ONCORHYNCHUS

Newsletter of the Alaska Chapter, American Fisheries Society

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In this issue:

The NOAA bottom trawl survey has been used since the 1970s to document benthic community composition and collect environmental data from the Bering Sea during the summer. Photo from the Alaska Fisheries Science Center.

Early Warning Signals for Sudden Change in Alaskan Fisheries

Mike Litzow

What if we could use data to make inferences about what's going to happen in an ecosystem in the future? This is the somewhat quixotic question that has kept myself and a group of colleagues working with historical data sets for several years now, trying to determine if early warning signals (EWS) might be able to predict sudden change in Alaskan fisheries and ecosystems.

Research into EWS is one of the newest and fastest-growing subfields in ecology. The reasoning behind EWS is commonly based on the idea that ecosystems (or populations) can exist in multiple possible configurations, or alternative states. As a stressor brings the system closer to an abrupt shift between states, the system loses resilience, which makes it easier for stochastic perturbations to dislodge the system from the center of its current state. This loss of resilience creates statistical signals like increasing variance and increasing autocorrelation in key system parameters.

If the theory behind EWS is correct, then tracking these kinds of statistics over time might give us a handle on the stability of a system and its vulnerability to an abrupt change. This is potentially a real advance over traditional monitoring approaches that focus on mean values, as a change in the mean may become apparent only after the system has made an irreversible switch to an alternative state. The usefulness of EWS in Alaska is potentially immense. As Alaska continues to warm, and goes through events like the warm blob/El Niño that we are currently experiencing, imagine if managers had a relative measurement of the likelihood of groundfish communities slipping into an alternative state. Or think of Southcentral Alaska, where population growth and development are impacting anadromous fish habitat. If you were monitoring the health of salmon populations in the region, how useful would it be

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The President's Corner

Mary Beth Loewen

Mary Beth Loewen, AFS Alaska Chapter President.

Many of us that work in fisheries science—and in other sciences—participate in professional societies. These are groups that aren't based with an employer, but rather are comprised of individuals across numerous jobs and sectors. The American Fisheries Society (AFS), founded in 1870, is the world's oldest and largest organization dedicated to strengthening the fisheries profession, advancing fisheries science, and conserving fisheries resources. Our own Alaska Chapter is 42 years strong, and has undergone many changes and much growth in that time. Professional scientific societies provide excellent means for networking, sharing science, and many other benefits. Societies, like anything else, have their costs and benefits. Typically the main cost is monetary—you pay an annual fee to be a member. In return, the benefits include journal access, reduced registration prices for conferences, and of course, benefits that are harder to put a price tag on, such as networking, collaboration, and the exposure to what is often the cutting edge of the field.

But in today's fiscal climate, what makes AFS continue to be worth the price of membership? Given the often broad disciplines contributing to such societies, and the growing diversity we see in fishery science jobs, here's a question for you: What is it that you want to get out

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Early Warning Signals, continued

to have an indicator of the relative likelihood that individual runs were approaching a switch into persistently negative population growth?

That is the heady promise of EWS. However, while over 90 journal papers have been published on EWS in the last decade, the idea is still best established in theory – specifically, in predictions based on a family of nonlinear mathematical models of "catastrophic bifurcation." In mathematical theory, these bifurcations are points at which the system takes on fundamentally different properties in response to external stressors, such as exploitation rate or temperature. These bifurcations separate different states of the system that are maintained by different feedback loops. This theory predicts that reversing the trend in the stressor may not result in recovery of the system to its original state, ("hysteresis"), and multiple alternative states of the system may be possible at a single value of the external stress parameter. The idea of critical bifurcations has entered the wider culture recently with the widespread appreciation of the existence of "tipping points" in ecosystem responses to stress.

These models have been central to theoretical ecology for decades, but field ecologists have struggled to apply model predictions in the real world. The EWS applications are a relatively recent development of these models, and the experience of extending EWS to the real world has been mixed. There have been promising demonstrations of EWS successfully predicting experimentally caused ecosystem transitions, but there have also been notable failures.

Luckily, Alaska has some pretty good data sets, fisheries-derived and fisheries-independent, that go back decades and, thus, are long enough to test some ideas. When working for the National Oceanic and Atmospheric Administration (NOAA) in Kodiak, I was fortunate to be involved with the small-mesh bottom trawl survey. This survey had been conducted since 1972 by the Alaska Department of Fish and Game (ADF&G) and NOAA in the Kodiak area and westward, notably in Pavlof Bay. Dan Urban, Ben Laurel, and I and found that catch variability in that survey peaked

