ONCORHYNCHUS

Newsletter of the Alaska Chapter, American Fisheries Society

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In this issue:

Photographs of sugar kelp, **Saccharina latissima.** *An entire plant representing growth in one season is about 1.5 meters long (right), and plants at low tide (left).* *Photos from Stewart Grant.*

What's up with Sugar Kelp?

Stewart Grant

The DNA ancestry business is booming. For roughly $100 you can send a cheek swab to a lab that will determine your genotypes for several diagnostic genes and tell you about the origins of your family. We are all curious about where we came from. It seems to be an innate drive to belong to a group. We are social animals, after all.

My wife had herself genotyped by one of these labs and, to her surprise, was told not only that she was German, which she is, but that she most closely matched people from the Black Forest in southern Germany. The signal came from the mitochondrial DNA she had inherited from her mother, whose ancestors had been farmers in the rolling hills between the Black Forest and the Rhine River.

Such DNA genotyping can also be a great tool in the management of Alaska's natural resources. Conserving genetic diversity is fundamental for devising biologically and evolutionarily sound fishery management strategies to achieve long-term sustainability. As an example of a genetic application, salmon returning to the many rivers and streams in Alaska often mix as they funnel toward the mouth of a large river. While high fish densities promote successful harvesting, fishing gear cannot identify fish belonging to endangered spawning populations. However, DNA markers can be used to discriminate fish returning to particular streams so that fishery management can better protect weak populations.

In the past few years, the kelp industry has turned its attention to Alaska, and several kelp 'farmers' have begun operations in the state. In the past decade, the number of permitted seaweed farms has grown from 1 in 2008 to 13 in 2018. The first requirement for developing sustainable mariculture is to create a database of genetic diversity among populations. Based on the interests of an increasing number of seaweed farmers, we opted to focus on sugar kelp (*Saccharina latissima*). Along Alaska's coast this kelp typically inhabits calm bays and coves at depths from the sublittoral fringe down to 30 m. Living from 2 to 4 years, this plant exhibits a single, undivided blade that can grow to 5 m (16 ft) long and 20 cm (8 in) wide.

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The President's Corner

Joel Markis, AFS Alaska Chapter President.

After wrapping up a successful AFS Alaska Chapter annual meeting in March, a great deal of Chapter business and my time has focused on advocating for our profession and trying to ensure that fisheries science is taken into account, and relied on, when making policy decisions that impact fish and fish habitat in Alaska and our nation.

On December 11, 2018, the Environmental Protection Agency and the Department of the Army proposed a revised definition of "waters of the United States" (WOTUS). After analysis, the Chapter's Environmental Concerns Committee and Executive Committee, and an ad-hoc group of AFS fisheries professionals, worked to prepare comments in response to the reclassification of the WOTUS definition. In summary, "The Alaska Chapter of AFS opposes 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." You can find the entire letter we submitted at *https://afs-alaska.org/ak-chapter-comments-on-wotus-2/*.

After submitting the WOTUS letter, our Chapter members worked closely with the Western Division and Parent Society to develop a comprehensive review of the Draft Environmental Impact Statement (DEIS) submitted by the Army Corps of Engineers (ACOE) for the proposed Pebble Mine. The DEIS is a massive document and it took a great effort to thoroughly review and analyze the

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Sugar Kelp, continued

The DNA markers come in all shapes and sizes, each with their own peculiar biologies that affect how the markers behave in any population. Most of the DNA is found in the nucleus of a cell. Copies of this DNA are passed on by both parents each generation. These two copies together are called genotypes. We also find DNA in some of the organelles in a cell, particularly mitochondria in animals, and mitochondria and chloroplasts in plants. Only a fraction of the genetic information is encoded in organellar DNA compared to the information in nuclear DNA. Typically about a 1,000 copies of organellar DNA can be found in a cell. Unlike nuclear DNA, organellar DNA is inherited only from the female parent.

The results from the two classes of markers give us different views of the same population events. We had these different views in mind when we chose a commonly used mitochondrial DNA 'barcode' gene that has been used in many studies of seaweeds. We also chose a chloroplast DNA gene that encodes a key enzyme in plant metabolism and, again, is commonly used in seaweed taxonomy. It is worth pointing out that the patterns we see in the DNAs from these two organelles arose independently of one another. Since mitochondrial and chloroplast DNAs don't talk to one another, we have two independent views of the same population history.

