



# ONCORHYNCHUS

Newsletter of the Alaska Chapter, American Fisheries Society  
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*Aerial view of Salcha River Chinook Salmon on their redds during the 2018 sUAS survey.  
Photo from Brian McKenna.*

## Drones: A New Technique for Monitoring Salmon Spawning Escapements

*Brian McKenna, Daryl Parkyn, Vincent Lecours, Chris Stark, and Brian Lepping*

Drones, or small unmanned aerial systems (sUAS), are relative newcomers as tools for fisheries biologists and managers. However, recent advances in sUAS technology, including better quality cameras, navigation control, and longer battery life, along with affordable pricing and effective regulations, have increased sUAS utility for fisheries research. Several recent studies tested the ability of sUAS to assist salmonid research and management efforts (*Groves et al. 2016; McKenna 2017; Bickford et al. 2018; Witteveen and Polum 2018*). Fisheries applications of sUAS will continue to increase as researchers find new uses for this expanding technology.

The Tanana Chiefs Conference (TCC) began exploring sUAS as a tool for salmon fisheries research and management during the summer of 2017. While collecting tissue samples from spawning Chinook Salmon, *Oncorhynchus tshawytscha*, in the Salmon Fork and Coleen rivers to add to the Yukon River Chinook Salmon Genetic Baseline, we first had to locate spawning Chinook Salmon, and then catch them using rod and reel.

We had previously collected tissue samples in 2015 and 2016 (without using an sUAS), and we were aware of the challenges associated with locating and capturing spawning Chinook Salmon. In 2017, we used an sUAS to help locate spawning salmon. Having an “eye in the sky” through the sUAS provided a distinct advantage in locating the salmon compared to our previous seasons of boat surveys and looking for salmon from a gravel bar or cut bank. The sUAS aerial view reduced water surface glare and gave a top down view of the entire spawning area, providing improved knowledge of what was going on beneath the water’s surface. We were instantly hooked! Not only did the sUAS help us locate spawning areas, but we were able to target individual salmon within each spawning area. In years prior to using an sUAS, we would cast blindly into spawning areas hoping to catch and sample salmon. That “blind” casting often led us to recapturing previously sampled salmon. To avoid harassing the salmon, we had to move downriver to the next spawning area after recapturing several

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## The President's Corner



*Joel Markis, AFS Alaska Chapter President.*

Greetings Alaska Fishheads, Fishfolks, and Fishnerds, Welcome to fall! It has been a busy last few months and it seems like just yesterday we were all gathered in Sitka for our annual meeting. Since then many of us have embarked on courageous summer field work, traveled to exotic parts of the state, and endured one of the hottest summers on record, all in the name of fisheries management and science! It has been an exceptional summer to say the least. We had a couple big fires early on in the interior part of the state, shortly followed by the record breaking *Swan Lake Fire* and unprecedented high *water temperatures on the Kuskokwim*. Alaska is certainly changing and many of us are seeing the impacts of these changes in the fisheries work we do.

Last week I had the pleasure of attending the joint National conference between AFS and The Wildlife Society (TWS) in Reno, Nevada. I asked our Chapter Treasurer if I could wager all of the Chapters coffers on black and let it ride, but Lee Ann politely declined. It was a massive meeting with ~4,500 attendees (1/2 fish folks), and some *20 concurrent sessions*. Alaska was extremely well represented in attendance, presentations, and awards, with our very own Past Student Representative Justin Priest and current Student Representative Donnie Arthur being recognized at both the Western Division and Parent Society levels. The meeting was a great opportunity to engage with colleagues from Alaska and the Northwest, as well as a chance to be exposed to some interesting work

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## Drones, continued

salmon in a given spawning area. But by using the sUAS, we were able to target and capture single specific salmon, thereby increasing our number of samples, and nearly eliminating recaptures.

With the summer 2017 success, we examined new ways to apply sUAS technology. A proof of concept study for summer 2018 used an sUAS and photogrammetry to monitor Chinook Salmon spawning escapement in the Salcha River, a Yukon River tributary off the Tanana River. Our project goal was to enumerate Chinook Salmon redds in the Salcha River. Redd (salmon nest) surveys are commonly used to provide a count that gives a stock specific index of spawning escapement and population size. Redd surveys are often accomplished with a variety of traditional, above surface, techniques, such as aerial, boat, and shoreline surveys. We used the sUAS to capture overlapping georeferenced imagery to build an interactive photomosaic for Chinook Salmon spawning areas. Our specific objectives were to: (1) document Chinook Salmon spawning sites in the Salcha River; (2) generate digital maps or orthomosaics for documented spawning areas; (3) enumerate Chinook Salmon redds using digital orthomosaics; and (4) compare the precision and accuracy of digital redd surveys with traditional redd survey methods.