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President's Corner, continued

of a scientific society membership? What ways would you like to see the Alaska Chapter grow and support current, and hopefully new, members? For you, what makes AFS such a great organization to be actively involved with? For myself, AFS has been a strong part of my fisheries world since graduate school. Being part of the Executive Committee has given me insights into the benefits of membership far beyond our annual meetings, and brought me a greater understanding of the advantages that professional society membership can provide. There are many tangible benefits that the Alaska Chapter provides in return for membership, most obviously the annual Chapter meeting, AFS Western Division meeting, and annual Society meeting. In an age of constantly advancing telecommunications, there's still something irreplaceably human about connecting with a wide range of colleagues in person at a professional conference. In research fields, like fisheries science, professional conferences are designed as forums to present ongoing projects. For presenters, this format allows them to discuss their work and solicit feedback. Conference attendees can serve as an intermediate form of peer-review, asking questions about potential directions for the projects and providing recommendations for next steps. Presentations, posters, and discussions make professional conferences essentially "one stop shopping" for attendees to keep up with the current state of the science. This is useful for those in research fields as well as those outside the research arena, such as managers and professionals from other sectors. Our own Chapter has recently seen a drop in attendance by fisheries managers and the hatchery community, both of which are huge components of Alaskan fisheries. Whether because of timing of the annual meeting, or a perceived lack of relevant information, our Chapter meetings suffer when these voices aren't part of the fisheries conversation. How do we develop and diversify conference attendance?

One way is to look outside our own Chapter. Following the success of the 2014 meeting in Juneau, the 2017 meeting in Fairbanks will once again be held in conjunction with the American Water Resources Association (AWRA), as well as the Yukon Chapter of AFS. This will allow members from both societies to interact with new potential collaborators, attend talks outside your normal realm, and provide the opportunity to sit in on sessions from a range of specialties, to foster innovation and "out of the box" thinking. What if a difficult research issue in one discipline could be tackled with expertise from another area? Collaborating with the AWRA and the Yukon Chapter should facilitate opportunities for these nontraditional interactions to occur, leading to better science, management, and sustainable resource use.

As a member, travel awards to offset costs are available for almost every meeting, from Chapter to annual meetings, if you take the time to apply. But AFS is not just about reduced rates to meetings, a chance to see friends, and maybe give a presentation. Beyond meetings, there are myriad opportunities to expand your involvement and reap the benefits of being actively involved with the world's largest professional fisheries society. One of the primary purposes of AFS is to facilitate professional development of its members. Professional development is an ongoing process that starts with formal education and continues throughout your career. The AFS provides many opportunities for professional development, including Continuing Education courses at meetings and online (hopefully coming soon), and hopefully an off-meeting Continuing Education opportunity this fall. These opportunities can culminate in Professional Certification from the American Fisheries Society. Certification is a formal recognition of academic and professional achievement of specific standards, as well as continued dedication to learning and professional growth. Even better, the AFS Western Division will reimburse you for costs associated with the Certification!

Even beyond these conventions, though, AFS membership provides a wealth of support

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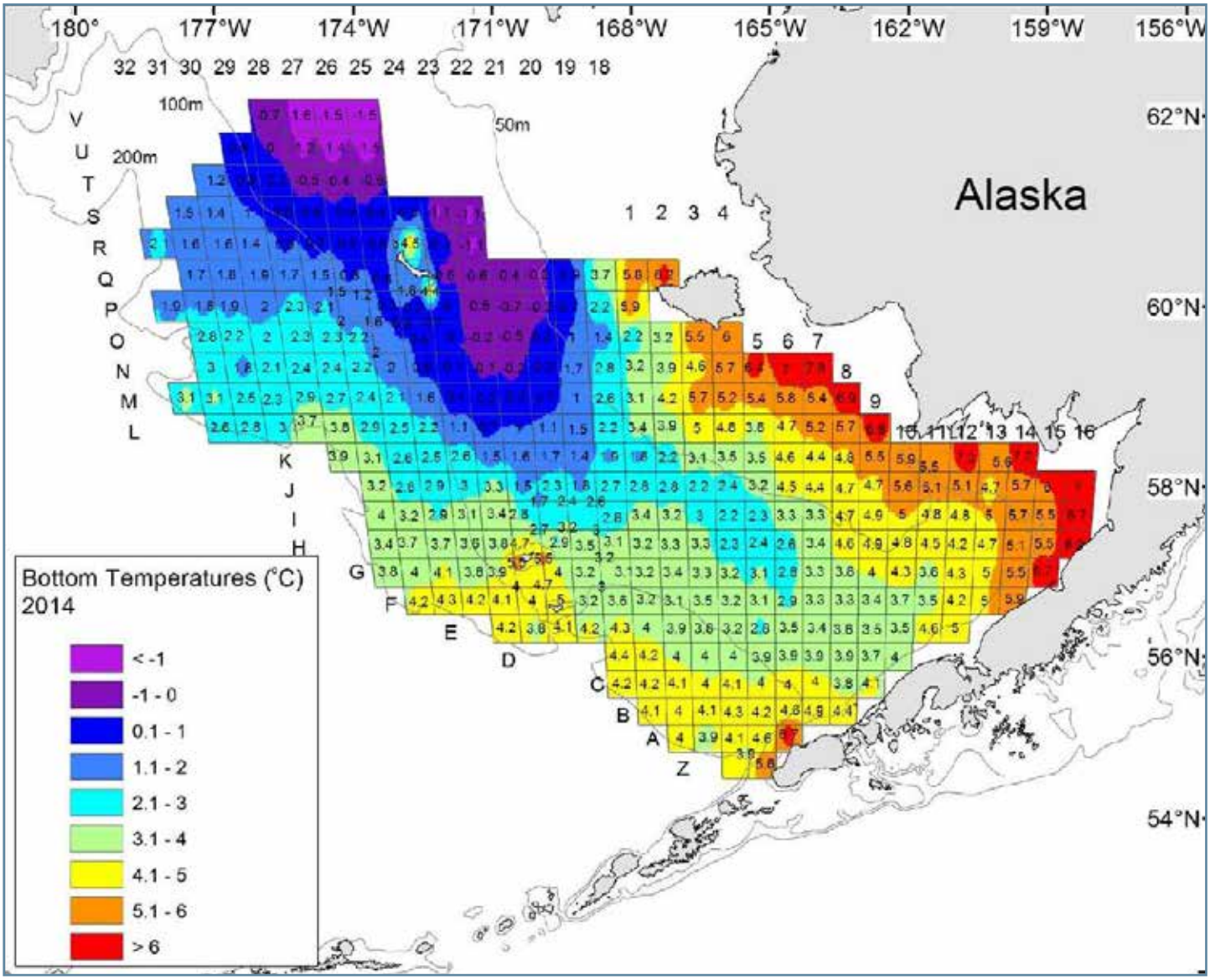
President's Corner, continued