We also chose a group of nuclear genes called microsatellites to help define sugar kelp populations. This DNA consists of short repetitive sequences, which have large mutation rates that are useful for detecting genetic differences among populations. The microsatellite markers in our study were the same as those used in a study of sugar kelp in the North Atlantic (*Neiva et al. 2018*), so comparisons are easy to make. Because high mutation rates in microsatellite markers carve up imprints of past events with new alleles, we are unable to make inferences about the distant past.

Previous studies of sugar kelp in the North Atlantic used the same barcode DNA marker that we used (*Luttikhuizen et al. 2018*; *Neiva et al. 2018*) and included a small sample from British Columbia. Based on this small sample, the Northeastern Pacific

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President's Corner, continued

information and conclusions provided within. After doing so, we developed what I believe is a thorough and comprehensive review of this document that is backed up by leading, peer reviewed science and the best available information for a project of this size in this region. In summary, "Based on our review of the DEIS submitted by the ACOE for the Proposed Pebble Mine, we find it fails to meet the basic standards of scientific rigor in a region that demands the highest level of scrutiny and thoroughness. The DEIS is an inadequate assessment of the potential impacts of the project. Specifically, we find the DEIS is deficient because 1) The impacts and risks to fish and their habitats are underestimated; 2) many of the conclusions are not supported by the data or analysis that has been provided; and 3) critical information is missing." You can find the entire letter at *https://afs-alaska.org/ak-afs-comments-on-pebble-deis/*.

These issues and others have forced myself and the Executive Committee to consider our role in commenting on and voicing a position from our Chapter's perspective. As we see many laws and regulations supporting fish habitat being challenged or eroded, it is even more important to try and promote our science and our profession. It is equally, if not more, important to remain nonpartisan and let the science direct our positions to maintain credibility. This however, is not an excuse to simply conduct the science, be a respected expert in your field, or a leader in education; we must be responsible for communicating our science and what we do to the general public and policy makers. It has become easier to disseminate information, but this takes time and effort. We cannot let a lack of effort on our part result in lesser science or less informed individuals shaping the discussion and policies regarding fish and fisheries. Our membership possesses a great deal of expertise and we have a responsibility to share that expertise. I will continue to engage our membership and promote action on issues that are important or of concern to Alaska and our aquatic resources. If there are issues that you feel are important to communicate or weigh in on, I urge you to reach out to anyone on the Executive Committee or the Environmental Concerns Committee; we will use our collective resources to put fisheries science first.

Lastly, as I write this, our legislature has failed to overturn the Governor's veto of $440 million to state agencies and programs, the largest portion of this to our university system. This will have severe impacts across the state, but most influential to our membership will be the impact to research, education, and our student members. We have tough times ahead and the importance of highlighting the value of the work our membership does in understanding, managing, and conserving our fisheries resources will be critical. Fish hard, dive deeper, and keep doing the hard work you do to maintain our Chapter and our profession.

Amazon Smile

The AFS Alaska Chapter is enrolled as a charitable organization in *AmazonSmile*. Anyone who shops online at Amazon can now support the Chapter financially, at no additional cost! Simply shop through *AmazonSmile*. If you are not already registered, go to *AmazonSmile*, select charity lists, and enter or select American Fisheries Society Alaska Chapter. The shopping experience is identical to Amazon.com with the benefit that the *AmazonSmile* Foundation donates 0.5% of the purchase price of eligible purchases to the Alaska Chapter. While the contribution is not large (the maximum quarterly contribution to date was $25.31 for the 2nd quarter in 2017), contributions have increased from the initial donations in 2016. These contributions represent supplemental income to support Chapter projects. There is no additional expense to the customer, no price add-on, and no cost to the Alaska Chapter.

