ONCORHYNCHUS

Newsletter of the Alaska Chapter, American Fisheries Society

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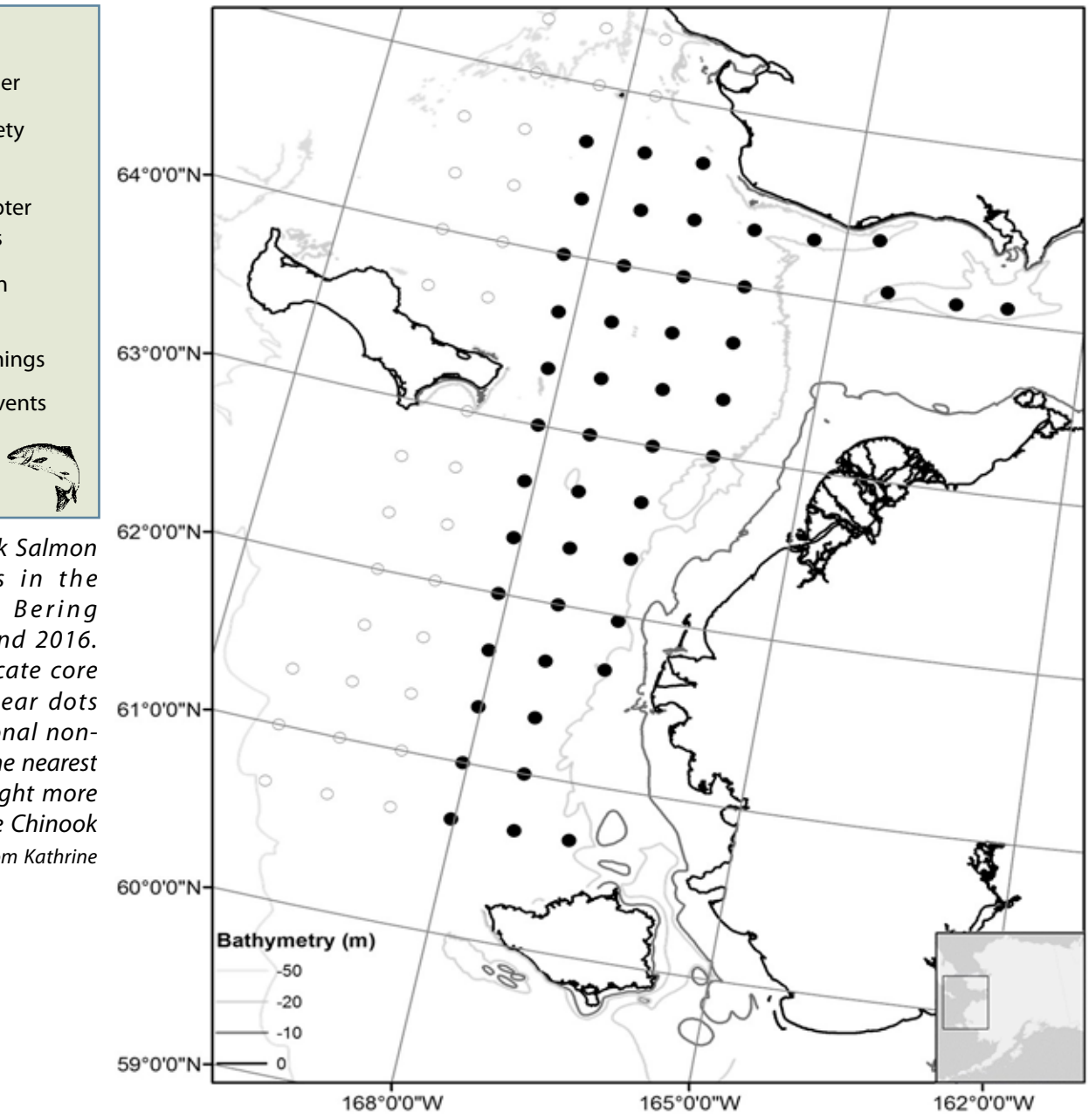
In this issue:



Juvenile Chinook Salmon trawl stations in the northeastern Bering Sea for 2015 and 2016. Black dots indicate core stations and clear dots indicate additional non-core stations if the nearest core station caught more than five juvenile Chinook Salmon. *Figure from Kathrine Howard.*

Reconstruction of Juvenile Chinook Salmon Diet: Does Diet Really Matter?

Jarred Stone

Through advances in stable isotope ecology and the use of mixing models to address complex ecological questions regarding predators' foraging habits, ecologists have explored unique ways to elucidate feeding ecology of marine fishes. Stable isotope ecology has been shown to be a valuable tool when addressing questions regarding food sources, migratory behavior, life histories, energy sources, and food-web pathway dynamics. When I first made the decision to pursue graduate school, little did I know that my research would require me to become a detective of fish physiology, mixing-models, and Bayesian statistics. This research required that I delve deep into the uses

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The President's Corner

Aaron Martin,
AFS Alaska Chapter President.

Happy Spring everyone!

Aw yeah. It is break up season. Time to remember where your rain gear and 'tuffs' are and see what you left in the yard last fall as the snow melts away.

I always feel a great sense of excitement and appreciation this time of year. Spring is a time of growth and opportunity. It also marks a time of transition for the American Fisheries Society Alaska Chapter President. As I wrap up my tenure, I would like to take this opportunity to express my appreciation and highlight some of the Alaska Chapter's significant achievements from the past year.