services, if you're willing to take advantage of the opportunity. Get involved in a Technical Committee within your Division, or a standing committee within the Chapter. Publish work from a symposium in peer-reviewed proceedings, which often become the go-to references for years to come. Build editorial experience by serving as a peer reviewer or on an editorial board. Students, take advantage of cheap textbook prices and reduced rates at conferences. Finally, regardless of membership level, please consider what it would take to get you to commit to a more active role within the Alaska Chapter. With our upcoming opportunity to host the Western Division meeting in 2018, the energy and expertise of our membership will be needed in a variety of ways. The Executive Committee looks forward to continued growth and development of our Chapter, and we welcome the contribution of all members.

Early Warning Signals, continued



Example of bottom temperatures by survey station during the NOAA summer trawl survey, 2014. Photo from the Alaska Fisheries Science Center.

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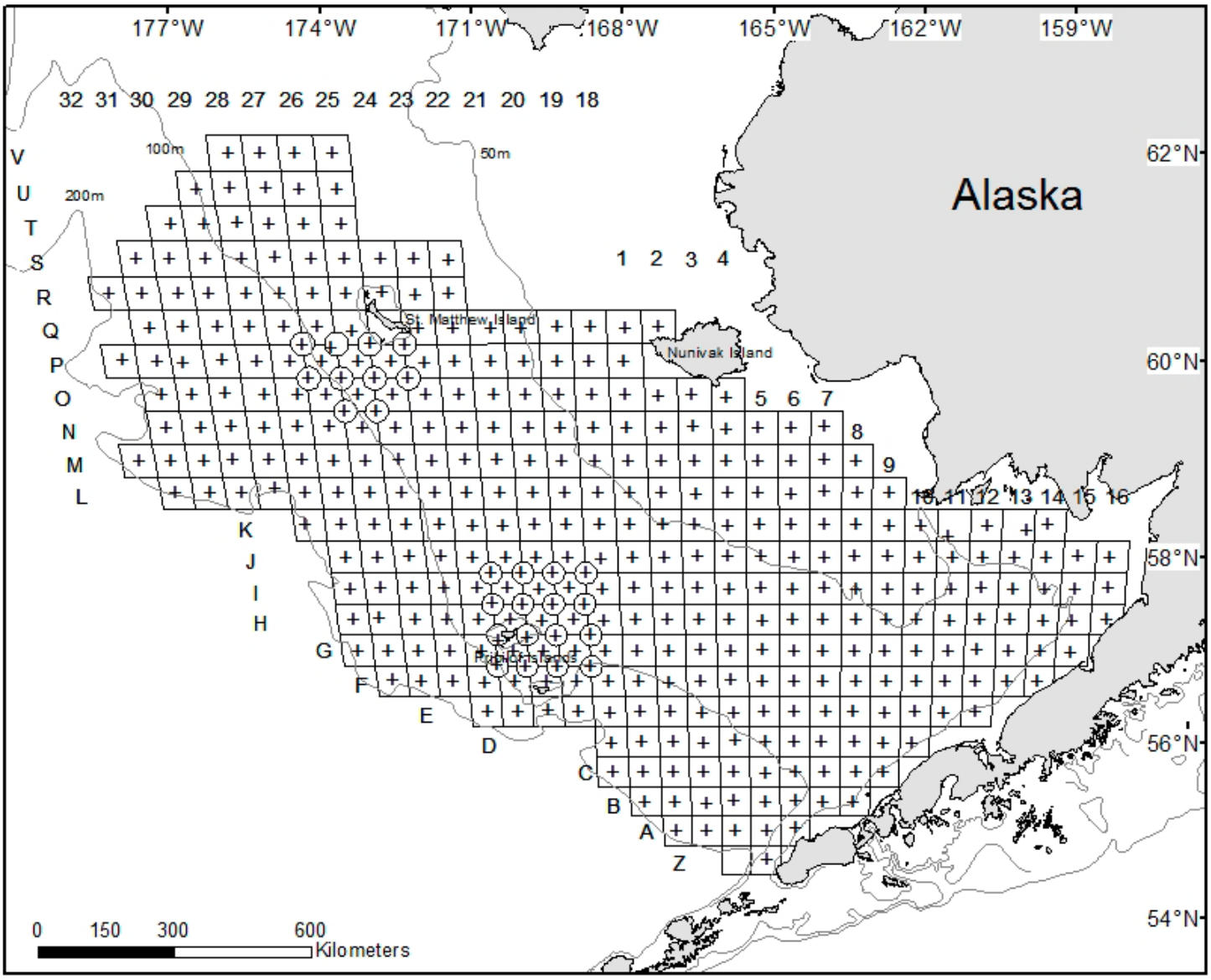
Early Warning Signals, continued