Using a river boat for travel, and a drone to capture aerial imagery of spawning areas, we were able to locate and document 25 large Chinook Salmon spawning sites within the Salcha River. We selected 13 of the 25 sites to conduct our proof of concept study to create orthomosaics that would allow us to conduct digital redd surveys. We used a quadcopter sUAS platform (DJI Phantom 4 Pro V2.0) and a free mission planning application (Pix4Dcapture) to conduct the aerial missions and capture the georeferenced imagery. The flight crew consisted of two individuals – a remote pilot and a visual observer. Both the pilot and the visual observer were certified remote pilots under the Federal Aviation Administration's (FAA) Code of Federal Regulations Title 14, Part 107 rule for sUAS pilots (*FAA 2016*).

Using structure from the motion (SfM) photogrammetry software (Pix4Dmapper), we

*Continued on page 4*

## President's Corner, continued

that is being done across our country and abroad.

While in Reno I attended the Western Division executive meeting where myself and chapter officers from the western states discussed many issues pertinent to our chapters and the Division. The Western Division and the Cal/Neva Chapter of AFS were the hosts of the joint Reno meeting and a great deal of the discussion focused on finalizing and pulling off a successful meeting. Other discussions and motions involved governance reporting, taxes, and electronic communication, most of which I am happy to report that our Alaska Chapter is functioning in an exemplary manner and even seen as a role model to other chapters. While in attendance I was able to highlight our Chapter's accomplishments over the last year and on a cocktail napkin I scribbled down 4 things I was especially proud to report back to the Division.

1) The advancements we have made with our websites and technology included migrating to an AFS Server, saving \$1,300 annually, and transitioning all of our Chapter Executive Committee (Ex-Comm) to personal G-suite, enhancing communication and information sharing.

2) Our most recent Chapter annual meeting, which despite federal furloughs and a state travel ban, was widely successful and even received great praise from the Division's Secretary/Treasurer Tracy Wendt, who stood up in our meeting and said "No disrespect to other chapters, but this was the best chapter meeting I have ever been to."

3) Our work on issues of environmental concern, most notably the Waters of the US (WOTUS) and Pebble Draft Environmental Impact Statement letters that our Chapter worked diligently on.

4) Our efforts to support our students, primarily through funding professional development and travel to Chapter and regional AFS meetings.

The last several months have proved to be a busy time in Alaska for conservation and science advocacy. This trend appears to likely continue over the next few years. While at the Reno AFS meeting, I met with AFS Policy director Drue Winters and AFS Executive Director Doug Austin and voiced Alaska's appreciation for their

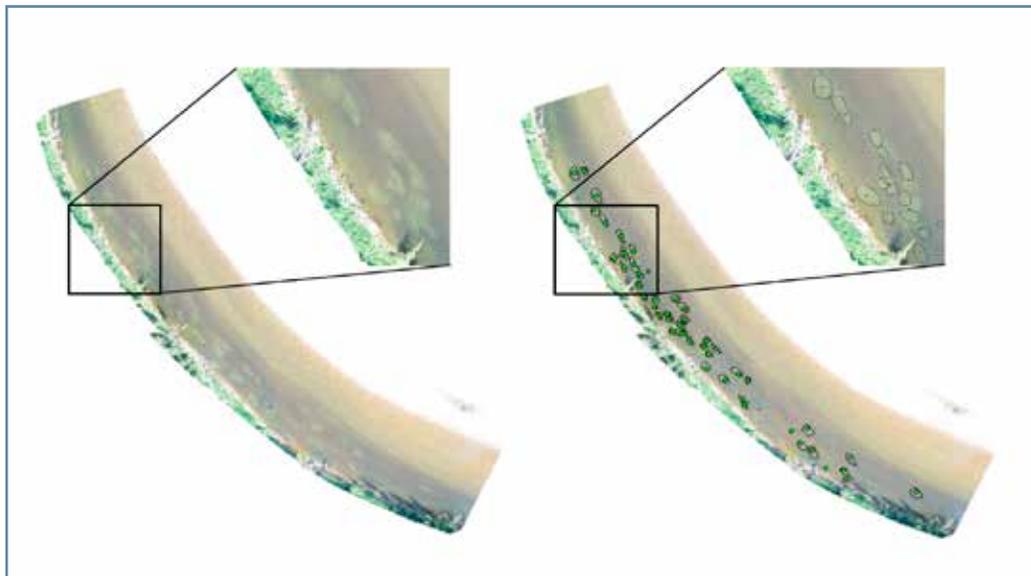
support on the Parent level in advocating that science be put first in decisions that impact fish and fish habitat. Both Doug and Drue, as well as incoming AFS President Scott Bonar, voiced appreciation to our Chapter for our involvement in these critical issues and the importance of providing our local perspective and expertise. I assured all of them that our Chapter would remain diligent in highlighting science and encourage that the best science be used in making decisions that impact fish and fish habitat. While meeting with Division and Society leadership, I informed them of the recent efforts to exempt portions of Alaska from the [2001 Roadless Rule](#) and that many groups see this as having the potential to negatively impact fish and fish habitat. We plan on continuing to work with our Chapter's Environmental Concerns Committee and our membership on these and other issues that arise and will continue to seek support from the Division and Society on these efforts.