First, I would like to thank you all for your commitment to manage the aquatic resources of Alaska. Alaska's fisheries are a global resource and our collective efforts provide a benchmark for fisheries and habitat management. For context, Alaska's seafood harvest of 5.6 billion pounds in 2016 resulted in an ex-vessel value of $1.7 billion, nationally translating to $12.8 billion of economic output and 99,000 full–time equivalent jobs (*McDowell Group 2017*). Our State's seafood was sold in 105 countries in 2016. Furthermore, sportfishing is estimated to create more than $1.4 billion in revenue throughout Alaska (*Southwick Associates Inc. et al. 2007*) and subsistence fishing provided

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Salmon Diet, continued

Jarred Stone holding an immature Chinook Salmon (Oncorhynchus tshawytscha). Photo from Jarred Stone.

and applications of Bayesian mixing models to apportion food source contributions to a foraging animal. Mixing models use carbon and nitrogen isotopes as biotracers to estimate the proportion of prey contributions to a consumer. Tissues of the consumers are built directly from the dietary sources they consume, which allows the use of stable isotope mixing models to estimate the assimilated diet of a group of individuals with their respective isotopic ratios of the consumer's selected tissue and its associated food sources (*Phillips 2012*). There are three necessary components: 1) consumer (predator) stable isotope $\delta^{13}C$ and $\delta^{15}N$ values; 2) source (prey library) $\delta^{13}C$ and $\delta^{15}N$ values; and 3) discrimination factors (also known as trophic enrichment factors), which are the differences between the source and the consumer $\delta^{13}C$ and $\delta^{15}N$ values. From here, if you have adequately sampled your source contributors (prey), you can build probability distributions that describe prey contributions to the predator's diet.

Most researchers assess only one tissue type when sampling their predator, which only gives the researcher a single snapshot into the predator's past foraging habits depending on the tissue sampled and turnover rate of that tissue for that predator. Samples from distinct tissues can yield different timeframes for when the predator incorporated

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President's Corner, continued

food and cultural connection for our 229 federally recognized tribes. While these fishing sectors and respective agencies do not always agree on management actions, I applaud you all for having and continuing to have constructive dialogues that push each other to find the places of mutual interests that advance our field and ensure the sustainability of our aquatic resources and the ways of life that depend on them.

I also thank the other Executive Committee members (Marybeth Loewen, Jeff Falke, Joel Markis, Lee Ann Gardner, and Tessa Minicucci) and the members of our other committee's that make our chapter function and grow. The diligence and commitment of these individuals has helped us make considerable strides to improve the administration of the Alaska Chapter and secure new and ongoing opportunities for our members. Below is a summary of some of the accomplishments of 2017.

1) 2017 Annual Meeting: Through a collaborative effort with the American Water Resource Association Alaska Section, we were able to host one of the largest Chapter meetings on record for Interior Alaska, attract new attendees (and members) from Alaska and the Yukon Territory, and have one of the most successful auctions in a decade, which directly supports our student members. The Alaska Chapter waived meeting costs for 28 students who volunteered at the meeting and provided them with a complimentary banquet ticket. For 8 of the 28 student volunteers, the Alaska Chapter also covered their travel/lodging costs, equaling ~$3,000 in travel/lodging support. Total meeting-related support to students by the Alaska Chapter in 2017 was ~$4,700.

2) The Alaska Chapter also supported the 2017 Western Division American Fisheries Society (WDAFS) Student Colloquium in McCall, Idaho via travel support for two Alaska students ($1,400) and a donation of $500 to the colloquium program committee.

3) The Alaska Chapter has provided significant coordination and leadership in its role as host for the 2018 WDAFS meeting. Logistics and planning for this joint meeting greatly exceed any local meetings held since the Alaska Chapter hosted the AFS Parent Society National Meeting in 2005.

4) The Environmental Concerns Committee reviewed and commented on 13 actions related to state or federal management of aquatic resources ranging from water rights issues to the Clean Water Act (e.g., impacts of the development of Pebble Mine).

5) The Alaska Chapter's Facebook site gained over 100 new followers in 2017 (140% increase), with the final number reaching 358 at the end of the year. Use of social media so far has proven to be very useful in helping Alaska Chapter members network, prepare for, and attend, annual meeting special events, as well as highlight emerging research and show non-members the work, purpose, and opportunities of the Alaska Chapter.

6) The Alaska Chapter gathered feedback from membership regarding a proposed restructuring of the University of Alaska's fisheries program, which would have deeply impacted not only students, but also many of the critical stock assessment and management research programs that involve our Chapter members in the academic field. The Alaska Chapter used this input to develop a letter opposing the restructuring of the program, which was provided to the UA Board of Regents. This letter provided crucial feedback to the Board of Regents and helped influence their decision not to restructure the state's university fisheries program.

7) Welcomed the formalization of the Alaska Pacific University Student Subunit and thanked them for their time and energy in leading the fundraising and auction item donation efforts for the 2018 WDAFS meeting.

8) The Alaska Chapter Executive Committee (Ex. Comm.) met for an officer retreat in November 2017 to discuss the status and direction of the Alaska Chapter and how we (the Ex. Comm. and membership) can continue to meet the goals and objectives of the Society, Western Division, and Chapter. This was the first time the Alaska Chapter Ex. Comm. met for strategic planning

President's Corner, continued

purposes for over two decades and resulted in several new initiatives that will be finalized in 2018. We plan to continue with an annual officer retreat into the future.

2018 is going to be another big year for our chapter. We have the 2018 WDAFS meeting coming up at the end of May; register now. Thanks to all of you that have provided leadership and coordination for this event. Additionally, with assistance from our Financial Assets Oversight Committee and other volunteers we will be formalizing the financial plan for the new student travel endowment. Finally, we also are finalizing the Alaska Chapter's Bylaws and Procedures Manual – THANK YOU Marybeth Loewen and Jenni Stahl for all your work in getting this closer to the finish line.