Stations sampled annually during 1982–2015 by the NOAA Bering Sea trawl survey; data were used for the calculation of early warning signals (EWS). Figure from the Alaska Fisheries Science Center.

a couple years before the crash in the shrimp fishery in the late 1970s, which seemed to support the EWS theory (*Litzow et al. 2008*). Franz Mueter, Dan Urban, and I then used ADF&G catch data to look at variability in catches in crustacean fisheries (*Litzow et al. 2013*). Again, the theory seemed to work with catch variability increasing prior to fishery collapses, though another theoretical prediction, that the skewness of catches should increase prior to a collapse, was not supported.

These initial successes got me thinking that there might really be some merit to EWS, and I was eager to continue testing the idea with Alaskan data. The trouble with studying methods for predicting collapse in the real world, though, is that you are limited by the number of collapses that have occurred. Alaskan fisheries management has generally been quite successful, and we've only had one wholesale community reorganization that has any kind of reasonable data – the 1976/77 PDO shift. After we'd studied the Pavlof Bay community change, and the collapse of crustacean fisheries, we seemed to be running out of historical collapses to study. But, there was a natural experiment in the Bering Sea. Summer bottom temperatures increased in the NOAA trawl surveys from 1982 to the mid 2000s. Franz Mueter and I documented

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Early Warning Signals, continued

northward shifts in the majority of the demersal fish and crustacean communities sampled by the trawl survey during that warming period. Statistically, bottom temperatures correlated with this community shift, and the observed shifts in distributions were consistent with similar observations of poleward shifts with warming in terrestrial and marine ecosystems globally.

Then something interesting happened during 2006–2013 when Alaska experienced a strong cold anomaly. Summer bottom temperatures in the Bering Sea, and winter surface temperatures, fell to levels nearly as cold as those observed during the early 1970s, before the last PDO shift. But the Bering Sea community distribution didn't respond as we expected given the earlier temperature-distribution relationship. Instead of retreating back to a spatial distribution similar to the start of the time series, the community showed a more muted response, retreating southward less than anticipated. This directional response to temperature, where the biology shows one reaction to warming, but then fails to retrace the path of that reaction when the system cools down, is consistent with hysteresis, one of the central features of the nonlinear models used to develop the EWS theory.

Hysteresis is just a reaction to external conditions that depends on the state of the system, the direction of change in the external parameter, and the history of past conditions. Basically, reversal of some conditions, such as temperature, doesn't necessarily bring the system exactly back to a previous state. While it's very difficult to formally demonstrate hysteresis with observational data, it is easy to determine if a data set is consistent with hysteresis, and that seems to be the case with the Bering Sea community distribution-temperature relationship. The distribution-temperature relationship suggests two different "states" in the community, a warm community state and a cold community state, with different thresholds in response to temperature. A mechanistic explanation for why the community should show these different thresholds in temperature response is of course far beyond us. But we do know that diverse communities tend to be more resilient than depauperate communities (i.e., communities with low species richness), and Franz Mueter and I found that the species richness of the Bering Sea demersal community increased during warming, as the depauperate Arctic community was replaced by the more speciose subarctic community. So it may be that the more diverse community is more tolerant of temperature perturbation than the Arctic community.