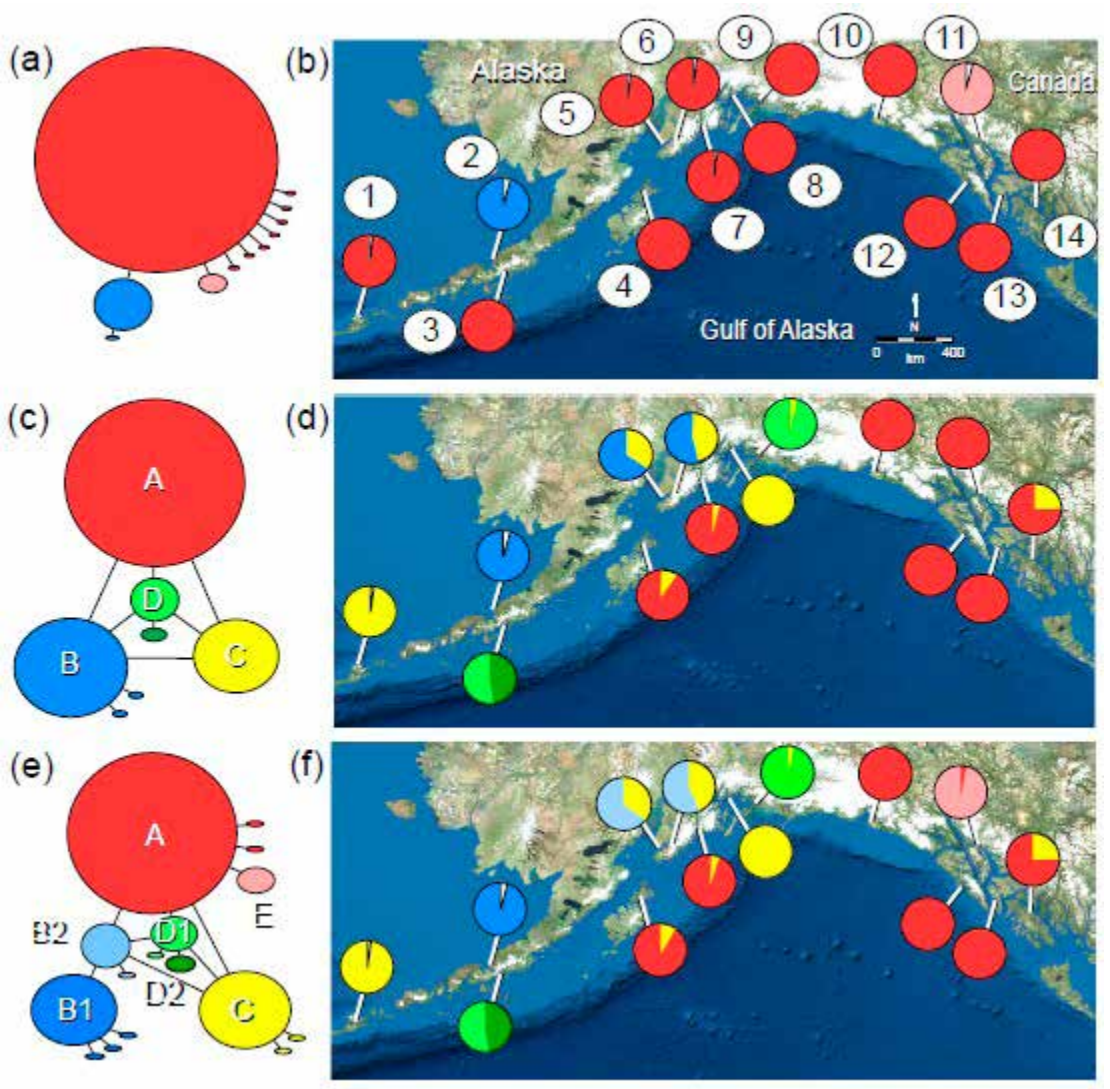
Year	AmazonSmile Foundation Donations
2019	$ 32.26
2018	$ 40.55
2017	$ 61.35
2016	$ 35.77
Total	$169.93

2016 only included quarters 2–4
2019 only shows quarter 1–2

Sugar Kelp, continued

sugar kelp populations appeared to lack genetic variability. In email correspondence with a European colleague, the first question he asked was whether I had found a high frequency of the 'A' genotype that they had found in a small sample from British Columbia. The answer was 'yes.'

A comparison of our sequences with those from British Columbia showed that nearly all the plants in the Gulf of Alaska bore the 'A' haplotype, except for two locations. One was Port Moller, where the plants carried a different genotype, and another at Auke Bay, where plants carried yet another genotype. Based only on data from this one marker, we could be reasonably certain that all the populations in the Gulf of Alaska had gone through a profound bottleneck in population size and had lost a tremendous amount of genetic diversity.



Haplotype networks and haplotype frequency distributions among samples of sugar kelp (a, b) Mitochondrial DNA cytochrome oxidase I (COI) (624 base pairs). (c, d) Chloroplast ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit (rbcL) (735 base pairs). (e, f) Concatenated COI and rbcL sequences (1,359 base pairs). Figures from Stewart Grant.

But wait, we also had results for chloroplast DNA. As expected, this gene had seen population history from a different perspective and gave us a more detailed view of population structure. We then glued the DNA sequences together for each plant and reanalyzed the longer, more informative sequences. These results showed more genetic variation among populations. Interestingly, many populations were still fixed for a single haplotype.