As we look forward to winter and even spring 2020, some of the exciting things on the horizon include our 3rd annual retreat for the Alaska Chapter Ex-Comm. This is an opportunity for the Ex-Comm to get together in person and really examine the Chapter, our priorities, and how we are doing at meeting our goals and the needs of our membership. This has proved highly beneficial the last two years and I am excited for the work that we will achieve at this year's meeting. We also have our eagerly anticipated [2020 Annual Chapter Meeting in Fairbanks](#). This year's Interior meeting will bring fisheries minds from all over the state and hopefully some of our brothers and sisters from across the border to the Golden Heart City. The Planning Committee has already begun preparing for what will certainly prove to be an exceptional meeting in Alaska style. The meeting will be March 23–26 at the Westmark Fairbanks; updated meeting information will be posted on our website <https://afs-alaska.org/>. Fish hard, get wet, and don't be afraid to go below the ice! 🐟

### Drones, continued

created digital orthomosaics for each of the 13 large Chinook Salmon spawning sites surveyed with the sUAS. All digital orthomosaics were generated as GeoTIFF files capable of being opened in GIS software for subsequent analyses. Two separate reviewers using GIS software reviewed the digital orthomosaics independently. Redds were digitized and enumerated by each reviewer.

To assess the effectiveness of sUAS surveys compared to traditional methods for locating and counting redds, we conducted a boat redd survey and a manned aerial redd survey (Robinson R44 helicopter) in addition to the sUAS redd survey on the Salcha River. Redd estimates from the sUAS surveys were consistently greater than boat surveys in all spawning sites, and greater than redd estimates from manned aerial surveys in 12 of 13 spawning sites. Redd estimates from manned aerial surveys were greater than the estimates from boat surveys in 7 of 10 spawning sites. The



*Digital orthomosaic of a Chinook Salmon spawning site. Left shows the orthomosaic of the entire spawning site. Right shows the digital redd survey enumeration by two independent reviewers (one review shows point features and the other uses polygons). Both panels display zoomed in screenshots showing the resolution of the orthomosaic, and the ability to zoom and pan during the digital redd enumeration process. Graphic by Brian McKenna.*

boat redd survey method averaged 41% fewer redds than did sUAS digital redd surveys, and the manned aerial survey method averaged 30% fewer redds than the sUAS digital redd surveys.

Redd estimates from boat surveys and sUAS digital surveys showed the least concordance, while redd estimates from the boat and manned aerial surveys showed the greatest concordance. Redd estimates from sUAS digital surveys were more comparable to manned aerial surveys than to boat surveys. However, manned aerial surveys and sUAS digital surveys failed to demonstrate a strong agreement. The lack of strong agreement arose from the systematic underestimation of redds by non-sUAS survey methods.



*The flight team consisted of a remote pilot in command and one visual observer. Both crew members were FAA 14 CFR Part 107 certified remote pilots. Photo by Brian Lepping.*

This study was unique in applying sUAS and photogrammetry to generate digital orthomosaic maps of Chinook Salmon spawning areas to enumerate redds. Based on the results of this study, the integration of sUAS and photogrammetry shows promise as a novel approach