This possibility of hysteresis opens up some interesting predictions with EWS. The model of hysteresis and alternative community states predicts that the warm community, under the stress of the persistent cold perturbation, should have been losing resilience and getting closer to a sudden shift in distribution. Thus, EWS should

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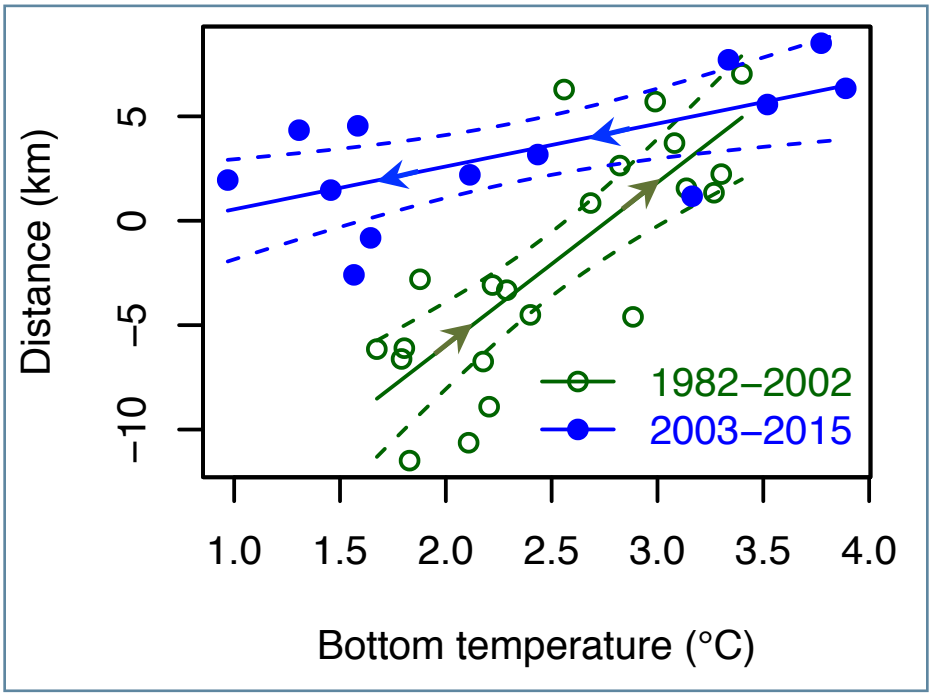

Possible hysteresis in the Bering Sea demersal community distribution-temperature relationship. Community distribution (distance from mean N-S distribution) is plotted on the y-axis. Arrows indicate the dominant direction of temperature change before and after 2002. Note that the community moved north during the warming period, but then failed to fully reverse that distribution change during the cooling period. Figure from Mike Litzow.

Early Warning Signals, continued

have reflected that decline in resilience. Variance and autocorrelation in distribution should have also increased.

In a study funded by Alaska Sea Grant, Bob Lauth and I tested this prediction. The NOAA trawl survey includes 285 stations that were sampled in every year during 1982–2015, providing great spatial and temporal replication for calculating EWS. We found that spatial variance and spatial and temporal autocorrelation for distributions of the 12 taxa best-sampled by the trawl survey all increased during the cold anomaly. We also used three cold years outside of the persistent cold anomaly as a "control" observation to test the idea that these increases in variance and autocorrelation were due to the effects of cold per se, rather than declining resilience. This is an important consideration, since many groundfish in the Bering Sea show changes in behavior and distribution in response to cold that might increase statistical values such as variance. Although the control years were slightly colder on average than the 2006–2013 cold anomaly, the EWS were not elevated during these years. We concluded that the EWS were responding to declining resilience rather than cold effects per se.

So, these three studies on EWS in Alaska offer hints that the theory might work to some degree with real data. The idea of EWS, and its application to real data from Alaska, has come a tremendous way in only a decade, but many further tests will be needed before the idea can become a tool used by managers. *Krkošek and Drake (2014)* demonstrated that EWS may work in the context of salmon spawner-recruit models, and I think that salmon are a very promising area for the application of EWS in Alaska – both because the quality and quantity of historical data for testing the idea, and because of the value that EWS would have in giving us early warning of sudden responses of salmon populations to the ongoing stressors of climate variability and climate change. If anyone is interested in exploring the idea, please get in touch!

Mike Litzow has been studying Gulf of Alaska and Bering Sea ecology for 20 years. He lives on a sailboat with his family (currently in South Africa) and works at the Farallon Institute for Advanced Ecosystem Research in Petaluma, California. Mike's email is litzow@faralloninstitute.org.