The story continues, because we still had yet to consider the microsatellite data. We measured the differences between populations with a standard statistic for the two classes of markers. Microsatellites showed about half of the amount of differentiation between populations overall (F_{ST} = 0.360) compared to the organellar DNA (F_{ST} = 0.777). The reason for lower microsatellite divergence lay in the ability of these highly polymorphic markers to capture recent dispersals. There were no 100% differences between populations among microsatellite alleles as there were for some organellar genes.

When plants were grouped by organellar

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Sugar Kelp, continued

lineages and projected onto microsatellite principal component analysis space, our samples clustered according to organellar lineage and not according to geographical location. The microsatellite and organellar DNA datasets gave different answers, because they had recorded events on different time scales. The slower mutation rates of organellar DNA do not obscure historical population events with new mutations as occurs for microsatellite loci.

How do we unravel these tangled data to make sense of them? The science philosopher Karl Popper encouraged scientists to make 'bold hypotheses.' Here, we use ideas from paleoclimatology, biogeography, ecology, and kelp reproductive biology to arrive at an explanation.

During the most recent ice-age cycle, which lasted a little over 100,000 years, lobes of terrestrial glaciers covered coastal areas in several places and drove many local sugar kelp populations to extinction. However, some populations survived in isolated northern refugia and began to diverge genetically from one another. We see the results of this divergence in contemporary populations as separate organellar lineages.

Microsatellite variability is superimposed on these lineages because of higher mutation rates among loci. The challenge is to account for the microsatellite similarity between widely separated populations in the same organellar lineage. This pattern can only be explained by recent dispersals of the various ancient lineages so that not enough time has elapsed for microsatellite allelic frequencies to diverge from one another.

The chaotic distributions of organellar lineages around the Gulf of Alaska imply post-glacial dispersals over 100s of kilometers in some cases. Long-distance dispersals are unusual events because most spores settle within a few meters of a parent plant.

The occurrence of a single genotype in many populations is a reflection of sugar kelp reproductive biology. Ecologists have tediously determined that individual plants can release as many as 10^8 or more spores in a season, but only one spore per square meter will geminate into a microscopic plant and survive to produce a large kelp plant. The high mortality of developing plants and sweepstakes recruitment leads to reproductive skew, in which only a few plants contribute offspring to the next generation. We see the result of this as low within-population genetic variability, but considerable among-population differences.

Sample identifier, site location, and sample size for this study of the genetics of sugar kelp.
Table from Stewart Grant.

Sample	Location	*N*
1	Nateen Bay, Unalaska	30
2	Port Moller, Alaska Peninsula	90
3	Kuiuk Bay, Alaska Peninsula	31
4	Malina Bay, Kodiak Island	32
5	Homer Spit, Kachemak Bay	31
6	Humpy Creek, Kachemak Bay	31
7	Lowell Point, Resurrection Bay	27
8	Whittier, Prince William Sound	6
9	Cordova, Prince William Sound	23
10	Boat Harbor, Yakutat	31
11	Homer Spit, Kachemak Bay	31
12	Harris Island, Sitka	26
13	Tokeen Bay, Scott Island	32
14	Kaguk Bay, Prince of Wales Island	42

Our genetic survey of sugar kelp populations will have to be augmented with samples from other localities to provide a more detailed description of population structure. This genetic baseline will aid in the transport and development of broodstock for the culture of this species. Coastal ecosystems and fishery populations have been over-exploited in most regions around the globe, and Alaskan fishery managers are in a unique position to conserve Alaska's bountiful marine resources.

Thanks to the many people who helped collect samples of kelp across Alaska. Several individuals at the Alaska Department of Fish and Game Gene Conservation Laboratory were instrumental in helping see this project through to completion. Wei Cheng oversaw the laboratory analyses of the kelp samples, Zac Grauvogel produced an excellent microsatellite dataset, and Eric Chenoweth, Paul Kuriscak, Marial Terry, Zach Pechacek,

Continued on next page

Sugar Kelp, continued

Nick Ellickson, and Chase Jalbert extracted DNA from hundreds of seaweed samples. This project was funded by the North Pacific Research Board (Project 1816) and the Alaska Department of Fish and Game.

Stewart Grant previously worked in academia (South Africa) and for state (Alaska), federal (Seattle), and international (Malaysia) fisheries research agencies. He is currently an affiliate faculty member in the College of Fisheries and Ocean Sciences at the University of Alaska Fairbanks at Juneau.