In closing, I appreciate you entrusting me with guiding the Alaska Chapter over the past year. It has been simultaneously rewarding and challenging. My experiences with the American Fisheries Society have continued to help me evolve as a professional, employee, and friend. We work across an enormous landscape in Alaska, but our community is small. I look forward to helping to keep us connected and to facilitate the growth of our Chapter.

With gratitude, Aaron.

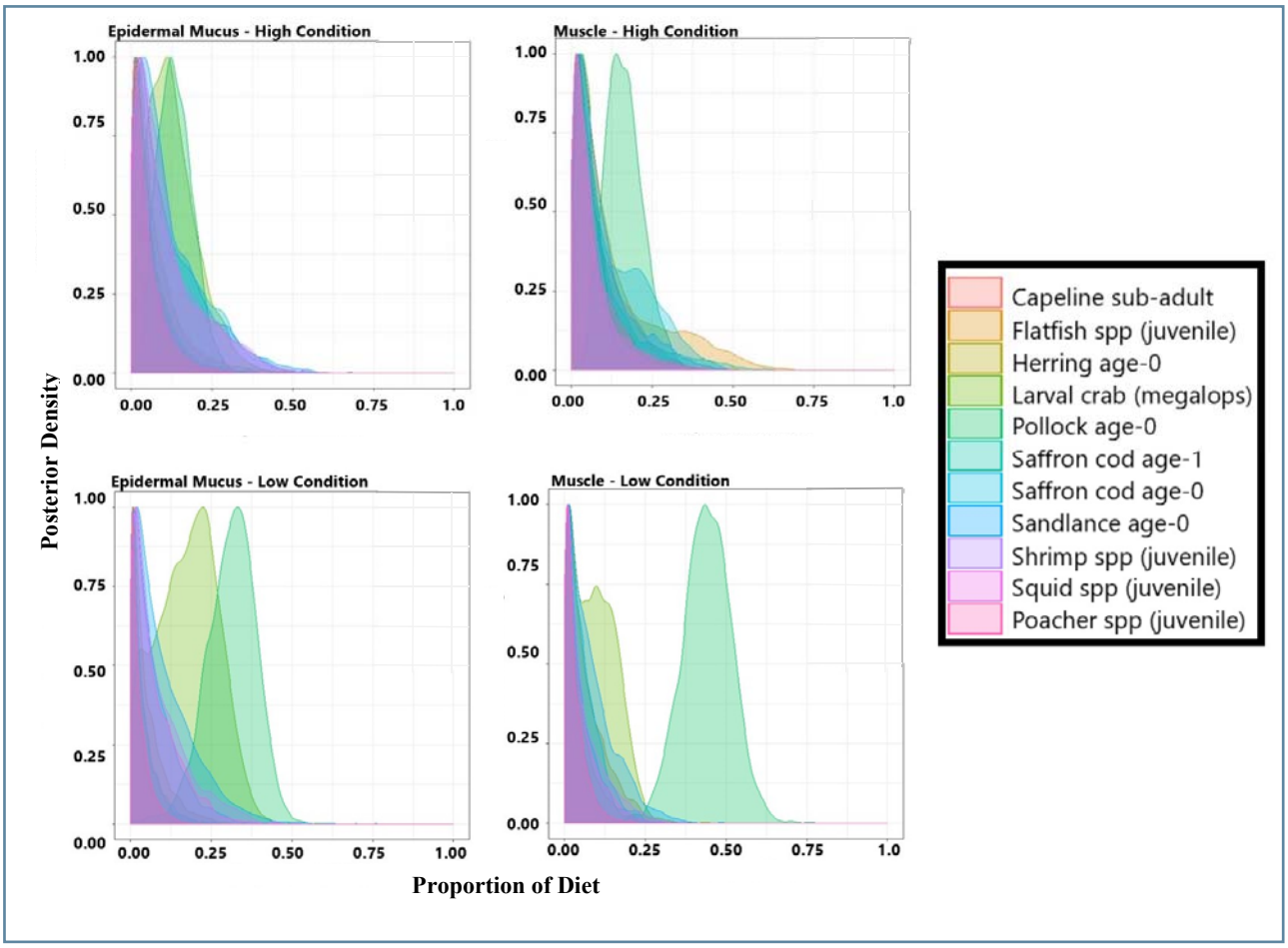
Western Division Meeting of the American Fisheries Society

Welcome to fisheries in the last Frontier! The Alaska Chapter is proud to welcome you to the 2018 Western Division Meeting "Change, Challenge, and Opportunity in Fisheries: Fishing for Solutions." This 43rd Annual meeting will be held in Anchorage, Alaska May 21–25, 2018. Fisheries are vital to the Alaskan economy and way of life. The conservation, research, and management that have helped Alaska maintain a strong connection to fisheries is paramount and discussions from across the west will be welcomed. Online registration for the meeting is currently open. Early Bird Registration ends April 21, with registration costs increasing April 22. Volunteers are still needed to help with registration, audio/visual, signage, and continuing education. Student volunteers should contact Tessa Minicucci (*tjminicucci@alaska.edu*) or Britta Baechler (*baechler@pdx.edu*). Volunteering professionals should contact Jeff Falke (*afs.alaska.presidentelect@gmail.com*). For more information, to register, or to volunteer go to *http://wdmtg.fisheries.org/*.

