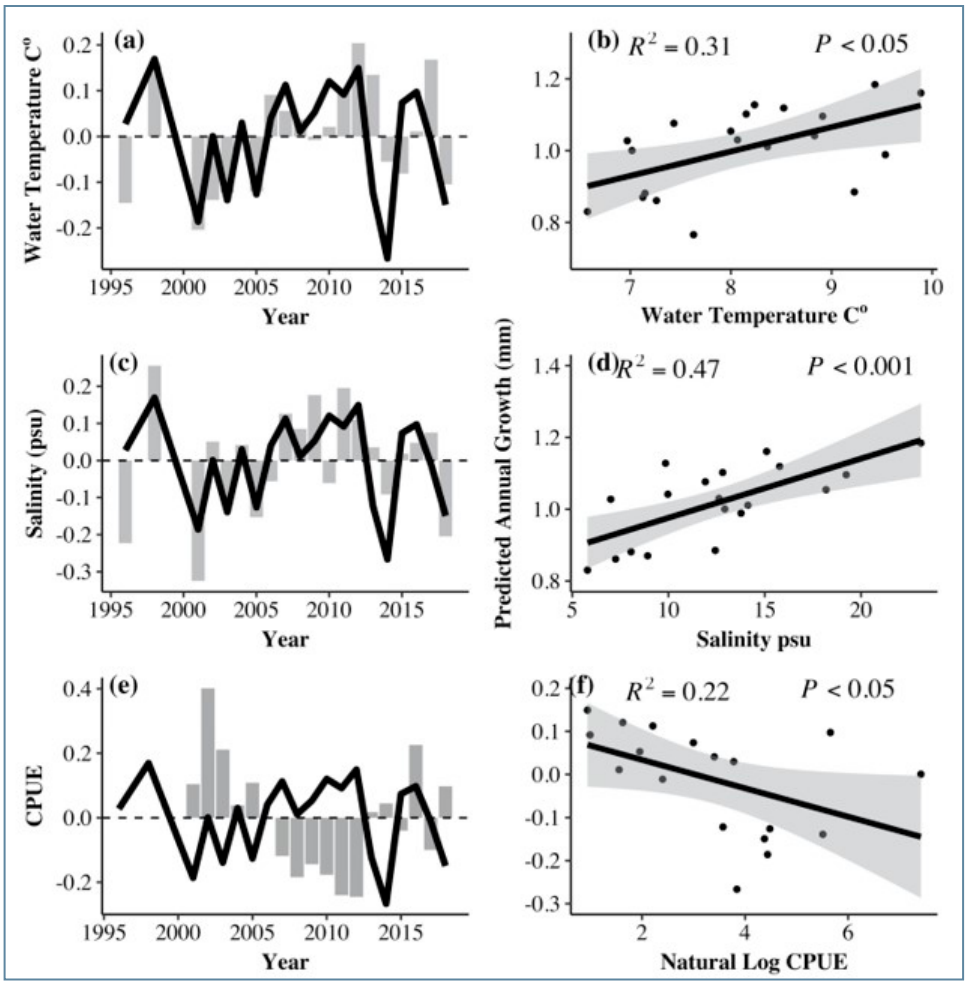
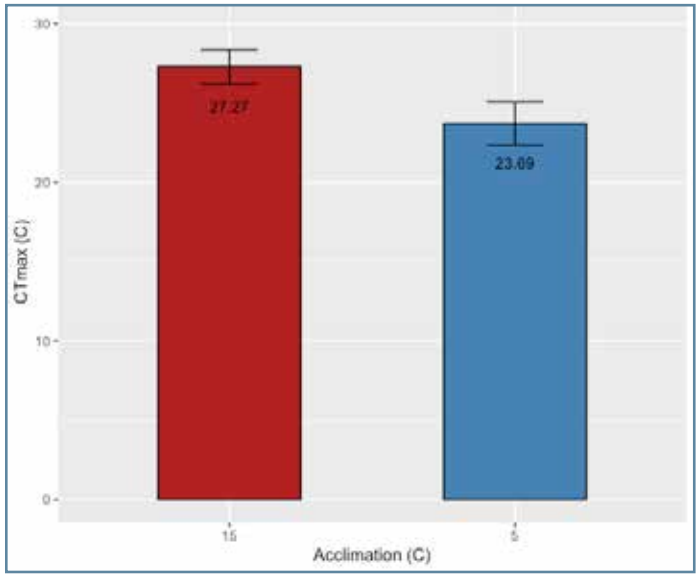
Beaufort Sea, continued



Significant correlates (bars in a, c, and e; P < 0.05) with the Arctic Cisco otolith biochronology (black line in plots a, c, and e) near Prudhoe Bay, Alaska, and their associative linear model predictions with 95% confidence interval (shaded area); (plots a and b) mean annual water temperature, (plots c and d) mean annual salinity, and (plots e and f) mean annual Arctic Cod catch per unit effort (CPUE). All extrinsic correlates were natural log-transformed and mean-centered prior to model fitting. *Figures by Kyle Gatt.*

Differences in thermotolerance (CTmax) of Broad Whitefish between higher (15°C) and lower (5°C) water temperature acclimation treatments (p < 0.001). *Figure by Carolyn Hamman.*



For the laboratory experiments, each species is split into two groups and acclimated at two water temperatures (5°C and 15°C) to see if contrasting (low and high, respectively) thermal environments impact thermotolerance and subsequent HSP70 expression. After the 2020 field season, live Broad Whitefish were collected, transported to UAF, and acclimated in aquaria for one week before being subjected to a thermal ramping rate that would induce continual expression of HSP70 but was also non-lethal. Once CTmax was reached (expressed as a loss of equilibrium), the fish were euthanized and tissue samples were collected for subsequent HSP70 concentration analyses. Preliminary results showed that the two acclimation temperatures did impact the thermotolerance of Broad Whitefish. This implies that as climate change progresses, Broad Whitefish appear to possess the potential to shift their thermotolerance in response, ultimately increasing their survivability. Tissue samples are currently being analyzed to see if HSP70 can predict the observed thermotolerance shift in this species, and summer field collections in 2021 will focus on Arctic Cisco, with a repeat of the aforementioned experiment and laboratory analyses.