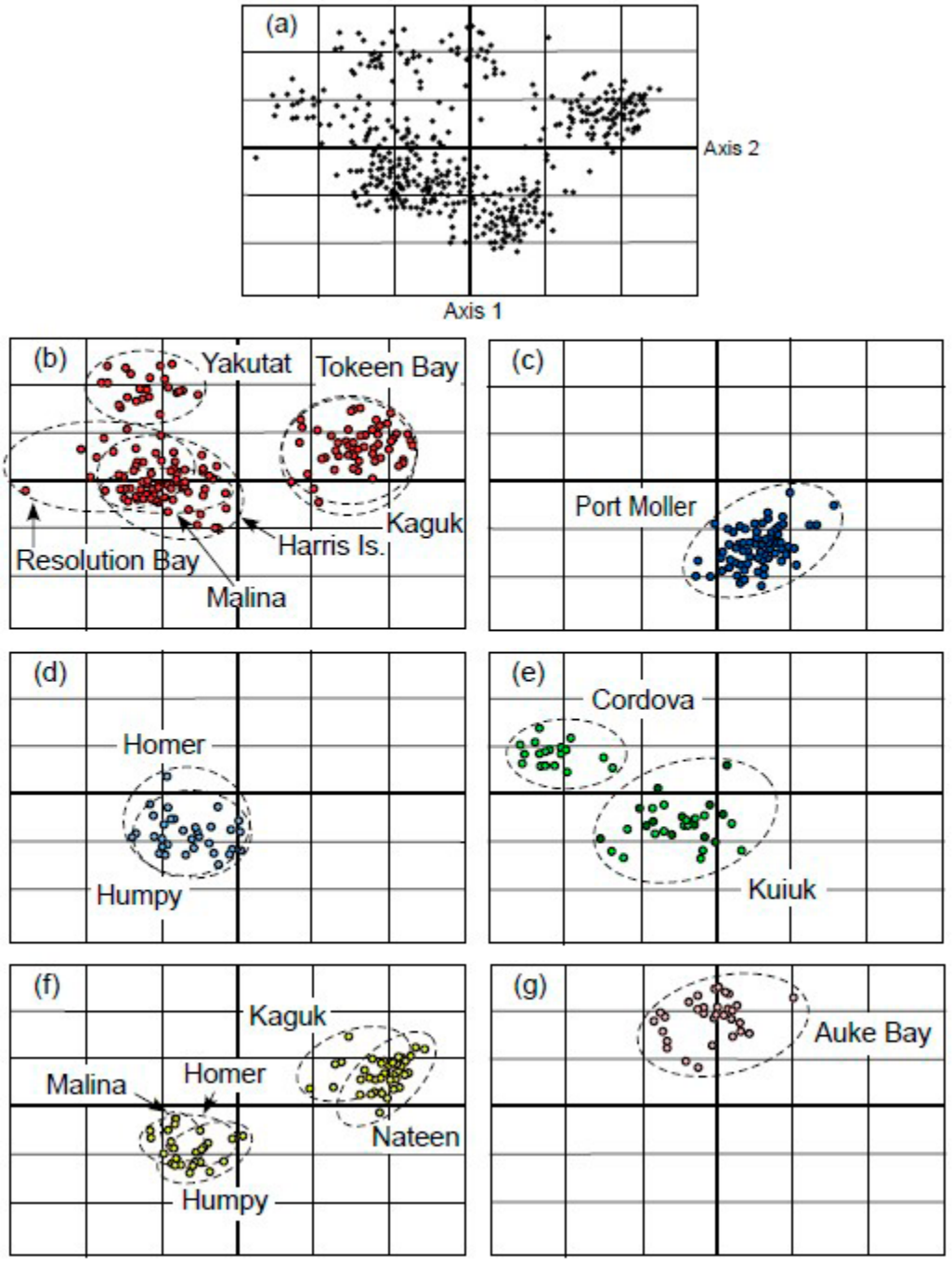

Figure 3 – Principal component analysis (PCA) of microsatellite DNA (12 loci) alleles frequencies. (a) Total PCA of samples from 13 localities in the Gulf of Alaska. (b–g) PCAs of plants carrying particular COI-rbcL haplotypes as in Figure 2: (b) Lineage A (red); (c) Lineage C (yellow); (d) Lineage B1 (dark blue); (e) Lineages D1 (green) & D2 (dark green); (f) Lineage B2 (light blue); (g) Lineage E (pink). Figure from Stewart Grant.

Next AFS Alaska Chapter Meeting Announced

Lock in Your Dates! The 46th annual meeting of the AFS Alaska Chapter will be in Fairbanks, AK, at the Westmark Hotel March 23–26, 2020, with the concluding banquet on March 26.

We are excited to be headed back up north and excited to engage with our colleagues in the Yukon!

Please visit *https://afs-alaska.org/* for up to date details.