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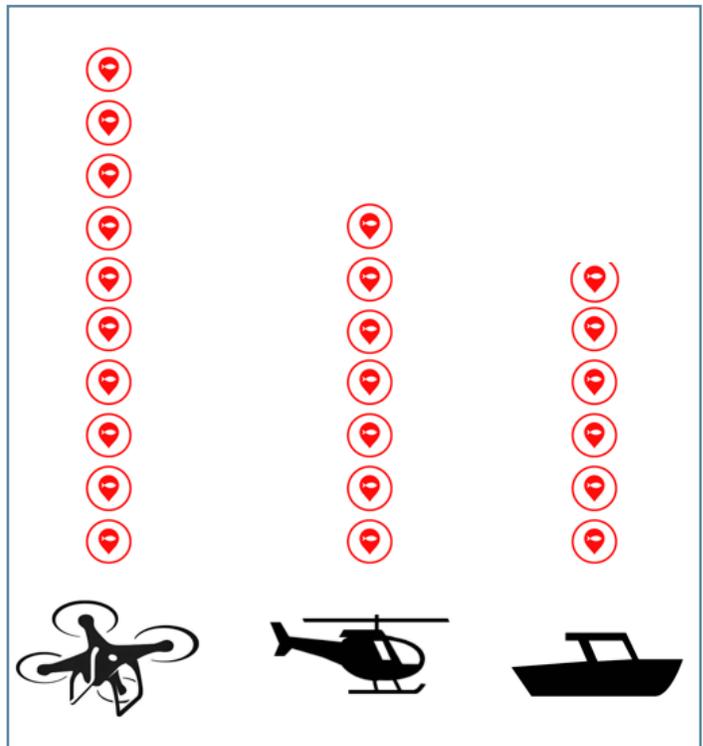
**Drones, continued**

for conducting redd surveys in shallow, clearwater systems. This new digital redd survey method using sUAS and photogrammetry presents a cost effective and safer alternative to manned aerial surveys, thus producing quality data while saving on both time and cost.

While digital redd surveys of sUAS derived orthomosaics showed an advantage over traditional redd survey techniques such as boat surveys and manned aerial surveys, there are limitations to the usefulness of drone technology. Inclement weather and turbid river conditions can inhibit the ability of drones to take flight and capture imagery that penetrates the surface of the water. Regulations such as the requirement for the drone to remain within visual line of sight of the pilot, and short battery life, limit the size of an area that can be surveyed. As such, manned aerial surveys are currently better suited for large survey areas such as surveys of an entire river, whereas sUAS surveys are better matched for site-specific surveys. Therefore, for larger systems we recommend manned aerial surveys be used to initially locate spawning sites. Conversely, in systems where spawning sites are known, we recommend sUAS to conduct redd surveys. As the technology and regulations continue to move forward, there is potential for sUAS to extend its spatial range in the future and become a more viable option for larger area surveys. Fixed wing sUAS platforms are capable of longer flight times, and it is possible to receive a beyond visible line of sight (BVLOS) waiver through the FAA to enable larger areas to be surveyed.

In summary, digital redd surveys of sUAS-derived orthomosaics showed an advantage over traditional redd survey techniques such as boat surveys and manned aerial surveys. This may be attributed to observer errors associated with real time, single pass, fly-over observations of spawning sites, as opposed to a digitally recorded review process. The generation of a digital orthomosaic record of each spawning site is an added benefit of using sUAS and photogrammetry to conduct redd surveys, and provides an infinite opportunity for future review and multitemporal analyses.

Our 2018 proof of concept study proved successful; a video link for the 2018 study can be



*The relative proportion of observations by different redd survey methods, 2018. Small unmanned aerial systems estimated on average 30% more redds than manned aerial surveys and 41% more redds than boat surveys. Graphic by Brian McKenna.*

found at <https://vimeo.com/289315453>. Our 2018 success led us to conduct an advanced, in-depth investigation in 2019. We utilized sUAS, not only to enumerate Chinook Salmon redds via digital orthomosaics, but also to analyze temporal and spatial aspects of the spawning event while characterizing Chinook Salmon spawning habitat in the Salcha River. To use the digital orthomosaics to assess Chinook Salmon redd distributions and densities over time, we generated weekly orthomosaics for each Chinook Salmon spawning site, and then overlaid the orthomosaics within a GIS format to assess spatial and temporal development in redd construction. Unfortunately, an unseasonably high amount of precipitation and sustained flooding precluded completion of this project in 2019. However, documentation of redd distribution and spawning habitat, within and between years, will be valuable for understanding the impacts of climate change.

But, we are excited by the results we have seen over our first few years of exploring this  
*Continued on next page*

## Drones, continued

newer technology. Despite being sidelined by the elements in 2019, we plan to continue our research in 2020 and beyond. In future studies we are considering exploring image analysis algorithms as a means of reducing observer error, as well as reducing the time and cost associated with the review process. Please feel free to contact Brian McKenna ([brian.mckenna@tananachiefs.org](mailto:brian.mckenna@tananachiefs.org)) if you have any questions about the aforementioned studies, or general interest in future sUAS projects.