Although the original intent of the Beaufort Sea Long-Term Nearshore Fish Monitoring Program was to monitor the impacts of oil and gas development in Prudhoe Bay, the long duration (nearly four decades) and standardized nature of sampling

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Beaufort Sea, continued

have allowed the collection of fish assemblage and other biological data concurrent to changing environmental conditions in this region. The Arctic is warming at a rate almost twice the global average, and this warming is causing significant alterations to the physical and chemical environments. The net result is significant implications for the marine, diadromous, and freshwater fishes in the nearshore waters of the Beaufort Sea. Many of these fish stocks are data limited in that we do not have a full understanding of their distribution, life history, or population dynamics. However, through the graduate student-led projects associated with the Beaufort Sea Long-Term Nearshore Fish Monitoring Program, our understanding of the impact of climate-driven environmental change on these fishes in Arctic Alaska has increased, particularly for those species of subsistence importance in this dynamic environment.

Justin Priest is a Fishery Biologist for the Alaska Department of Fish and Game (ADF&G), Duncan Green is a Fish and Wildlife Technician at ADF&G, Kyle Gatt and Carolyn Hamman are M.S. students at UAF, and Dr. Trent Sutton is a Professor of Fisheries and the Associate Dean of Academic Programs at UAF.

From the Annual Meeting

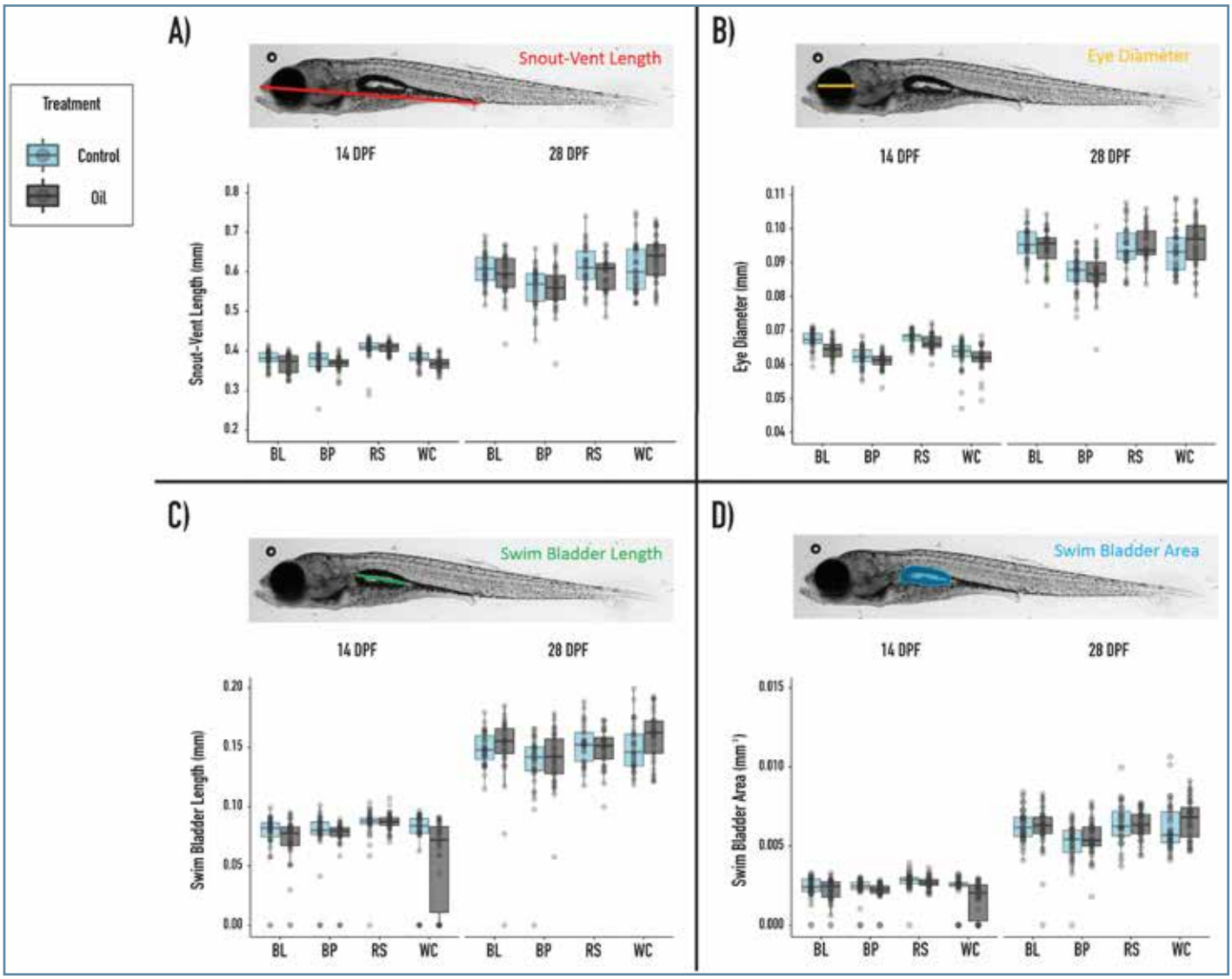


Figure from AFS Alaska Chapter meeting by Ph.D. presentation winner, Kelly Ireland. Crude oil exposure alone did not significantly impact somatic markers for Threespine Stickleback. There was a significant interaction between treatment (control and oil) and time (14 or 28 DPF) on the snout-vent length ($p = 0.01$), swim bladder length ($p < 0.01$), and swim bladder area ($p < 0.01$) of fish from Westchester Lagoon. BL = Big Lake, BP = Bear Paw, RS = Rabbit Slough, WC = Westchester Lagoon, DPF = days post fertilization.