Professor Terry Quinn Passes

On May 3, 2019, our friend, colleague, and mentor, Prof. Terrance J. Quinn, II, passed away in Rancho Cucamonga, California. Terry is well known to most of our AFS Alaska Chapter members. He supervised 36 students who received M.S. or Ph.D. degrees at the University of Alaska Fairbanks (UAF), including many who remain professionally active and in leadership positions. Those who took his population dynamics course know that Terry was a gifted classroom teacher. Terry's class on fisheries population dynamics became a core part of a graduate-level fisheries degree at UAF. That course also became the basis of his book, *Quantitative Fish Dynamics*, which was published in 1999, coauthored with his friend Rick Deriso. Near the end of his life, Terry stated that of all the awards he had received, he was the proudest of an Award of Recognition and Appreciation from the North Pacific Fishery Management Council in 2016 and the Wally Noerenberg Award from the AFS Alaska Chapter in 2009.

In 1973 Terry received a bachelor's degree Phi Beta Kappa in mathematics from the University of Colorado, and in 1977 a master's degree in fisheries from the University of Washington. He received his PhD in biomathematics from the University of Washington in 1980. His dissertation, under the supervision of Vince Gallucci, dealt with methods to estimate marine mammal abundance. Following graduation, Terry spent several years at the Pacific Halibut Commission working on stock assessment methods.

Terry was recruited in 1985 to join what was then the School of Fisheries and Science as part of the University of Alaska Juneau. The following year the University of Alaska reorganized, and Terry was moved to the Juneau Fisheries Division of the School of Fisheries and Ocean Sciences at the University of Alaska Fairbanks, which later became the College of Fisheries and Ocean Sciences. Terry was granted tenure in 1991 and promoted to full professor in 1998. He retired and became professor emeritus in 2018.

Terry authored or co-authored over 100 peer-reviewed scientific publications. His published work has received over 4,000 citations in the scientific literature. He collaborated with colleagues all over the world, especially in Chile, New Zealand, South Africa, and Canada. Terry was particularly devoted to the Scientific and Statistical Committee of the North Pacific Fishery Management Council, which he served on from 1986 until his death. He was a member of Ocean Studies Board of the National Research Council (NRC) from 1995 to 1998. He served on five NRC committees and chaired two of those, all leading to NRC publications. In addition to many other service activities, he was an associate editor of the Canadian Journal of Fisheries and Aquatic Sciences for over 15 years.

Terry had many interests. In his younger days he loved to camp, scuba dive, and cross country ski. His friends knew that he was an accomplished classical pianist. Many others knew of his musical interests through his garage bands, including Terry and the Quinn Essentials, the Dull Knives, and Heather and the Planktones, who occasionally played for UAF student events. Above all, he enjoyed teaching and he loved his students.

In lieu of flowers, Terry requested contributions in his name to Juneau Jazz and Classics. A celebration of Terry's life will be held August 10 in Juneau at the Juneau Arts and Culture Center.

Student Subunit Happenings

Donnie Arthur, Student Subunit Representative

As we shift into the full swing of summer, fisheries students from across Alaska are hard at work, in the field and in the lab. An early spring and warm summer has allowed many students to dive into their field work earlier than in years past. Alaskan fisheries students have been doing impressive work from Washington State, to the glacial streams and bays of Southeast Alaska, all the way up to the Beaufort Sea, and everywhere in between. Students from many of Alaska's campuses intend to present at the first-ever Joint Annual Conference for The American Fisheries Society and The Wildlife Society in Reno, Nevada this fall. So stay tuned for many great reports on the data collected by students this summer!

Donnie Arthur, Student Representative for the AFS Alaska Chapter.

With many individuals being noticeably absent from Alaska's campuses in order to conduct summer field work, students have continued to share many impressive updates and accomplishments. To start, the AFS Student group at the Fairbanks campus was awarded a Small Project Grant of $1,000 from the AFS Western Division. This financial assistance is intended to aid students with their ongoing project investigating contaminants in Tanana River Burbot. Additionally, the Fairbanks-based AFS Student group elected new officers: Eric Walther (President), Noah Khalsa (Vice President), Elizabeth Hinkle (Treasurer), and Olivia Edwards (Social Media Coordinator). All of these students have been highly involved in AFS and we look forward to seeing their contributions as Student Subunit officers.