*Brian McKenna, a fisheries research biologist with the Tanana Chiefs Conference in Fairbanks, Alaska, is a certified remote pilot, and holds a Fisheries and Aquatic Sciences Master's degree in combination with a graduate certificate in mapping with unmanned aerial systems (UAS) from the University of Florida. Brian has been investigating applications for integrating UAS technologies into fisheries research since 2016. Dr. Daryl Parkyn is a Research Associate Professor with the University of Florida focused on the biology of migratory fishes. Dr. Vincent Lecours is an Assistant Professor with the University of Florida using cross-disciplinary background in geomatics and ecology to better integrate spatial concepts and applications like habitat mapping and environmental characterization. Chris Stark, a research biologist with the Bering Sea Fishermen's Association in Anchorage, Alaska, holds an M.S. in fisheries science from the University of Alaska Fairbanks. Brian Lepping, a fisheries biologist with Wood Group and owner of Red Tail Aerial Solutions, LLC, in Saint Louis, Missouri, is a certified remote pilot and conducted aerial missions and data analyses for this study. 🐼*

AFS memberships  
may be renewed online  
<https://fisheries.org>

Back issues of *Oncorhynchus*  
can be found online  
<https://www.afs-alaska.org/newsletter>

## Vancouver Aquatic Film and Photo Festival Submission

The Western Division of the American Fisheries Society (WDAFS), Washington/British Columbia Chapter of AFS (WABC), and the National Fish Habitat Partnership (NFHP) invite you to submit an aquatically oriented film or photograph to be showcased as part of the 2020 Vancouver Aquatic Film and Photography Festival. This film and photography festival will occur in Vancouver, British Columbia, April 12–16, 2020, during the [WDAFS/WABC annual meeting](#).

Film submissions must: (1) focus on aquatic themes (freshwater, estuarine, and marine) that advance our understanding, appreciation, and management of aquatic ecosystems; (2) be less than 30 minutes in length (ideally 10 minutes or less to allow for more films in the festival); and (3) be downloadable to conference organizers via [Vimeo](#). Participants may submit up to three films for consideration. The completed submission form is due on November 8, 2019, with final cut film submissions with Vimeo weblinks due to festival organizers no later than February 1, 2020. For questions, please contact Deborah Hart, Southeast Alaska Fish Habitat Partnership Coordinator, at [coordinator@sealakafishhabitat.org](mailto:coordinator@sealakafishhabitat.org) (907-723-0258).

High resolution photographs with aquatic themes can be emailed directly to [roger.tabor@fws.gov](mailto:roger.tabor@fws.gov) by November 8, 2019. Aquatic themes may include riverscapes, oceans, estuaries, underwater biota and scenes, fish activities, science activities, management activities, etc. Photographs will be displayed on a large screen during the conference, and select photographs shown during the plenary session with selected photographs receiving awards and recognition during the conference. [Additional information and submission forms can be found at the website.](#) 🐼

## Annual Chapter Meeting Planning

We cordially encourage you to join us March 23–26, 2020, for the 46th annual meeting of the Alaska Chapter, American Fisheries Society. This year's meeting will be held at in Fairbanks, Alaska at the Westmark Fairbanks Hotel & Conference Center. As meeting details develop, updated information will be posted at <https://units.fisheries.org/ak-mtg/>. 🐼

## Stan Moberly receives Stanley A. Moberly Award for Outstanding Contributions in Fish Habitat Conservation

Stan Moberly received the 1st annual Stanley A. Moberly Award for Outstanding Contributions in Fish Habitat Conservation. American Fisheries Society President Jesse Trushenski presented the award at the society's 2019 annual meeting in Reno, Nevada. The award is presented to an individual who has achieved significant success in a fish habitat career related to research, policy, management, education, project implementation, vision, communications and outreach, or some other endeavor. Stan Moberly has been an AFS member since 1964, serving as President of the Alaska Chapter and Western Division, and eventually President of the Society in 1987–1988. Stan left the Nebraska Game and



*Stan Moberly receives the 1st annual Stanley A. Moberly Award for Outstanding Contributions in Fish Habitat Conservation from American Fisheries Society (AFS) President Jesse Trushenski in Reno, Nevada. Photo from AFS.*