North Pacific Research Ideas Solicited

The North Pacific Research Board (NPRB) strives to build "… a clear understanding of the North Pacific, Bering Sea, and Arctic ecosystems that enables effective management and sustainable use of marine resources." The NPRB is seeking input on potential research topics to be included in the 2017 Request for Proposals (RFP). The 2017 RFP is scheduled to be released in October 2016. Research priorities will be developed this fall by the NPRB staff in consultation with the NPRB science panel, advisory panel, and board members, the North Pacific Fishery Management Council, and the broader research community. Suggested priorities may be submitted through the *RFP Input Form* at the NPRB website *http://www.nprb.org/*.

Photo by Tamara McGuire, Permit #14210.

Cook Inlet Beluga Whale Portal

Information on the endangered population of Cook Inlet beluga whales has not always been easy to find. That is changing with the recently launched *Cook Inlet Beluga Whale Ecosystem Portal*. This freely accessible portal is designed to integrate and visualize beluga whale observations with other biological, physical, and socio-economic data in the Cook Inlet region. The portal was developed through a cooperative effort by the Alaska Ocean Observing Systems (AOOS), the National Oceanic and Atmospheric Administration (NOAA), the Cook Inlet Regional Citizens Advisory Council (CIRCAC), and Axiom Data Science. While aiming to improve management and public awareness of Cook Inlet beluga whales, the portal will also help the development of various conservation, action, and habitat plans.

Student Subunit Happenings

Cheryl Barnes, Student Subunit Representative

The student subunit of the AFS Alaska Chapter would like to recognize the following fisheries students from the University of Alaska Fairbanks (UAF) and Alaska Pacific University (APU) for defending their M.S. thesis or Ph.D. dissertation during the 2016 spring semester:

Matthew Albert (M.S., UAF) - "Seasonal movement of Northern Pike *Esox lucius* in Minto Flats, Alaska"

Mayumi Arimistu (Ph.D., UAF) - "Influence of glaciers on coastal marine ecosystems in the Gulf of Alaska"

Catherine Chambers (Ph.D., UAF) - "Fisheries management and fisheries livelihoods in Iceland"

Allison Matter (M.S., UAF) - "A rapid assessment method to estimate the distribution of juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) in interior Alaska rivers"

Cameron Provost (M.S., APU) - "Age, growth, and sexual maturity of the Deepsea Skate, *Bathyraja abyssicola*"

Morgan Sparks (M.S., UAF) - "Embryonic phenology, phenotypic plasticity, and thermal adaptation in response to warming water temperatures by Bristol Bay Sockeye Salmon"

Jane Sullivan (M.S., UAF) - "Environmental, ecological, and fishery effects on growth and size-at-age of Pacific Halibut (*Hippoglossus stenolepis*)"

Emily Whitney (M.S., UAF) - "Trophic ecology of nearshore fishes in glacially-influenced estuaries of Southeast Alaska"

The 20th annual AFS Alaska Chapter Student Symposium was held on Friday, April 1, 2016 with distance delivery to University of Alaska campus locations at Juneau, Fairbanks, and Kodiak, as well as live feeds to other areas across Alaska and even to Seattle. The event was a tremendous success, with 31 Alaskan students giving presentations on their research. The diverse schedule included talks on invertebrates, fishes, and marine mammals, as well as freshwater, estuarine, and marine ecosystems. The winner for the short talk category was Tessa Minicucci (M.S. Student, Juneau Fisheries Division). Winners for the long talk category were Eric Torvinen (M.S. Student, Institute of Arctic Biology), Jenell Larsen (M.S. Student, Juneau Fisheries Division), and Jared Siegel (M.S. Student, Juneau Fisheries Division). Jenell Larsen was also awarded the St. Hubert Research Group award for best introduction. Thank you to all of the symposium presenters for helping us better understand the scientific research conducted by Alaskan students around the state. Special appreciation goes to volunteer judges for taking time out of their day to provide students with valuable feedback on their presentations. Finally, thanks to all AFS Alaska Chapter Student Symposium sponsors for making this event possible: the Alaska Chapter of the American Fisheries Society, St. Hubert Research Group, and the UAF School of Fisheries and Ocean Sciences. We hope to see everyone again next year!

Winners of the best presentation awards at the AFS Alaska Chapter Student Symposium: (L-R) Tessa Minicucci, Jenell Larsen, and Jared Siegel, all from the UAF Juneau campus. Not shown is Eric Torvinen from the Institute of Arctic Biology. Photo from Cheryl Barnes.

Tigalda Island, Eastern Aleutians, one of the images in the ShoreZone coastal inventory program. Photo from Sarah Cook.

ShoreZone Program 2016 Update

The ShoreZone program is a detailed inventory of the biology and geomorphology of North America's Pacific and Arctic coast from Oregon to Alaska. This spring, the ShoreZone program completed imagery surveys for over 4,800 kilometers of shoreline in the Eastern Aleutians (Fox Islands), central Alaska Peninsula, and Barren, Chirikof, and Semidi islands, marking the completion of image acquisition for approximately 92% of Alaska's coastline. Imagery from these surveys and all previous surveys are posted online at *http://www.shorezone.org*. The high definition video and photos are used to map biological and physical attributes of coastal habitats. The habitat data and imagery are available online at no cost to the user.