The AFS Alaska Chapter congratulates the following students for defending or graduating recently: Jesse Coleman (Ph.D., UAF) – "Livelihoods, fisheries policy, and the future: the changing social, cultural, and economic landscape of commercial fishing in Bristol Bay, Alaska;" Michelle Stratton (M.S., UAF) – "Identification of spawning areas, influence of environmental variation on freshwater migration timing and in-river movements of adult Coho Salmon in the Buskin River, Alaska;" and Joshua Russell (M.S., UAF) – "Evaluation of marine and freshwater growth and survival of Auke Creek Coho Salmon." Congratulation on achieving such incredible milestones and best of luck in your fisheries careers!

For the rest of you, please enjoy the rest of your summer, catch lots of fish, and safe sampling! I look forward to catching up with you all in the fall. In the meantime, you can contact me at *student@afs-alaska.org*.

Tight lines, Donnie.

Alaska subsistence fishing." Photo from Alfred Epchook, Kwethluk.

Saildrone to Track Tagged Red King Crab in the Bering Sea

While Alaska Red King Crab in the Bering Sea, and the risk/reward challenges involved in harvesting crab, are well identified in reality shows, and in reality, the modern fishing industry has been working hard with National Marine Fisheries Service (NMFS) biologists to keep Red King Crab populations healthy and sustainable. Factors driving declines in Bristol Bay Red King Crab stocks over the last decade are not well understood. Little is known about how environmental variability drives crab seasonal movements, habitat use, and interactions with groundfish trawl fisheries. The NMFS biologists have partnered with the industry-supported, nonprofit, Bering Sea Fisheries Research Foundation (BSFRF), to explore these unknowns. One exciting option is the deployment of an unmanned surface drone (saildrone) to track movement of tagged adult male Red King Crab in Bristol Bay. While general crab location can be determined during the fishing season and also during NMFS summer surveys, little is known about distribution and movement during other periods. There is also substantial uncertainty on how distribution will shift in a changing climate.

The NMFS biologists, working with industry vessels, planned to tag Red King Crab caught in research pots in June, immediately after the NMFS summer survey so the tagging effort could focus on areas of highest crab abundance. The tags are acoustic devices that transmit an ID number and bottom temperature. The saildrone, equipped with an acoustic receiver, will be deployed in October 2019, and again in April 2020, to locate the tagged crabs. Timing of saildrone deployment is intended to understand how red king crab move onto the fishing grounds in the fall, and also spring locations when crab are vulnerable as bycatch in trawl fisheries.

The saildrone is contracted and funded by BSFRF. Traditional tag and recovery methods are time intensive and depend on crabs being caught in a fishery or survey, and any recovered tags being returned. In contrast, the saildrone is programmed to autonomously search a grid ("mowing the lawn") and to focus the coverage if a tag is detected. The saildrone is 7 m long with a 5-m vertical "sail" and a 2.5 m keel. The "sail" is adjusted for the prevailing wind direction and speed, using the wind for movement, and is anticipated to effectively operate in winds up to 20–40 kts. The saildrone is solar powered and collects data such as wind speed and direction, air temperature, solar radiance, depth, sea surface temperature, CO_2, O_2, and salinity.

Saildrone to be deployed in the Bering Sea to track Red King Crab tagged with acoustic tags. *Photo from Scott Goodman, BSFR.*

A primary project result will be to identify what habitats are essential for Bristol Bay Red King Crab in different seasons, and whether current protected areas are effective. Temperature information transmitted by tagged crab to the saildrone will inform how temperature influences crab movement. Crab locations will be compared against sediment maps to characterize essential habitat. The study will also show whether crab protection areas are actually protecting crab.

Alaska Welcomes Recent Graduates to Fellowship Program

Alaska Sea Grant recently selected three graduate students for a year-long fellowship program. The Alaska Sea Grant State Fellowship program is modeled after the Knauss Marine Policy Fellowship that places young professionals in federal agencies in Washington, D.C., or in Congress. Both fellowships provide experience and networking opportunities that help recipients transition from academic study to successful careers. The Alaska fellowship program was initiated five years ago, with most fellows recruited into jobs with state or federal agencies serving Alaska's coastal needs.

More information about Sea Grant fellowships, including the Alaska Sea Grant State Fellowship is available at *https://alaskaseagrant.org/*.

Meredith Pochardt

Meredith Pochardt recently received her M.S. in fisheries from Oregon State University and will begin her fellowship in August working with the Habitat Conservation division at NOAA Fisheries Alaska Region. Pochardt will assist researchers evaluating habitat conservation and fisheries management needs, including synthesis of environmental data to develop habitat variables and analyze habitat data.