Parcs Commission in 1970 to take a position as Sockeye Salmon Project Leader with the Alaska Department of Fish and Game. In 1987 Stan took a position as Director of Marketing with Northwest Marine Technology (NMT). As Society President, one of Stan's first actions was to gather leaders representing the nation's conservation, environmental, commercial and recreational fishing, and media interests to address the nation's continuing loss of aquatic habitat. At a second gathering in October 1988, the leaders established F.I.S.H. (Fishermen Involved in Saving Habitat), a coalition for the conservation of aquatic habitat with Stan serving as the first Chairman from 1988–1994. The F.I.S.H. concept was adopted by four interstate fisheries commissions, with Stan co-authoring the original Memo of Understanding that created the Mississippi Interstate Cooperative Resource Association (MICRA). Throughout his career, Stan served as leader, and as a mentor to

the next generation of fisheries professionals. Stan now lives with his wife Linda Perine in Tenakee Springs, Alaska. 🐟

### North Pacific Research Board Request for Proposals

The North Pacific Research Board (NPRB) announces the release of its Core Program Request for Proposals (RFP). The 2020 RFP has an anticipated funding of \$4.0 million. Proposed research may focus on any of Alaska's large ecosystems (i.e., the Gulf of Alaska, Bering Sea, Aleutian Islands, and Chukchi and Beaufort seas). Proposals may be submitted within seven core target categories, with project funding caps depending on category. Note that the NPRB has adopted a rolling submission format for the Core Program, such that proposals may be submitted at any time. Additional information on this 2020 RFP is available at <https://www.nprb.org/>. 🐟

## Student Subunit Happenings

*Donnie Arthur, Student Subunit Representative*

Fall is here, and Alaska fisheries and aquatic science students at all campuses are waist-deep into coursework and lab analyses. Many students have shifted from setting nets and electroshocking streams to sorting through data and sifting through samples that were collected during the heat of the summer. One thing to say about our students is that they are adaptive. Each year in Alaska, these developing scientists experience the most drastic changes from

Alaska's summer to its not-so-friendly fall and winter. Few areas have seen as drastic a seasonal change as experienced by Alaska students. It can also be difficult transition from field work to the confines of a desk or lab.

Regardless of having to face rapidly changing conditions, Alaska fisheries students came out of the gate strong this fall. Students from campuses throughout Alaska attended the 2019 Joint Annual Conference for The American Fisheries Society (AFS) and The Wildlife Society in Reno, Nevada, during September 29–October 3. Ten fisheries students from Alaska attended this AFS conference, contributing an impressive 11 oral presentations and 2 poster talks. One particularly motivated undergraduate, Noah Khalsa (UAF), gave both an oral presentation and a poster talk. Additionally, the AFS Student group from the Fairbanks campus presented on their ongoing collaborative Burbot research project. Justin Priest, the former Student Representative for the Alaska Chapter, won the Skinner Memorial Award for his hard work and dedication to AFS. Alaska students consistently volunteered to help with conference tasks while in Reno. The Alaska Chapter of AFS is proud to be so well-represented by students at the 149th Annual AFS Conference.



*Alaska fisheries students outside the Reno-Sparks Convention Center at the 2019 AFS/TWS meeting in Reno, Nevada. Photo from Donnie Arthur.*

The AFS Alaska Chapter would also like to congratulate the following students for defending or graduating recently: Cheryl Barnes (Ph.D., UAF) – “Ecological interactions among important groundfishes in the Gulf of Alaska;” Madison Kosma (M.S., UAF) – “Foraging tactics of humpback whales feeding near hatchery-release sites in Southeast Alaska;” and Kirsten Ressel (M.S., UAF) – “Spawning-stage Capelin *Mallotus villosus* distribution, life history, and stock differentiation among regions.” Congratulation on achieving such incredible milestones and best of luck as you move forward in your fisheries careers!

For the rest of you, I wish you the best of luck with your studies this semester. As always, you can contact me at [student@afs-alaska.org](mailto:student@afs-alaska.org). Tight lines, Donnie 🐟

### 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 Dec 10.

Student Subunit Happenings, continued



Fairbanks students with title slide from Burbot presentation at AFS meeting in Reno, Nevada. Photo from Donnie Arthur.

## Molly Ahlgren Undergraduate Scholarship Applications

The Molly Ahlgren Scholarship was established by the family of Dr. Molly Ahlgren and the Alaska Chapter of the American Fisheries Society in 2004 to honor Dr. Ahlgren's life and dedication as an Associate Professor of environmental science at Sheldon Jackson College. Honoring Dr. Ahlgren's passion for undergraduate education in fisheries and aquatic sciences, there will be one \$7,000 scholarship provided for the 2020 Spring Semester to an undergraduate student in their junior year of studies pursuing a baccalaureate degree involving the disciplines of fisheries, aquatic, or biological science. The scholarship selection will be made in the fall of 2019 and funds will be made available for the 2020 Spring Semester.