Student Judges Needed for AFS Western Division Meeting

Engaging and recognizing students is a critical component of not only including students in the activities of a professional society, but also allowing students to explore the opportunities of involvement in the American Fisheries Society such as professional development and networking in the aquatic resources field. But this all starts with acknowledging the efforts that students have put into oral and poster presentations, and providing feedback and constructive comments on how well the "message" has been relayed and how to potentially improve that message. We need volunteers to help judge student presentations during the AFS Western Division meeting in Anchorage, AK, during May 21–25, 2018, and we can use your help. If you are willing to evaluate a small number of presentations, you can let us know by one (or both) of two ways. First, click "Yes" on the checkbox for the online registration whether you would be willing to serve as a judge of student presentations. Second, send an email to Jonathon Gerken (*jonathon_gerken@fws.gov*) indicating your availability. We will get back to you to confirm receipt of your interest. In advance, thanks so much for being willing to participate in this process that involves and promotes students, our new recruits.

Salmon Diet, continued



Epidermal mucus (left) and muscle tissue (right) prey source contributions of low (bottom) and high (top) condition juvenile Chinook Salmon. Figure from Jarred Stone.

the sources' stable forms of carbon and nitrogen isotopes. My research took a more comprehensive approach and paired tissue sampling with stomach content analysis to reconstruct the diet history of juvenile Chinook Salmon captured in the northern Bering Sea. Sampling both dorsal muscle tissue and epidermal mucus (better known as fish slime, collected from the outside of the skin) allowed two past time periods of juvenile Chinook Salmon diet to be reconstructed. Before my undertaking of this research, there had been only a couple of published investigations describing turnover rates of epidermal mucus of juvenile cold-water fish (*Church et al. 2008*; *Heady and Moore 2013*) and one research paper describing turnover rates of epidermal mucus in a species of worm (*Schmidt et al. 1999*). So, the technique of using epidermal mucus for wild captured juvenile Chinook Salmon was exploratory to say the least. Granted, one of the research papers did assess the tissue turnover rate of epidermal mucus in a hatchery setting where they experimentally switched the diet of juvenile steelhead. Perfect! I have some idea that, yes, epidermal mucus can be used and, yes, epidermal mucus of fast growing juvenile steelhead has a half-life of approximately 34 days.

Turnover in muscle tissue has been well documented in a variety of fishes, including salmonids. The literature suggests muscle tissue turnover occurs approximately every 94–136 days for juvenile salmonids. So, in sampling both epidermal mucus and muscle tissue, we constructed two different time periods, 94-136 days for muscle and 34 days for epidermal mucus. Because we sampled juvenile Chinook Salmon in the fall, we hypothesized this diet reconstruction represented the past 94–136 days (i.e., the post-smolt, freshwater to marine transition) of juvenile Chinook Salmon (from muscle tissue), past 34 days (from epidermal mucus), and

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Salmon Diet, continued

Chinook Muscle Tissue						Chinook Epidermal Mucus				
Condition	Species	Mean	SD	5%	95%	Species	Mean	SD	5%	95%
Low	Pollock YOY	0.44	0.08	0.314	0.559	Pollock YOY	0.31	0.08	0.178	0.427
	Larval Crab	0.09	0.07	0.003	0.203	Larval Crab	0.18	0.09	0.020	0.321
	Sandlance YOY	0.08	0.07	0.003	0.219	Sandlance YOY	0.10	0.09	0.004	0.283
	Flatfish spp	0.07	0.06	0.003	0.195	Shrimp	0.09	0.09	0.003	0.267
	Shrimp	0.06	0.06	0.002	0.192	Squid	0.07	0.07	0.003	0.220
Medium	Pollock YOY	0.29	0.06	0.190	0.382	Pollock YOY	0.24	0.07	0.125	0.339
	Flatfish spp	0.10	0.10	0.003	0.316	Larval Crab	0.16	0.09	0.018	0.306
	Sandlance YOY	0.09	0.08	0.003	0.247	Sandlance YOY	0.11	0.10	0.004	0.302
	Saffron Cod Age 1	0.08	0.08	0.002	0.251	Shrimp	0.10	0.10	0.004	0.291
	Saffron Cod YOY	0.08	0.07	0.003	0.224	Squid	0.08	0.08	0.003	0.243
High	Pollock YOY	0.16	0.06	0.078	0.267	Pollock YOY	0.14	0.05	0.058	0.228
	Flatfish spp	0.13	0.14	0.006	0.429	Larval Crab	0.13	0.08	0.025	0.277
	Saffron Cod YOY	0.12	0.11	0.005	0.320	Sandlance YOY	0.12	0.11	0.007	0.333
	Saffron Cod Age 1	0.09	0.11	0.004	0.333	Saffron Cod YOY	0.12	0.10	0.005	0.320
	Sandlance YOY	0.09	0.09	0.006	0.285	Shrimp	0.11	0.10	0.007	0.320

Muscle tissue (left) and epidermal mucus (right) percent contributions by top five prey sources for low, medium and high condition classes (determined by energy density residuals) of juvenile Chinook Salmon. Prey are ranked from highest to lowest mean, with respective standard deviation (SD), and credible intervals for upper 95% and lower 5% bounds. Young of the year are denoted as YOY. Table from Jarred Stone.

the last meal (from stomach content analysis). Our primary question was, "What do juvenile Chinook Salmon eat, and how does their diet influence their condition?"