Madison Kosma

Madison Kosma expects to receive her M.S. in fisheries this fall from the University of Alaska Fairbanks. Starting in September, Kosma will work with the Protected Resources division at NOAA Fisheries Alaska Region in Anchorage. Kosma will focus on a Cook Inlet beluga whale citizen-scientist project, beluga monitoring research, and outreach for sightings of North Pacific right whales.

Katlyn Haven

Katlyn Haven recently received her M.S. in marine resource management from Oregon State University and will be working with the National Park Service in Anchorage. Haven will support several management projects including lagoon monitoring, ocean acidification monitoring, and the development of digital image libraries for zooplankton and phytoplankton monitoring. Haven began her fellowship in July.

Aleutian & Bering Sea Initiative Funding

The ABSI announces a fellowship opportunity working with our partners at the Alaska Ocean Observing System (AOOS). Being part of the Margaret A. Davidson Graduate Fellowship will provide, pending congressional appropriations, an anticipated annual stipend of $41,000 per student for research and travel, and an annual equipment and supply budget of approximately $7,000. The first fellowship class will begin in summer 2020 with funding available for each of the 29 reserves in the National Estuarine Research Reserve System. Eligible applicants must be U.S. citizens, admitted to or enrolled in a full-time graduate program at a U.S. accredited college or university, with at least two years remaining in their course of study. Applicants are encouraged to explore each reserve's management priorities. For more information, *go to the website*.

Successful Electrofishing Course

Jeff Falke

In collaboration with instructor Dr. Jim Reynolds, the Alaska Chapter of the American Fisheries Society hosted a continuing education course titled "Methods and Measurements in Electrofishing" during May 28-31, 2019. The course was held at the William Jack Hernandez Sport Fish Hatchery in Anchorage – many thanks to Joe Giefer and the Alaska Department of Fish and Game for providing the facility. Many state and federal agencies require electrofishing safety training as part of their professional development requirements, or require the training for fish collection permit applicants. The 2019 Alaska course was the first under a new system designed to better integrate with AFS Alaska Chapter continuing education opportunities, while reducing the average cost per participant. The course was a great success with 13 participants representing university, state, federal, and Alaska Native natural resource organizations. Classroom course topics included: Electrofishing Circuit Principles, Safety and Systems, and Effects on Fish. In addition to the theoretical aspects of electrofishing, the course stressed practical applications. The participants learned how to use a digital multimeter and oscilloscope to test and troubleshoot their gear, and the highlight of the class was a trip to Campbell Creek to sample fish and apply the knowledge gained in the classroom through an applied exercise. Given the electrofishing training needs within Alaska, the Alaska Chapter hopes to offer this course annually as a valuable continuing education option.

Participants in May 2019 electrofishing class. Photo from Jeff Falke.

Dr. Jim Reynolds directs a student through field exercises as part of an electrofishing course in Anchorage during May 2019. Photo from Jeff Falke.

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 Sept. 10.

Meetings and Events

148th Meeting of the American Fisheries Society

September 29–October 3, 2019: This meeting will be co-hosted by AFS and the Wildlife Society in Reno, NV. For more information go to *https://afstws2019.org/about/*.

PICES 2019

October 16–27, 2019: This meeting with the theme "Connecting Science and Communities in a Changing North Pacific" will be held in Victoria, BC. More information is at *https://meetings.pices.int/meetings/annual/2019/PICES/scope*.

Shellfish - Resources and Invaders of the North

November 5–7, 2019: This symposium on northern hemisphere shellfish will be held in Tromsø, Norway. For more information go to *https://www.ices.dk/news-and-events/symposia/shellfish/Pages/default.aspx*.

Alaska Young Fishermen's Summit

January 21–23, 2020. This 8th summit to provide training and networking will be provided by Alaska Sea Grant in Juneau, AK. More information will be posted at *https://alaskaseagrant.org/events/*.

American Fisheries Society Alaska Chapter

March 23–26, 2020. The 46th annual meeting of the AFS Alaska Chapter will be in Fairbanks, AK. 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/*.

21st Western Groundfish

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

Funding for Marine Debris Removal

The NOAA Marine Debris Program (MDP) is currently accepting applications for Community Based Debris Removal grants. This annual national opportunity provides funding to support projects that will create long-term, quantifiable ecological habitat improvements for NOAA trust resources through on-the-ground marine debris removal activities.

Funding is prioritized for projects targeting derelict fishing gear and other medium- and large-scale debris. Typical awards will range from $50,000 to $150,000 for projects ranging from 1–3 years in duration.

Applicants must submit a 2-page pre-proposal ("Letter of Intent") no later than September 4, 2019. Applicants whose proposals align with program priorities will be invited to submit full proposals. More information is available at the *Marine Debris Program website*.

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