Applicants must meet the following requirements:

- Be considered a junior by accumulation of credits, as determined by the University of Alaska System or Alaska Pacific University, involving the disciplines of fisheries, aquatic or biological science and be in good academic standing with their respective institution.
- Demonstrate the potential for future contributions to a fisheries, aquatic, or biological science related profession.
- Demonstrate financial need.

- Be a member of the American Fisheries Society or in the process of obtaining membership.
- Email your application packet to [akafs.ahlgren.award@gmail.com](mailto:akafs.ahlgren.award@gmail.com) no later than 5:00 pm Alaska Time, November 15, 2019.

Applicants will be evaluated on their work and/or educational experiences and interest in the disciplines involving fisheries, aquatic or biological science, interest in professional advancement, and reason(s) for financial need. The scholarship recipient will be introduced at the Alaska Chapter Annual Meeting to be held in Fairbanks from March 23–26, 2020. All travel and meeting registration expenses will be paid for by the Alaska Chapter. The scholarship recipient will be required to write a brief statement about their experience at the Alaska Chapter meeting that will be published in the Alaska Chapter's newsletter, *Oncorhynchus*.

[Download application forms](#) and find additional information online or contact scholarship committee chair Ray Hander ([ray\\_hander@fws.gov](mailto:ray_hander@fws.gov), phone: 907-456-0402). 🐟

## Marilyn Sigman, Marine Education Specialist, Retires

Marilyn Sigman, Alaska Sea Grant's marine education specialist, recently retired. Sigman joined Alaska Sea Grant in 2009 and is well known for her marine education and literacy efforts across the state. During this time, Sigman trained about 250 teachers in 25 Alaskan communities, and provided grant funding to schools to increase the quantity and quality of Alaska marine and aquatic education to more than 7,000 students annually, including all of Anchorage's 3,700 4th-graders. Sigman led professional-development workshops to bolster teachers' skills in developing lesson plans that align with Next Generation Science Standards (NGSS). She was particularly known for efforts to update the Alaska Seas and Watersheds Curriculum, bringing cutting-edge marine education to Alaska's K-12 schools. Marilyn also worked with the Alaska Department of Education and Early Development to adopt new science standards for the state of Alaska.

Sigman recently partnered with the North Pacific Research Board and the Arctic Research Consortium of the U.S. to assemble scientists and Alaska Native and non-Native educators to develop culturally responsive guidelines for researchers working in rural Alaska communities. A major focus was designing outreach activities that are place-based and involve indigenous youth in the collection of data and in problem-



*Marilyn Sigman poses in front of a bowhead whale jaw in Utqiagvik, Alaska. Photo from Alaska Sea Grant.*

solving in their communities. Recommendations also encourage collaboration with indigenous educators and other community members who can help incorporate local traditional knowledge that is given equal weight to western science.

Prior to joining Alaska Sea Grant, Sigman worked as a naturalist, wildlife biologist, estuary project director, Center for Alaskan Coastal Studies director, and science education consultant for the North Slope Borough. Sigman is currently serving as interim director of the Pratt Museum in Homer, but looks forward to transitioning into full retirement soon, or at least to having more time for writing. 🐳

## Funding for Marine Debris Prevention

The Marine Debris Program of the National Oceanic and Atmospheric Administration (NOAA) is currently accepting applications for activities to prevent the introduction of marine debris into the marine and coastal environment. This opportunity provides organizational funding for projects that actively engage and educate a target audience (such as students, teachers, industries, or the public) in hands-on programs designed to raise awareness, provide practical approaches, reduce barriers, and encourage and support changes in behaviors to ensure long-term prevention of marine debris. Typical funding awards range from \$50,000 to \$150,000.

The application involves a two part proposal process. Applicants must first submit a short Letter of Intent (LOI) that is reviewed by NOAA to confirm that projects are a good match for the opportunity. If the LOI is successful, then the applicant is invited to submit a full proposal. The LOI's are due November 5, 2019. Specific information on the funding process is available at <https://www.grants.gov/web/grants/view-opportunity.html?oppId=320683>. For questions, please contact Peter Murphy ([peter.murphy@noaa.gov](mailto:peter.murphy@noaa.gov)). 🐳

## The Alaska Native Science and Engineering Program

Elizabeth Spangler

*Editor's note – This article is excerpted from an article published in August 2019 in [Fisheries Magazine](#).*

Alaska Natives are the poorest people in the nation and are underrepresented in the science and engineering professions due to a range of systemic problems resulting in poor academic and social preparation for college. In 1995, Herb Schroeder, an engineering professor at the University of Alaska Anchorage, observed that no Alaska Natives pursued engineering degrees. Herb created a systemic change that is now known as the Alaska Native Science and Engineering Program (ANSEP). This program dramatically improves education quality and increases student academic and social preparation for college while reducing costs for families and government. The ANSEP faculty work with students every year starting in sixth grade and through middle school, high school, and university. Today there are 3,000 ANSEP students enrolled from sixth grade up to Ph.D. programs, and more than 600 alumni working with federal and state agencies, industry, philanthropic organizations, and educational institutions.