Shore stations were established on the Alaska Peninsula in May 2016 to complement the aerial surveys by providing ground verification for shoreline substrates, as well as invertebrates and algal communities. At 28 ground stations, substrate size and percent cover were quantitatively sampled on selected shoreline units. Additionally, biobands at each station were sampled with all organisms quantitatively recorded using percent cover or counts, as appropriate. Three to five quadrats were completed within each bioband, for a total of over 350 quadrats sampled during the two low tide cycles in May. The data from these shore stations will be available from the *Alaska Shore Station Database*.

Over 60 organizations and agencies have funded ShoreZone in Alaska, British Columbia, Washington, and Oregon. ShoreZone imagery and habitat attribute data have been used to support a wide range of projects including oil spill response, land management planning, research studies, coastal erosion monitoring, coastal development, and archeological inventories.

Another result of the beautiful imagery acquired from the ShoreZone surveys are two artistic exhibits showcasing the diverse habitats of the dynamic Alaskan coastline – one highlighting the Gulf of

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ShoreZone Program 2016 Update, continued

Alaska and another the Arctic. The full *Coastal Impressions: A Photographic Journey along Alaska's Gulf Coast* is on display at the Alaska SeaLife Center in Seward all summer, and will be transferred to the new Cordova Center in Cordova this fall.

If you would like more information about ShoreZone or are interested in training, please contact Kelly Ingram, ShoreZone Partnership Coordinator at The Nature Conservancy at *kelly.ingram@tnc.org* or 907-865-5703.

Elodea Monitoring by Alaskan Pilots

Elodea, an invasive subsurface aquatic plant, has been raising concerns for freshwater habitats across Alaska. Thought to have been introduced as a release from freshwater aquariums, this plant damages native ecosystems by reducing flow, reducing dissolved oxygen, and increasing sedimentation. This plant can clog waterways, impeding navigation by boats and floatplanes, and making fishing problematic or impossible. Self-sustaining Elodea in Alaska was first documented in Eyak Lake near Cordova in 1982, followed by the Chena Slough near Fairbanks in 2009. Elodea has subsequently been found at several freshwater systems in the Cordova, Fairbanks, Anchorage, Nenana, and central Kenai Peninsula areas. Adaptability to a range of low to high temperatures and variable light conditions gives Elodea a high competitive ability against other aquatic vegetation. Elodea even continues to grow under ice in the winter when most native vegetation is dormant. While plants are dioecious with separate male and female plants, reproduction and distribution is largely vegetative with plants fragmenting into easily transportable pieces that subsequently settle into the sediment. Suitable Elodea habitat is likely to increase in response to climate change.

To eradicate this threat to Alaskan waters, a statewide inter-agency task force was established, led by the Alaska Department of Natural Resources. Following a public process to obtain the necessary permits, treatment is typically through the herbicides fluridone or diquat. These herbicides at concentrations <8 ppb effectively starve Elodea without imposing restrictions on fishing, swimming, or potable water during treatment. It is expected that treating a water body for three seasons is adequate to eradicate Elodea. Meanwhile, efforts are underway to determine if Elodea has spread to other locations. Floatplanes have the potential to spread this plant, but pilots, biologists, and the general public may also be part of the solution by monitoring lakes and water bodies to help determine Elodea distribution.

Underwater image of the invasive aquatic plant Elodea. Photo from *http://plants.alaska.gov/invasives/elodea.htm.*

To aid in monitoring, some floatplane pilots recently attended a training session in Fairbanks to learn about Elodea, and how to respond. Organized by the Fairbanks General Aviation Association, the training included both lectures and hands-on sampling experience. Aditi Shenoy, Invasive Plant Specialist for the Fairbanks Soil and Water Conservation District, provided the background on Elodea, identification, and the known distribution. Shenoy outlined eradication plans for the three water bodies containing Elodea near Fairbanks, but also identified the locations that had been surveyed without finding Elodea. Adam White, Government Affairs with the Alaska Airmen's Association, covered ways to minimize risk of spreading Elodea by checking the floatplane, and cycling water rudders soon after take-off to dislodge vegetative matter. The final training component was held at the float pond at Fairbanks International Airport. Sampling kits were distributed among attendees and the sampling procedures demonstrated. The process involved throwing a two-headed rake into the water, retrieving the rake with an attached rope, and seeing what types of

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Elodea Monitoring, continued

vegetation were present. Applying this process at 17 spots around the float pond reaffirmed that Elodea was not likely present.