Student Subunit Happenings

Elizabeth Hinkle, Student Subunit Representatives

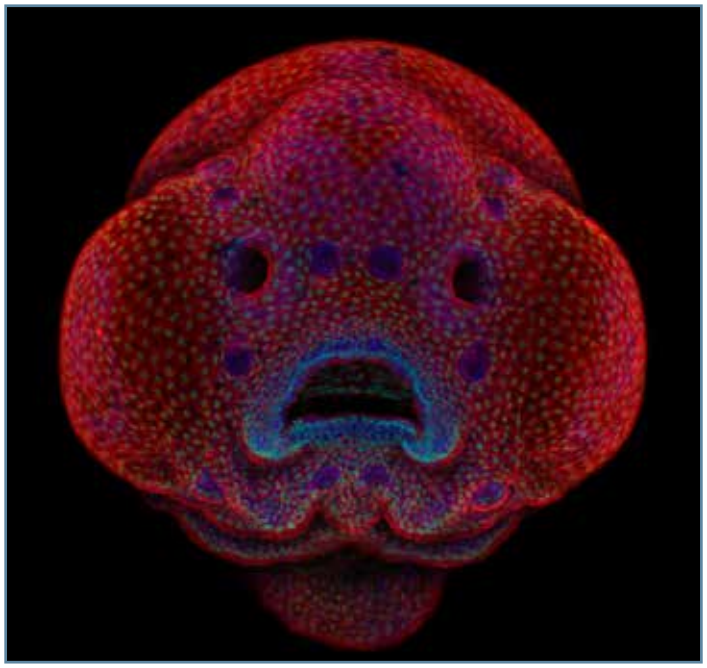
The Alaska Chapter AFS 2021 virtual conference was a hit! It was great to see so many student participants and uplifting to see everyone's pixelated faces! I would especially like to recognize the student award winners Kelly Ireland (Ph.D.), Olivia Edwards (M.S.), and Will Samuel (Undergraduate) for best oral presentations, and Chris Sergeant (Ph.D.) and Carolyn Hamman (M.S.) for best poster presentations. Congrats on your accomplishments!

This year's conference theme was "Coming Together for the Love of Fish," and that got me thinking about why I love fish, and why we should all love fish. Admittedly, I love biology, and my love of fish is something that I built over time because I love biology. I like the study of life, and I appreciate being able to use fish as an access point into the natural world. Studying the lives and times of fish is like viewing another realm in which I can never be fully immersed. I will never know what it is like to breathe with gills, to swim easily upstream, or to feel vibrations tickle my lateral line. Fish live in a totally different, yet parallel, universe, and it is thrilling that we are allowed a peek.

In concurrence with this year's conference was the statewide COVID vaccination rollout. It has been made poignantly clear to me the risk and sacrifice of individuals who volunteered for the vaccine trials, and I appreciate their contribution to a safer world. This led me to start thinking about other nonhuman animals that we have used and sacrificed for medical advancements. I would like to take time to honor some noteworthy contributors to biomedical science: fish.

Fish oils are typically used as a generic dietary supplement to enhance our consumption of polyunsaturated fatty acids, but findings indicate that fish oil is useful in preventing cardiac arrhythmias (*McLennan 2001*) and atrial fibrillation (*Ninnio et al. 2005*), and can reduce your heart rate and oxygen uptake during exercise (*Peoples et al. 2008*). But the utility of fish doesn't stop with just their oils.

Research lead by the National Institute of Allergy and Infectious Diseases (NIAID) determined that lamprey (superclass Cyclostomata) and lab mice have a very similar response to the influenza virus. This is evidence that the antibody response to protein antigens is conserved between mammals and jawless fish, which makes lamprey prime candidates for understanding infectious disease (*Altman et al. 2015*).



A photo of a four-day-old Zebrafish embryo claimed top honors in the 2016 Nikon Small World Photomicrography Competition. Image produced at the University of Texas' Anderson Cancer Center in Houston, Texas. Photo by Oscar Ruiz.

Collagen is the most useful substance for tissue engineering and recent research shows that fish have a lot of it! Collagen extracted from the skin and bones of rays, tilapia, and salmon can be modified to tolerate mammalian body temperatures and can be used for both vascular and bone grafts. Fish collagen is biodegradable, biocompatible, and readily available, making fish our potential go-to surrogates of tissue regeneration (*Yamada et al. 2014*).

Recent genetic advancements have found that Zebrafish are a useful model for studying autism spectrum disorder (ASD; among lots of other things). Because of their external fertilization, rapid development, malleable genome, and high genetic homology to humans, these social fish are an excellent model for ASD—more specifically they have helped identify 12 ASD risk genes which improved our understanding of ASD and may aid in potential treatments (*Rea and Raay 2020*).

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Student Subunit Happenings, continued

A 2019 review paper found that interacting with fish in aquariums can help us relax and improve our wellbeing (*Clements 2019*). Some wholesome findings within the review include that installing aquariums in the dining rooms of assisted living homes helped dementia patients gain weight and uptake more nutrients (*Edwards and Beck 2014*), and that placing aquaria into rooms reduced anxiety of mentally ill patients (*Barker et al. 2003*).