Juvenile Chinook Salmon were captured using a surface trawl fished by the Alaska Department of Fish and Game *R/V Pandalus* in August of 2015 and 2016 in the northern parts of the Bering Sea. All juvenile Chinook Salmon captured were sampled for both epidermal mucus and muscle tissue and frozen for later analysis of energy density using bomb calorimetry. We used kilojoules/gram wet weight (kJ/g) as a metric for condition to infer lipids stored in somatic tissue. Energy density residuals were then used to indicate whether a fish had higher or lower energy density than expected given the fish's weight. Chinook Salmon were then apportioned by their standardized residuals such that the lowest 25% of residual scores were assigned "poor" condition, the highest 25% of residual scores were assigned "high" condition, and the remaining 50% of the fish that were centered around 0 were considered "normal" condition.

Analysis of the stable isotope data required the use of two packages in R, Mixing Model Stable Isotope Analysis in R (MixSIAR ver. 4.1.3; *Stock and Semmens 2016*), and Stable Isotope Bayesian Ellipses in R (SIBER; *Jackson et al. 2011*). Both packages answer different questions regarding foraging qualities of the predator of interest. Right, now, for my research questions and approaches!

1. How does diet influence condition of juvenile Chinook Salmon during the post-smolt phase and prior to their first winter at sea? Mixing models, as applied with MixSIAR, can address prey contributions using both muscle and epidermal mucus to reconstruct two past time frames of diet history.
2. Is there a difference between prey niche widths of juvenile Chinook Salmon groups with different body conditions? Standard ellipse area (area ‰²) with SIBER can address differences in prey niche width between muscle and epidermal mucus to reconstruct two different time frames of diet history.

Trophic niche width (area ‰²) is a measure of the variability in the predator's isotope space

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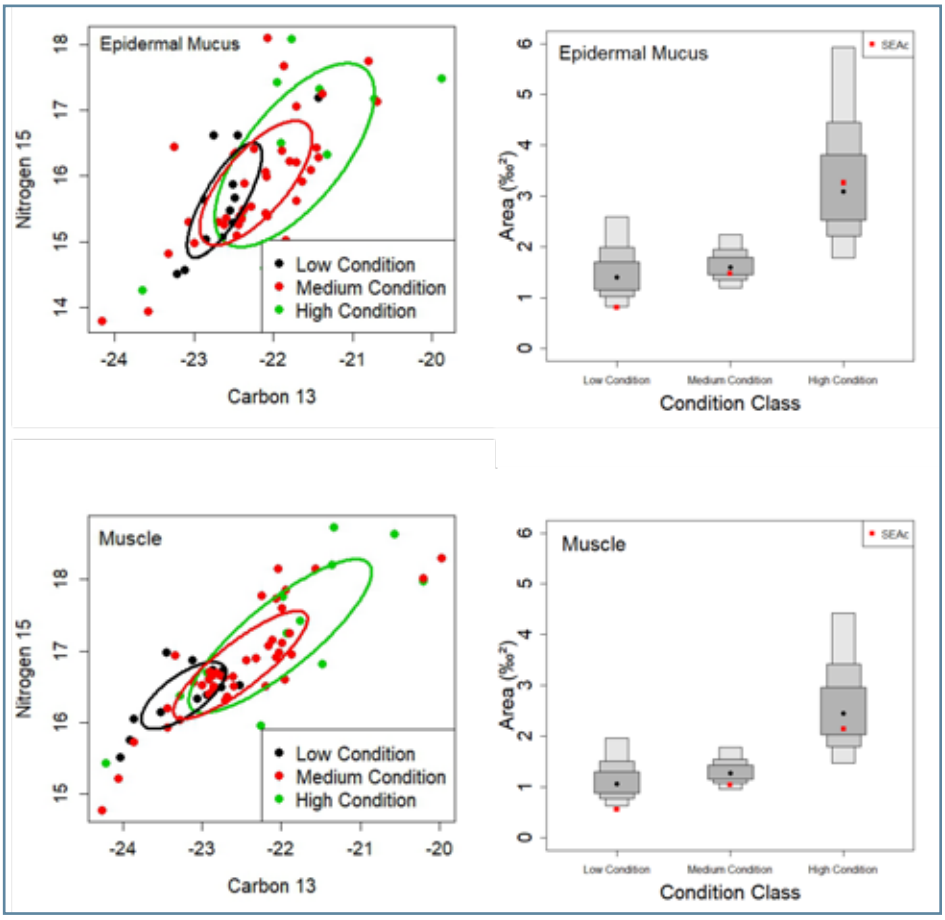
Salmon Diet, continued

on a bivariate plot that assesses variation of individuals within a group (standard ellipse area: bivariate equivalent to standard deviation). This variation within consumer tissue samples can be measured and compared with other groups, such as across different condition levels. Predators with a narrow and/or small trophic niche width tend to be diet specialist, whereas predators with a wide and/or large trophic niche width tend to be diet generalist.

Initial results indicate juvenile Chinook Salmon with high condition consumed a more diverse range of prey types (diet generalists), suggesting that a more varied diet contributes to healthier fish with higher energy densities. Young of the year (YOY) Walleye Pollock (*Gadus chalcogrammus*) were found to be the primary prey item. However, YOY Pollock was less important for low and normal condition fish based on both muscle tissue and epidermal mucus, indicating selection for YOY Pollock could be contributing to lower energy density and, ultimately, lower lipid stores prior to winter. Juvenile flatfishes (Paralichthyidae) also were found to be a significant contributor to higher condition juvenile Chinook Salmon in the summer (muscle tissue), making up 13% of juvenile Chinook Salmon diet. We also found larval crab to be of increasing importance as summer shifts to fall, as noted in the differences between muscle tissue and epidermal mucus.