The floatplane pilots that attended the training represent an important step in extending the Elodea survey network in the 2016 summer. The distribution of sampling kits to these pilots provides the means to sample lakes and rivers and report findings back to the team actively working to eradicate Elodea to Alaskan waters. This is a trial program to involve the aviation community in the effort to monitor and eventually eradicate this threat to fish habitat. If successful, similar projects can hopefully be expanded to other areas.

2016 AOOS Ocean Film Contest

The Alaska Ocean Observing Systems (AOOS) is hosting the third annual Ocean Film Contest, seeking short films highlighting Alaska's coasts or oceans. Films may be of any genre relating to the ocean (i.e., people using the ocean and coast, marine research, marine wildlife, ocean-related policy issues, etc.). Films must be 10 minutes or less in length, must be your own original creation, and must not infringe on any third party rights. You need not be a professional to submit a film, and individuals may submit as many films as they wish. Award categories will include: (1) Judges Choice ($1,000 cash prize); (2) Best treatment of a complicated issue; (3) Best videography; and (4) a Youth winner. Additional prizes will also be awarded.

Videos will be shown during ocean-related events across Alaska, posted on the AOOS website, and shared for other educational purpose. The submission deadline is September 16, 2016, with contest winners announced by November 18, 2016. For more information, go to *http://www.aoos.org/film-contest/*.

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

Alaska Sea Grant Chooses Three State Fellows for 2016

Starting this summer three new Alaska Sea Grant State Fellows will gain professional experience in marine policy in Alaska — Sarah Apsens, Jane Sullivan, and Jennifer Marsh. All three have been fisheries graduate students at the University of Alaska Fairbanks School of Fisheries and Ocean Sciences. Sarah Apsens will work at the National Park Service in Anchorage, gaining experience in habitat typing and management issues. Jane Sullivan will be placed with the NOAA Sustainable Fisheries Division in Juneau working on improving sampling design and protocol in the fisheries observer program or best practices for incorporating observer data into stock assessments. Jennifer Marsh will work with NOAA Fisheries in the Habitat Conservation Division in Anchorage, to update the essential fish habitat section for the Arctic Fisheries Management Plan, among other projects.

The Alaska Sea Grant State Fellowship was launched in 2015 to provide recent or soon-to-be graduates a jump-start to careers in marine and coastal policy. The program matches fellows with state or federal agency hosts in Alaska for a 12-month paid fellowship. Marysia Szymkowiak and Matt Robinson, the first fellows in the program, are completing their fellowships this summer. Alaska Sea Grant shares the cost of the fellow stipends with the agency hosts.

AmazonSmile

Please spread this message far and wide! Tell your family and friends, your colleagues, and anyone who shops online at Amazon. Anyone interested AFS and Alaska's fisheries can now support the AFS Alaska Chapter financially, at no additional cost! When customers shop on AmazonSmile (*smile.amazon.com*), the AmazonSmile Foundation will donate 0.5% of the price of eligible purchases to the charitable organizations selected by customers.

There is no additional expense to the customer, not a price add-on, and at no cost to the AFS Alaska Chapter. The shopping experience is identical to Amazon.com with the added benefit that the AmazonSmile Foundation will donate to the charitable organizations selected by customer.

Meetings and Events

Aleutian Life Forum

August 16–20, 2016: This meeting will be held in Unalaska, AK. For more information go to *http://www.aleutianlifeforum.com/*.

146th Annual Meeting of the American Fisheries Society

August 21–25, 2016: This meeting will be held in Kansas City, MO. For more information, see *http://2016.fisheries.org/*.

2016 Alaska Chapter of the American Statistical Association

August 23–25, 2016: This meeting will be held in Anchorage, AK. Daniel Lee (Columbia University) will give a two-day workshop on Bayesian inference. For further information, see *https://www.123signup.com/event?id=prjhd*.

2016 Aquatic Resources Education Association

October 23–28, 2016: This biennial meeting of AREA will be held in Shepherdstown, WV. For more information go to *https://area.wildapricot.org/*.

Center for Salmon and Society Workshop: Long-term Challenges to Alaska's Salmon and Salmon-Dependent Communities

November 1–3, 2016: This meeting will be held in Anchorage, AK. For further information see *https://seagrant.uaf.edu/conferences/2016/salmon-and-society/*.

PICES 25

November 1–13, 2016: This conference, celebrating 25 years of efforts by the North Pacific Marine Science Organization to further understanding of the North Pacific's natural and socioeconomic systems, will be held in San Diego, CA. For more information, go to *https://www.pices.int/meetings/*.

The Flatfish Biology Conference

December 6–7, 2016: This meeting will be held in Westbrook, CT. For further information contact *renee.mercaldo-allen@noaa.gov*.

Impacts of the Environment on the Dynamics of High-Latitude Fish and Shellfish

May 9–12, 2017: This 31st symposium in the Lowell Wakefield Fisheries Symposium series will be held in Anchorage, AK. More information is at *https://seagrant.uaf.edu/conferences/2017/wakefield-fish-dynamics/*.

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