A simple Google search will land you in a plethora of examples emphasizing that fish are important tools for enhancing biomedical science. So, if you like me, were not born with the fish-obsession gene, give it time. There are many reasons to appreciate fish, and I have just given you several more. They're friends, they're food, they're ecosystem engineers, and they're contributors to medicine. What more do you need to love fish?!

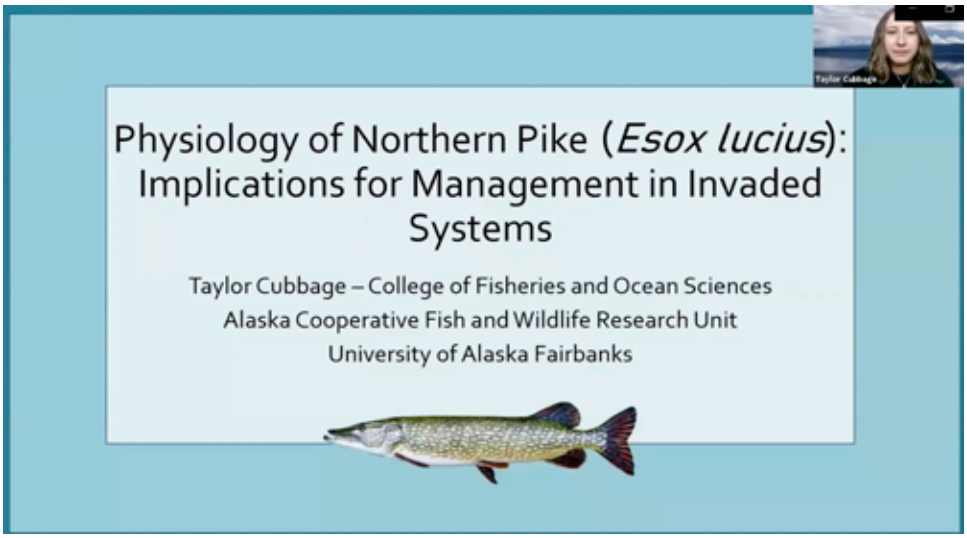
AFS Student Symposium a Success

Lia Domke, Jesse Gordon, Taylor Cubbage

The AFS Student Symposium went fully virtual for its 24th year of bringing fisheries and aquatic science students together from across Alaska. On February 26, 2021, from 12-5 p.m., we had the pleasure of hosting over 180 attendees to watch 22 undergraduate, M.S., and Ph.D. students share their research at a variety of stages. While the presentations were pre-recorded to ensure relatively smooth time-keeping, we had engaging live question and answer sessions after each talk. Presentations were formally scored by 15 judges to choose the best long and short talks, but we also had general audience members provide feedback which were shared anonymously among student presenters.

We sincerely appreciated the time that our judges and general audience members took to provide feedback to students, so to thank them at the end of the symposium, we hosted our first ever raffle composed of donated artwork made by local Alaskan artists. Sealife stickers (designed by a Sitka-based artist, Raven Shaw) were won by Sara Germain, Erica Chenoweth, and Parker Bradley; a Sockeye Salmon magnet was won by Carolyn Hamman; two handmade mugs (made by Lia's mom, Kathy Nielson) were won by Andrew Seitz and William Samuel; lovely cards (designed by Sitka-based artist and fisherman Pat Kehoe) were won by Katie Howard; and a wooden hand-carved and painted Chinook Salmon (made by Taylor Cubbage) was won by Molly Payne.

After the judges' scores were tallied, Taylor Cubbage (M.S., Fairbanks) won best long talk with Jamie Musbach and Rebecca Cates tied for runner-up best long talks. Erika King (M.S., Juneau) won best short talk, with Kevin Fitzgerald as runner-up best short talk. We thank the AFS Alaska Chapter for donating presentation prizes for best long and short talks to encourage students to put their best foot forward. From halibut and dinoflagellates to stock assessments and indigenizing salmon science, our Alaska students are engaging in remarkable research and Taylor, Jesse, and I feel grateful to have facilitated this event. We look forward to the AFS Student Symposium resuming physical events supported by the College of Fisheries and Aquatic Sciences, but we now have the confidence to keep broadening our student participation with a successful virtual meeting under our belts! Thank you to all participants!



Taylor Cubbage, recipient of best long talk at the virtual AFS Student Symposium in February 2021. Image from Lia Domke.

Juvenile Salmon Size and Growth in Alaska: A Call for Data Sharing and Collaboration

Greetings, fisheries folks. We are reaching out to the Alaska AFS Chapter with a call for data sharing and collaboration among people working with juvenile salmon in Alaska. Many of us catch and measure juvenile salmon in a wide variety of research, monitoring, citizen science, and educational programs. By pooling our data, we can assemble a rich dataset with the potential to reveal large-scale patterns and trends of statewide importance. Towards this goal, we are asking you to help us build a database of juvenile salmon length and weight measurements.

Measuring juvenile Chinook Salmon on the Chena River. Photo by Erik Shoen.

What data are needed? We are compiling fork length and weight data from juvenile salmon sampled in fresh waters of Alaska. All observations should include the date, location, sampling gear, and species. Associated data such as habitat type (e.g., lake, stream, main channel, off channel) and catch per unit effort are encouraged, but not required. Salmon measurements from water bodies where temperature is monitored are particularly valuable. To make this easy, you can just send us the Aquatic Research Permit report spreadsheet(s) you submitted to ADF&G, and we can directly input your data. We can also work with other data formats, just ask.

We will list all contributors of usable data as coauthors of a public data release. Depending on the size and scope, we may also publish the database as a peer-reviewed data paper, with all contributors invited to participate as coauthors. As an added incentive, we will make the database accessible to all contributors prior to public release for use in any subsequent analyses. We plan to analyze these data as part of a new project to examine spatial and temporal patterns in size and growth in the context of climate change.