Juvenile Chinook Salmon might benefit from selecting higher energy density prey items, which could contribute a multi-fold increase in energy intake depending on types of forage fish being consumed. Energy density of forage fishes highlights the possible importance of selecting for higher energy density forage fish such as Pacific Sandlance (*Ammodytes personatus*, 5.06 ± 0.12 kJ/g) compared to a lower quality prey item such as



Multivariate isospace plot ($\delta^{13}C$ and $\delta^{15}N$) of low, medium, and high condition groups of epidermal mucus and muscle tissue of juvenile Chinook Salmon. Rectangles represents credible intervals in 25% increments, and black dots represent the mode values. Red dot represents the small sample size corrected mean. Figure from Jarred Stone.

Pollock (3.47 ± 0.06 kJ/g ; Anthony et al. 2000).

Trophic niche width analysis, visualized through the use of standard ellipse area, indicated juvenile Chinook Salmon of high condition had the largest trophic niche width (area ‰²) when compared to fish of lower condition. This analysis compliments the mixture model analysis, whereby fish found with a more general diet habit are of higher condition than those specializing on one or two prey sources.

Juvenile Chinook Salmon stomach contents (n = 138) yielded 147 prey items and eight prey types: crab larvae (megalopa stage), invertebrates (primarily Diptera), Pacific Sandlance, poachers (Agonidae), flatfishes, Capelin (*Mallotus villosus*), amphipods (Amphipoda), and cods (Gadidae). Of the 147 prey items, 52% (primarily fish) were unidentified due to being too digested to distinguish. It is also likely some prey items were

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Salmon Diet, continued

not as evident during the stomach content analysis due to differences in digestion rates of various prey taxa (*Macdonald et al. 1982*; *Pinnegar et al. 2001*). Crab larvae and invertebrates had the highest frequency of occurrence. Fish made up an average of 95% (97% in 2015 and 92% in 2016) of the identified stomach contents by weight. The largest identified prey item consumed was a Capelin measuring 112-mm fork length (FL). The smallest identified forage fish consumed was a poacher measuring 16-mm FL. The average length of identified fish prey consumed was 41-mm FL (SD 20.45 mm, n = 82). Mean feeding intensity, measured as stomach contents weight as a percent of body weight (% BW), did not differ significantly among low, medium, and high condition fish (t-test, p = 0.60, n = 68). Thus, diet quality was likely more important that diet quantity in understanding differences in condition of juvenile Chinook Salmon as determined by energy density.

Use of epidermal mucus for stable isotope analysis allows for rapid determination of a fish's diet and, most importantly, could be collected non-lethally, which will benefit researchers studying endangered or threatened animals. This research has direct management implications to understand the importance of the diversity of forage fish communities for juvenile Chinook Salmon condition.

I would like to thank the At-Sea Processors Association for funding this research. I would also like to thank my academic committee, Dr. Bradley Harris, Dr. Kathrine Howard, and Dr. Nathan Wolf, who have been excellent mentors during my pursuit of everything from fish slime to my Master's degree.

Jarred Stone (jstone@alaskapacific.edu) is a graduate student with the Fisheries Aquatic Science and Technology Laboratory at Alaska Pacific University in Anchorage. Jarred works as a Graduate Pathways Program student with the United States Fish and Wildlife Service – Office of Subsistence Management. Jarred received his undergraduate in Natural Resources with an emphasis on Fisheries Ecology from Northland College in Ashland, Wisconsin.

AFS Alaska Chapter Officer Elections

Under the AFS Alaska Chapter Bylaws, Chapter officers consist of a President, President-Elect, Vice-President, Treasurer, and Secretary. Terms of the Treasurer and Secretary are two years, with the Treasurer elected on even numbered years and the Secretary elected on odd numbered years. The term of the Vice-President is one year. At the end of the one-year term, the Vice-President succeeds the President-Elect, who succeeds the President. This year, 2018, the Chapter is electing a Vice-President and a Treasurer plus an out-of-cycle election for our Secretary due to the position being vacated unexpectedly. Please cast your ballot securely online at *https://www.surveymonkey.com/r/PRC6NSS*. We require your name or AFS membership number to verify that you are an Alaska Chapter member and to ensure that each member votes only once. Each candidate's biographical summary and platform statement is on the the balloting page. If you prefer to vote by mail using a paper ballot, please request one by contacting *afs.alaska.president@gmail.com*; paper ballots must be received no later than 11:59 PM AKST April 22, 2018. Online balloting will also be open through 11:59 PM AKST on April 22, 2018. Those elected will take office at the 2018 Western Division American Fisheries Society meeting. We'll announce election results by late April.

2018 Alaska Tsunami Bowl

During the weekend of February 9–11, 2018, 121 students and 32 coaches representing 27 teams gathered in Seward for the largest Alaska Tsunami Bowl to date. Students submitted research papers, gave oral presentations, and/or competed in the quiz bowl. The regional competition, part of the National Ocean Sciences Bowl engaging students in ocean sciences, prepares students for ocean-related and other STEM (science-technology-engineering-math) careers and becoming knowledgeable stewards of the marine environment. Alaska is the only region requiring students to write a research paper and give an oral presentation before competing in the buzzer-style quiz bowl. This year's Alaska winners, the "Cordova Yeti Crabs," will go on to compete in the National Ocean Sciences Bowl finals in Boulder, CO April 19–22. For a listing of top finishers and recognitions, participating schools, and national and local sponsors go to *https://www.facebook.com/TsunamiBowlNOSB/*.