The ANSEP approach is a longitudinal educational pathway leading Alaska Native students through a series of program components: Middle School Academy, Middle School Career Explorations, Acceleration Academy (summer), Acceleration High Schools, Summer Bridge (between high school and university), and University/Graduate Success. The Middle School Academy is a 2-week residential science and engineering experience during which students build a top-end personal computer from scratch and earn the right to keep it by successfully completing algebra 1 prior to eighth grade graduation. Students also complete hands-on science and engineering projects in teams, live in the university residence halls, and experience life as a scientist or engineer. Middle School Career Explorations keeps students engaged during subsequent middle school years by bringing Middle School Academy graduates back to campus for 5-day, hands-on, project-based exploration exercise. The Acceleration Academy engages students with hands-on engineering and science projects, while enrolling in college-level classes taught by university faculty. The Acceleration High Schools then engage university faculty as instructors supported by

K-12 teachers, graduate and undergraduate students, and practicing professionals from partner organizations; students earn both high school and university credits. During Summer Bridge, new high school graduates live on the University of Alaska Anchorage campus; working full time in paid professional internships with state and federal agencies, Native organizations, industry, philanthropic organizations, or university and agency laboratories; participants complete 160 h of calculus or science instruction for university credit. The University and Graduate Success components include an academic community composed of students, faculty, staff, and external partners focused on the academic success as well as the personal and professional development of each student. Students are co-enrolled in classes, participate in organized study groups, partake in peer and professional mentoring, and work summer internships with partner organizations.

The ANSEP continues to adapt as the program expands and develops, keeping what works and discarding what doesn't. Program success is evident in that ANSEP students exceed state and national averages at each academic level ([Bernstein et al. 2015](#)). For example, 26% of all students nationwide successfully complete algebra 1 prior to eighth grade graduation versus 77% for ANSEP students. Additionally, 95% of participating ANSEP high school students advance one full level in math and science coursework each summer by completing college classes taught by university professors, and 95% of graduates in the ANSEP Summer Bridge successfully transition to B.S. science or engineering degrees.

Partnered with a team of over 100 educators, Native organizations, philanthropic organizations, government agencies, firms, contractors, and research laboratories, ANSEP is based on the indigenous principle stressing the importance of community. The program brings highly qualified students with cultural values and insights into the workforce of partner organizations. One of the key ANSEP lessons is to engage students, faculty, and professionals in a community focused on having fun with science and engineering. Another lesson is to take small steps, stick with it, and work towards transformational, systemic change to broadly demonstrate the capabilities of Native students. 🐻

## Meetings and Events

### Alaska Marine Science Symposium

January 27–31, 2020: This meeting will be held in Anchorage, AK. For more information, visit <http://www.alaskamarinescience.org>.



### Alaska Forum on the Environment



February 10–14, 2020: This meeting will be held in Anchorage, AK. For more information, visit <http://www.akforum.com/>.

### Northeast Pacific Pink and Chum Workshop

March 3–6, 2020. This workshop will be held in Bend, OR. More information will be available at <http://orafs.org/> or contact Kathleen Neely at [PinkandChumWorkshop@gmail.com](mailto:PinkandChumWorkshop@gmail.com).



### American Fisheries Society Alaska Chapter

March 23–26, 2020. The 46th annual meeting of the AFS Alaska Chapter will be in Fairbanks, AK. More information will be posted at <https://afs-alaska.org/>.



### American Fisheries Society Western Division

April 12–16, 2020. This meeting will be held in Vancouver, BC. More information will be posted at <https://wdafs.org/>.



### 12th International Conference on Climate Change: Impacts & Responses



April 17–17, 2020. This conference will be held in Venice, Italy. More information is at <https://on-climate.com/2020-conference/program>.

### 21st Western Groundfish

April 27–May 1, 2020. This conference will be held in Juneau, AK. More information is at <http://www.westerngc.org/>.



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