We will make the final database publicly accessible, so anyone will be able use it to address a variety of questions. We hope this resource will help provide a knowledge base upon which researchers can evaluate the consequences of environmental conditions and changes for juvenile salmon size and growth across Alaska, as well as other research questions.

For more information on participating in this process, contact Erik Schoen (UAF) at *eschoen@alaska.edu* or Dan Rinella (USFWS) at *daniel_rinella@fws.gov*.

Young Fishermen's Development Act

Signed into federal law on Tuesday, January 5, 2021, the "Young Fishermen's Development Act" seeks to preserve fishing heritage through a national program to train and assist the next generation of commercial fishermen. Receiving bipartisan support, the bill was championed by Reps. Young (AK), Moulton (MA), Golden (ME), Pingree (ME), and Radewagen (AS), and by Sens. Sullivan (AK), Murkowski (AK), Markey (MA), Collins (ME), King (ME), and Cantwell (WA). New entrants in the fishing industry face challenges of access and economics. Alaska Sea Grant Director Ginny Eckert noted, "The fishing industry is the largest private employer in Alaska."

The new law provides competitive grants to support local and regional initiatives for fishermen across the nation. Eligible initiatives may include programs, workshops, and services for fishermen on a range of topics such as seamanship, marketing, and fisheries management. Implementation is anticipated in 2022 through the National Sea Grant Office.

AFS Alaska Chapter Awards

Our Alaska Chapter meeting had many highlights last week but none as satisfying and inspiring as seeing our students give smart and creative presentations of their work. With the involvement of more than 20 volunteer judges, Awards Chair Jeff Falke coordinated a valuable process to give students feedback on their efforts. Based on this judging process, a few presentations stood out and deserve special recognition. The following students received the highest scores on their presentations, earning them cash prizes:

Oral Presentations

Ph.D. – Kelly Ireland, "Effects of Crude Oil on Juvenile Threespine Stickleback Growth and Development Varies by Population"

M.S. – Olivia Edwards, "Juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) Spring Outmigration Timing and Fish Size in the Chena River, Alaska"

Undergraduate – Will Samuel, "Analysis of the Cripple Creek Project: Assessing the Effects of Fish Passage Improvements and Habitat Enhancement"

Poster Presentations

Ph.D. – Chris Sergeant, "How will Pacific Salmon in Alaska Respond to Changes in Streamflow and Water Temperature?"

M.S. – Carolyn Hamman, "Detection of Arctic Cod *Boreogadus saida* using eDNA in Prudhoe Bay, Alaska"

Undergraduate – None submitted

Congratulations to all our Alaska Chapter students! And thank you to the judges! Well done!

At our Chapter Business Meeting, we also celebrated a few special individuals: Kortney Birch – our 2021 recipient of the Molly Ahlgren Scholarship, Toshihide "Hamachan" Hamazaki – our 2021 Alaska Chapter Service Award winner, and Catherine "Kitty" Mecklenburg – our 2021 Wally Noerenberg Award winner.

Tsunami Bowl

The Alaska Tsunami Bowl was held March 27–28, 2021, marking the 24th National Ocean Science Bowl regional competition in Alaska. While typically held in Seward, Alaska, the 2021 competition was virtual due to COVID-19. The Alaska regional competition is hosted by the University of Alaska Fairbanks College of Fisheries and Ocean Sciences, with support from the Alaska SeaLife Center, Alaska Sea Grant, and various marine-related government agencies, private businesses, and individuals. High school students from across Alaska present research papers and compete in a buzzer-style quiz bowl. The winning team (Juneau-Douglas High School) will participate May 7-17 at Nationals against other regional teams from across the United States.

Research Project Research Paper:

1st place: Dimond High School: Sour Patch Kids
2nd place: Juneau-Douglas High School: New Squids on the Dock
3rd place: Cordova Jr./Sr. High School: Pterosquad

Research Project Oral Presentation:

1st place: Juneau-Douglas High School, New Squids on the Dock
2nd place: Dimond High School, Sour Patch Kids
3rd place: Gustavus High School, Otterly

Amazing Best Overall Research Project:

Trophy Winner: Dimond High School, Sour Patch Kids

Sportsmanship Award:

Eagle River, Bad Basses

Quiz Bowl, Overall Winner:

1st place: Juneau-Douglas, New Squids on the Dock
2nd place: Gustavus, Otterly Amazing
3rd place: Cordova, Petrosquard

Congratulations to all teams for your hard work and dedication this winter!

ONCORHYNCHUS

Oncorhynchus is the quarterly newsletter of the Alaska Chapter of the American Fisheries Society. Material in this newsletter may be reprinted from other AFS websites.

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

Barnes Receives Western Division Diversity and Inclusion Service Award

Cheryl Barnes, recipient of the 2021 AFS Western Division Diversity and Inclusion Award. Photo from Cheryl Barnes.

Cheryl Barnes, chair of the AFS Alaska Chapter Diversity, Equity, and Inclusion Committee and member of the AFS Western Division AFS Diversity & Inclusion Committee, received the 2021 Diversity & Inclusion Service Award from the Western Division. This award is presented to a Western Division member who has demonstrated service to supporting diversity, equity, and inclusion in fisheries. The purpose of this award is to celebrate everyday, unsung heroes who dedicate their time and passion to supporting participation and engagement among those who are underrepresented in fisheries. Nominees are scored for demonstration of their service to diversity and inclusion within AFS, their workplace or academic setting (for students), and their community and other groups not associated with AFS or their workplace, especially towards promoting involvement in fisheries and science.