AFS Parent Society Awards for 2017

The Parent level of the American Fisheries Society provides a variety of awards to recognize individuals or groups that have played a substantial role in the aquatic resources field through aspects such as education, research, conservation. Following are several individuals with Alaska ties that were recognized by the society in 2017.

James R. Reynolds – William E. Ricker Conservation Award

The William E. Ricker Resource Conservation Award is given to an individual or organization for outstanding accomplishments or long-term contributions that advance aquatic conservation at a national or international level. James Reynolds has been a strong leader in fisheries and natural resources conservation throughout his career. After receiving his Ph.D. in fishery biology from Iowa State University in 1966, Reynolds worked with the U.S. Fish and Wildlife Service in Michigan, and then as assistant unit leader for the Missouri Cooperative Fishery Research Unit. Reynolds then worked at the Fish and Wildlife Cooperative Research Unit at the University of Alaska until retiremng in 1999. Beginning in 2003, he served two years as a Peace Corps volunteer at the University of the South Pacific in the Fiji Islands, developing a data management and analysis system to address locally managed marine areas. Reynolds may be best known for his contributions to the science of electrofishing, having taught over 200 electrofishing short courses and authored numerous papers on electrofishing methodology. Reynolds was AFS Alaska Chapter President during 1981–1982.

Photo from Fisheries magazine.

Carol Ann Woody – President's Fishery Conservation Award

Photo from Fisheries magazine.

The President's Fishery Conservation Award recognizes individuals or entities for singular or long-term contributions that advance aquatic resource conservation at a regional or local level. As the 2017 award recipient, Carol Ann Woody has been an exceptionally strong advocate for the conservation of wild Pacific salmon, particularly in Alaska's Bristol Bay area. In 1998 Woody received a Ph.D. in fisheries science from the University of Washington. Woody has probably done more than any individual to raise awareness of potential impacts of mining Bristol Bay's massive copper porphyry deposits and to gather independent baseline data on water quality, habitat, and fish communities. She was one of the first scientists to express concerns regarding probable damage from the Pebble Mining Project on the Sockeye Salmon *Oncorhynchus nerka* fishery. The region produces half of the world's wild Sockeye Salmon, large numbers of other salmon, plus trout, char, and other resident fishes. Woody has gone beyond the science while mentoring students, tribal members, nongovernmental organizations, and subsistence, sport, and commercial harvesters regarding the potential biological and environmental impacts of a mega-mine in an ecologically sensitive region. Woody was AFS Alaska Chapter president during 2000–2001.

Vanessa R. von Biela – Best Paper in Marine & Coastal Fisheries

Former UAF student Vanessa R. von Biela received this award for "Influence of Basin- and Local-Scale Environmental Conditions on Nearshore Production in the Northeast Pacific Ocean."

Just Let Go! Relying on the Same Old Solutions …

Jim Reynolds

The Einstellung effect occurs when we depend on previous experience to solve a new problem and fail to see that a better solution exists. Einstlellung literally means "installation" in German, but also refers to a person's attitude. In other words, we are reluctant to let go of a familiar approach to problem solving. Trapping monkeys is a good example of the Einstellung effect. A banana is placed in a tethered container with an opening just large enough for a monkey's hand. Upon reaching in and grasping the banana, the monkey is trapped because it won't let go.

Graphic from Jim Reynolds.

As another example, our governments have had a hard time letting go of bounties. In its simplest form, a bounty is a payment by government for the body, or body part, of an animal considered to be damaging to plants or animals desired by human society. Bounties have long been used as a method of fish and wildlife management, usually with little or no effect on the targeted population and at substantial taxpayer expense.

Perhaps the greatest boondoggle in Alaskan fisheries history was the bounty paid by the former U.S. Bureau of Fisheries (USBF) for caudal fins of Dolly Varden *Salvelinus malma* during 1921–1940. The bounty was paid to protect juvenile salmon from predation by Dolly Varden. The program highlighted two major problems common to bounties: unintended consequences and ineffectiveness. Robert Armstrong, an Alaskan naturalist and retired fisheries biologist, studied this case history and reported that the bounty program was finally evaluated in 1939, nearly 20 years after it began. In the Yakutat USBF office, for example, 20,000 fins were examined; of these, only 10% were from Dolly Varden; all other fins were from Rainbow Trout *Oncorhynchus mykiss* or Coho Salmon *O. kisutch* (*Hubbs 1940, cited by Armstrong and Wilson 2014*).

At present, 18 states still have active bounty programs; most are aimed at rodents in the East and South and coyotes in the West. But there are no more bounties on fish, right? Wrong. Since 1990, a bounty has been offered for Northern Pikeminnow *Ptychocheilus oregonensis* in the Columbia River (*http://www.pikeminnow.org/*). The Northern Pikeminnow Sport-Reward Program, funded by the Bonneville Power Administration, administered by the Pacific State Marine Fisheries Commission, and in cooperation with the Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife, pays anglers that catch and check-in Northern Pikeminnow with a total length of 9 inches or larger. Anglers receive $5.00 per fish for 1–25 fish, $6.00 each for 26–200 fish, and $8.00 each for ≥201 fish. The program is certainly more science-based than the century-old Dolly Varden bounty. Studies of Northern Pikeminnow have shown that it is a serious predator of juvenile salmon and that if it could be exploited at 10-20%, predation on juvenile salmonids could be substantially reduced. While predation has been reduced, exploitation has remained at an average 12% and the actual effect on salmon returns is unknown; nor can it be known because of the confounding effects of other management actions such as water releases, fish transport, and habitat improvement. Furthermore, the program has emphasized money making (website theme: "Catch Cash, Save Salmon") and other websites promote angler "side hustles," part-time activity for profit. In 2015 alone, the federal government paid $1.8 million in bounties with no proof that salmon returns were increased as a result.