Originally from California, Barnes earned a biology B.S. from San Diego State University and a marine science M.S. from Moss Landing Marine Laboratories. She moved to Alaska in 2015 to complete a fisheries Ph.D. from the University of Alaska Fairbanks. She recently moved to coastal Oregon where she works as a postdoctoral scholar associated with the University of Washington and NOAA Fisheries. Cheryl is generally interested in conducting research that informs marine resource management. Much of her work has focused on better understanding population and community dynamics of groundfishes in the North Pacific. Currently, she uses statistical models to evaluate biological and ecological responses to rapidly changing conditions in Alaskan waters.

Apart from fish, Cheryl is passionate about enhancing diversity, equity, and inclusion in STEM. Wholeheartedly believing in the power of visibility, she shares that she is a first generation college student from a working class family and identifies as queer. Cheryl strives to bring her authentic self into her work and is committed to dissolving barriers to participation in the fisheries field.

From the Annual Meeting

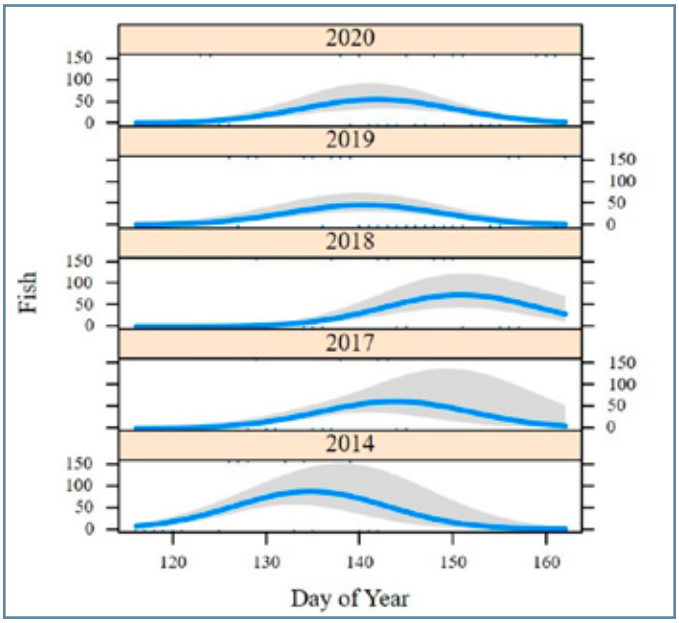
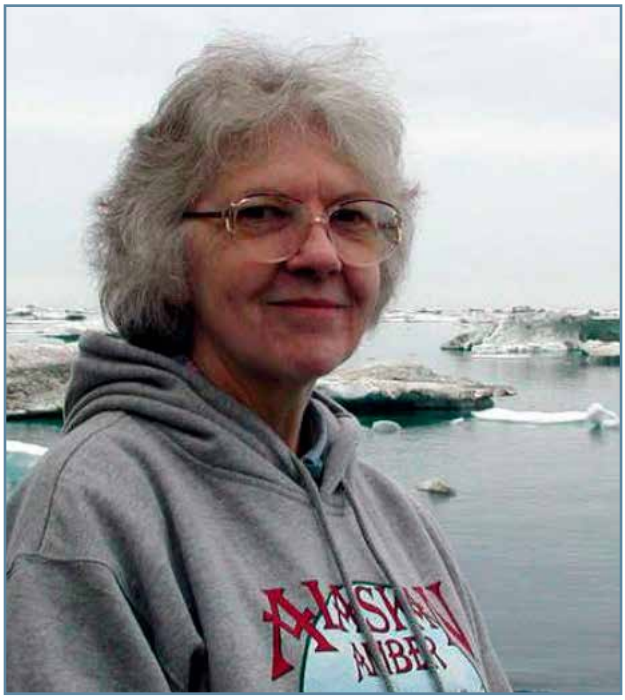


Figure from AFS Alaska Chapter meeting by M.S. presentation winner, Olivia Edwards, showing outmigration timing of juvenile Chinook Salmon in the Chena River, Alaska. The outmigration curve was predicted from five years of minnow trap data fit to a generalized linear model with a negative binomial distribution. Gray shading shows 95% C.I. Predicted peak outmigration date ranged from May 14 (2014) to May 29 (2018).

Wally Noerenberg Award

The Wally Noerenberg Award for Fishery Excellence, the highest award of the AFS Alaska Chapter, is bestowed as a special honor on individuals who have made great and outstanding contributions to Alaska fisheries. This award was established in 1981 by resolution of the Alaska Chapter membership. Our 2021 winner is Catherine ("Kitty") Mecklenburg. As an Ichthyology Research Associate with the California Academy of Sciences, she has participated in ichthyological surveys in the Bering Sea and Arctic waters from Russia to Greenland, and is an internationally recognized authority on Arctic fishes. While Ms. Mecklenburg is well known in Alaska for her foundational book *Fishes of Alaska* (2002; along with co-authors Anthony Mecklenburg and Lyman Thorsteinson), her more recent work has culminated in the production of two seminal Arctic ichthyofauna atlases: Pacific Arctic Marine Fishes (2016) and Marine Fishes of the Arctic Region (two volumes; 2018). Kitty is a member of the Fish Expert Network for the Arctic Council's Circumpolar Biodiversity Monitoring Program and leads efforts to develop genetic barcoding for northern fishes and increased accessibility of electronic taxonomic databases. The AFS Alaska Chapter is proud to recognize Ms. Mecklenburg for her role in advancing ichthyological and fisheries science in Alaska and beyond.



Catherine ("Kitty") Mecklenburg, recipient of the 2021 Wally Noerenburg Award from the AFS Alaska Chapter.

Molly Ahlgren Award

Kortney Birch

After hearing I was selected as the 2021 Molly Ahlgren Scholarship awardee, I was beyond grateful and honored to be recognized by this scholarship committee. Molly was such an inspiration to the fisheries world with her endless research on detritivores and dual aquaculture for salmon and sea cucumbers; it is a humbling experience to be recognized in her honor.

This year, due to the global pandemic, the Annual Alaska Chapter AFS conference was online and I was able to view the presentations in both live and pre-recorded sessions. One of the events I attended was centered on applied programs used to advance the use of human dimensions science in fishery management. I learned about fishing districts along the Yukon River and how salmon are a keystone resource for social health and sustenance. Another presenter touched on fishery management practices which impact indigenous people and how important it is to incorporate indigenous values into our journey to better fisheries.

Overall, this conference widened my perception of how fisheries can be improved and what the American Fisheries Society is all about. Moving forward, I hope to represent Molly's dedicated spirit towards aquatic life and contribute to the AFS. Through this scholarship, I will be able to complete my Bachelor's degree in Fisheries and Ocean Sciences with a concentration in Ocean Sciences and begin my career in conservation of marine life at risk.

Kortney Birch, recipient of the 2021 Molly Ahlgren Award. Photo from Kortney Birch.

Shackleton Glider Pursues Pacific Herring in Prince William Sound

Most readers of adventure, survival, and exploration are familiar with the 720 nautical mile journey of Ernest Shackleton in a lifeboat from Elephant Island to South Georgia Island in order to find a rescue party to save his crew after their ship, *Endurance*, was crushed in the Antarctic ice.

Through a collaborative project among the Prince William Sound Science Center (PWSSC), University of Alaska Fairbanks College of Fisheries and Ocean Sciences (UAF), and NOAA, the *Shackleton*, a six-foot long autonomous underwater glider, was recently deployed in Prince William Sound, Alaska. Looking like a yellow torpedo with wings, the glider moves forward at around 1 km/hr. Through small changes in buoyancy, the glider takes about 20 minutes to dive towards the ocean floor, then switches to positive buoyancy and slowly climbs back towards the surface. Every two hours, the glider surfaces and uploads data via satellite link.

While deployed in Prince William Sound, the *Shackleton* "expedition" is searching for Pacific Herring overwintering areas. Dr. Mary Anne Bishop (PWSSC) has been acoustic-tagging Pacific Herring in Prince William Sound the past four years to document year-round movement. The acoustic tags implanted in these fish have a battery life of over two years, emitting a series of "pings" every 90–120 seconds. When a tagged fish swims near an underwater acoustic receiver, the individual ping code number, along with the date and time, are recorded. Currently, over 300 tagged Pacific Herring are potentially alive in either the Sound or the Gulf of Alaska.

In addition to various oceanographic measuring devices, *Shackleton* is equipped with an acoustic receiver to detect tagged Pacific Herring. Scientists at UAF have programmed *Shackleton* to repeatedly cover areas where we suspect these fish overwinter with efforts initially concentrating in eastern Prince William Sound around the Port Gravina and Orca Bay spring spawning grounds. A small number of acoustic receivers in these areas previously detected Pacific Herring during winter. Being able to reprogram *Shackleton* to explore new routes and/or repeat areas where Pacific Herring have been detected represents a new chapter in the study of fish movements in the Sound.

*The **Shackleton**, an autonomous underwater glider being used to research Pacific Herring in Prince William Sound. Photo from the Prince William Sound Science Center.*

Funding for Pacific Herring tagging was made possible by the Exxon Valdez Oil Spill Trustee Council, while funding for this *Shackleton* glider "expedition" was made possible by the Alaska Ocean Observing System.

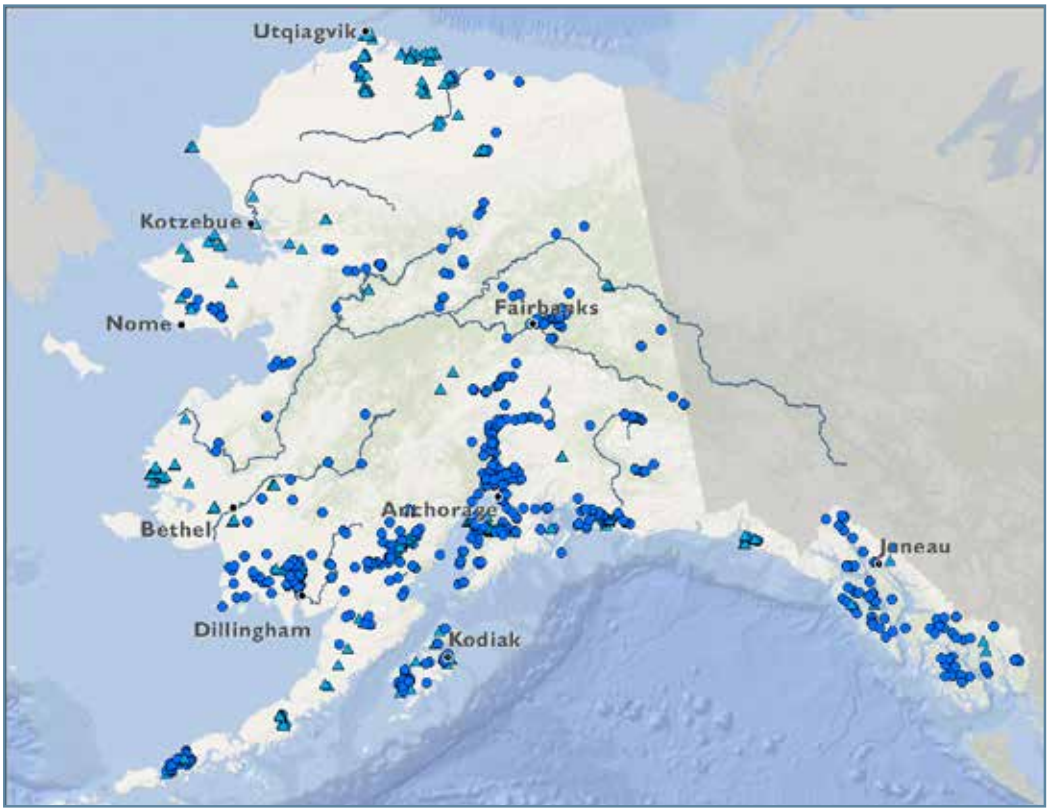
Esquible-Hussion Receives AFS Emerging LeadersMentorship Award