Some predator/competitor reduction programs are proving successful (e.g., Lake Trout *S. namaycush* suppression in Yellowstone Lake), but these are science-based goals that can be evaluated for effectiveness with no profit motive. Bounties have been notoriously ineffective at taxpayer expense, but governments continue to rely on them. Sometimes, we just need to let go.

Jim Reynolds (jbreynolds@alaska.edu) was AFS Alaska Chapter President during 1981–1982.

Student Subunit Happenings

Tessa Minicucci, Student Subunit Representative

Tessa Minnucci, AFS Alaska Chapter Student Subunit Representative.

The Student Subunit of the AFS Alaska Chapter would like to recognize the recent dissertation defense by Leah Zacher (Sloan) (Ph.D., UAF) – "Alaskan King Crab: Bering Sea Distributions and a Parasitic Castrator."

The 22nd annual AK-AFS Student Symposium was held on Friday, April 6, 2018. Remote connections were available in Fairbanks, Juneau, Sitka, and Anchorage, with additional connections upon request. More information will be presented in a future newsletter.

In Fairbanks, students talked with Tara Borland of Alaska Sea Grant to learn more about the Alaska Sea Grant Fellowship and the Knauss Fellowship. Students also heard from current Alaska Sea Grant State Fellow Chelsea Clawson, who spoke about her experience in the program and the opportunities she has been afforded because of it. Upcoming events in Fairbanks include a discussion on "Getting into Graduate School," a fly tying event in April, and elections for new AFS officers.

In March, Juneau students and faculty participated in the Small Vessel Operator class, taught by Neil Nickerson of UAS. Students learned about the safe operation of small vessels in southeast Alaska, emergency preparation and procedures, and were introduced to the "rules of the road and coastal navigation. The Juneau campus of the College of Fisheries and Ocean Sciences (CFOS) hosted a Fisheries Open House at the UAF Lena Point campus on Saturday, April 7, 2018. This provided an opportunity to share information on the UA Fisheries programs and activity-based science exploration for all ages, including touch tanks, science games, microscope discovery, and more. Finally, students will be hosting a Professional Development Workshop on April 20 at 11 am to 2 pm. Invited panelists from the U.S. Forest Service, National Marine Fisheries Service, the Alaska Department of Fish and Game, Kai Environmental Consulting Services, and Simon Fraser University will be speaking to CFOS students in Juneau and Sitka. Panel discussions will include learning about the transition from graduate school to the professional workplace, lessons learned from leaders in the field, and pros and cons of working for different agencies. The workshop will include a panel discussion, networking lunch, and breakout sessions to learn more from your favorite panelists. Please contact Cheryl Barnes (cheryl.barnes@alaska.edu) or Jenell Larson (jtlarsen@alaska.edu) with questions.

Juneau students and staff practicing their cold water survival skills during the UAS Small Vessel Operator class. Photo from Tessa Minnucci.

Backpack Electrofishing Course

The Northwest Environmental Training Center (NWETC) will offer a course on Backpack Electrofishing in Anchorage, Alaska, Saturday-Monday, May 19–21, 2018. Training will be held in conjunction with the annual meetings of the AFS Western Division. The three-day course combines classroom lectures on the first and third days and field exercises on the second day. This course is intended to meet the National Marine Fisheries Service training requirements for electrofishing field staff and a certificate is awarded for course completion that documents formal training. Reduced tuition is available to employees of Native American tribes, government agencies, nonprofits, students, and AFS and NAEP members. April 21 is the deadline for a $100 registration discount. For additional course information and registration, visit https://nwetc.org/, or call the Northwest Environmental Training Center at (425) 270-3274.

Scholarship and Grant Funding Opportunities

Marine Fisheries Section Student Travel Award

The Marine Fisheries Section of the AFS Parent Society is offering travel grants to support students attending the annual AFS meeting August 19–23, 2018 in Atlantic City, NJ. Each award consists of $500 of travel support, and a one year student membership to both AFS and the Marine Fisheries Section. Recipients must be currently enrolled students and be presenting a paper or poster on a marine fisheries topic at the annual meeting. Student applicants need not be members of the AFS at the time of application. Applications for the travel awards are due May 15, and successful applicants will be notified by June 20. Applications and questions should be directed to Dr. Adrian Jordaan (ajordaan@eco.umass.edu).More information is available at https://mfs.fisheries.org/.

Meetings and Events

Western Division Meeting of the American Fisheries Society

May 21–25, 2018: This meeting will be held in Anchorage, AK, hosted by the AFS Alaska Chapter. For more information, see https://wdmtg.fisheries.org/.

147th Annual Meeting of the American Fisheries Society 2018

August 19–23, 2018: This meeting will be held in Atlantic City, NJ. For more information, go to http://afsannualmeeting.fisheries.org.

11th Eleventh International Conference on Climate Change: Impacts & Responses

April 16–17, 2019: This meeting will be held in Washington, D.C. For more information, go to http://on-climate.com/2019-conference.

ONCORHYNCHUS

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Editor
Bill Bechtol
Bechtol Research
P.O. Box 3426, Homer 99603-3426
Phone 299-6146
afs.alaska.newsletter@gmail.com

Production
Connie Taylor
Fathom Graphics
P.O. Box 200448, Anchorage 99520-0448
Phone/Fax 272-3305
Connie@FathomGraphics.com

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Alaska Chapter Officers

Feel free to contact the Executive Committee members.