Janessa Esquible-Hussion, AFS Alaska Chapter member from Bethel, Alaska, received the 2020 Emerging Leaders Mentorship Award from the AFS parent society. This award was established to develop future leaders of the Society, and the fisheries profession as a whole, by providing selected candidates an opportunity to participate for one year in activities of the AFS Governing Board. Award recipients are paired with a mentor who is a member of the Governing Board, and will also be awarded up to $500 to offset costs associated with attending the governance meetings, held in conjunction with the annual AFS Meeting. Esquible-Hussion is the Natural Resources Director for the Orutsararmiut Native Council.

Janessa Esquible-Hussion, recipient of the 2020 AFS Emerging Leaders Mentorship Award. Photo from AFS.

Help Update Alaska Online Aquatic Temperature Data

With ecological and socioeconomic shifts driven by climate change, there is increasing interest in collecting data to understand patterns in stream and lake water temperatures and maintaining datasets to track long-term change. The availability of affordable and simple to use continuous temperature data loggers has increased the collection of water temperature across Alaska, including extremely remote locations. As a common platform for aquatic ecologists, fish biologists, and climate scientists to share their monitoring activities and discover the monitoring efforts of others, the Alaska Center for Conservation Science (ACCS) at the University of Alaska Anchorage developed a comprehensive statewide inventory of current and historic continuous monitoring locations for stream and lake temperatures, the *Alaska Online Aquatic Temperature Site* (AKOATS).



Water temperature monitoring sites in in the AKOTS database. Figure from https://accs.uaa.alaska.edu/aquatic-ecology/akoats/.

The AKOATs inventory features over 2,000 unique stream and lake temperature monitoring locations across Alaska from over 40 different data sources in a standardized, searchable format. An online web mapping application allows users to view water temperature monitoring locations compiled across the state of Alaska. Alternatively, data may be viewed and queried directly with commercial GIS software. The most recent comprehensive update was in 2018. To build an aquatic temperature data repository, your help is requested to contribute information on your loggers. Site metadata may be submitted through the AKOATS website at *https://accs.uaa.alaska.edu/aquatic-ecology/akoats/* or contacting Marcus Geist at *mageist@alaska.edu*.

In early 2022, AKOATS is being transformed from a spatial metadata inventory into AKTEMP, an online, publicly-accessible database of water temperature data for Alaska. AKTEMP will be integrated with the USGS Spatial Hydro-Ecological Decision System (SHEDS, *http://ecosheds.org*), which is currently in use across many Eastern US states. All spatial metadata captured in AKOATS will be available in AKTEMP allowing users to easily locate their sites and upload and review raw temperature data for sharing and storage. By contributing to the 2021 AKOATS update, you will ensure that AKTEMP contains the most current monitoring location data across the state when it becomes public in 2022.

Amazon Smile

Shop online at Amazon.com and support the Chapter financially, at no additional cost! Simply shop through *AmazonSmile*.and the AmazonSmile Foundation donates 0.5% of the purchase price of eligible purchases to the Alaska Chapter that can be used to support Chapter projects. Contributions to the Chapter totaled $71.34 over the past year.

Western Division Diversity & Inclusion Committee

Laura Slater (WDAFS Diversity & Inclusion Committee chair)

Laura Slater, chair of the AFS Western Division Diversity & Inclusion Award.

Hi, I am Laura Slater and I became chair of this committee in December. As a committee member since 2018, I have enjoyed the opportunity to learn from former chair, Cheyenne Owens. While our committee will miss her leadership, we are happy she has professional and personal opportunities carrying her forward along life's journey. Our committee is comprised of amazing members dedicated to increasing diversity and inclusion in the fisheries field. This work is important to ensure people coming from underrepresented or marginalized backgrounds are supported, feel they belong, and are encouraged to engage in their respective places of work or learning in the fisheries field. Increasing contributions from a diverse membership will strengthen our collective science, communication, and collaboration efforts. If you have ideas or experiences we can learn from, please offer input. Likewise, if you would like to become involved, we welcome your participation. Our committee developed a list of articles, websites, and videos that we found helpful to continue learning to become more self-aware in how our biases and preconceptions impact others, especially those underrepresented in STEM. We partnered with the Society's Equal Opportunity Section to share and continue to curate this resource list (https://diversity.fisheries.org/resources/). We hope you will join us on this learning journey. I want to promote two events during the virtual Western Division Meeting (May 10-14 ; https://wdafs.org/meetings/annual-meeting/): a continuing education workshop on "Unconscious Bias" and a symposium focused on "Diversity, Inclusion, and Equity: Informing and Adapting." Our committee is strengthening our communication with individual chapters, particularly chapters with committees focused on diversity, equity, and inclusion. Our goals are to share ideas and initiatives and provide support towards addressing identified needs. If you have anything you would like us to share, please let me know (laura.m.slater@gmail.com).

Meetings and Events

American Fisheries Society Western Division Annual Meeting

May 10–14, 2021. Virtual meeting originally scheduled for Ogden, Utah. More information is at https://wdafs.org/meetings/annual-meeting/.

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/.

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