Dear Panel Member,

Alaska, the nation's only arctic state, is home to 735,600 residents and hosts a million visitors annually. Alaska is vast, with a 36,000-mile coastline and a landmass one-third the size of the lower 48 states. About 75% of the population lives along the coast in more than 170 coastal communities; however, most of Alaska's communities, including the capital, are not connected by road. Alaska's indigenous cultures rely on marine and watershed resources. The relationship that subsistence users, both Native and non-Native, have with these resources is unparalleled anywhere in the country.

Alaska's fisheries and maritime resources are world-class. Over 60% of US landed fish and shellfish are harvested off Alaska. Seafood from Alaska can be found on tables worldwide—from Osaka to Chicago to Paris. The North Pacific and Bering Sea have some of the world's healthiest and best-managed marine resources. Alaska is the place that resource managers look to understand sustainable integrative approaches to managing marine resources.

Coastal communities and ecosystems in Alaska are responding to the direct and indirect impacts of climate change. Decreasing sea ice, increasing sea surface temperatures and ocean acidity, and harmful algal blooms are changing our way of life.

For 45 years Alaska Sea Grant has responded to concerns of communities, local governments, industry, tribes, agencies, scientists, teachers, and students. We engage stakeholders, foster partnerships, gain science-based understanding of issues, leverage our resources to problem-solve, and help implement forward-moving actions. We are a trusted and crucial link in connecting Alaskans concerned about community resilience and marine conservation. As a catalyst we move projects to fruition and encourage community engagement.

Alaska Sea Grant relies on partnerships to leverage our work, through volunteers and joint sponsorships. We operate with a diverse funding portfolio. Federal and university dollars are supplemented by a variety of sources, to strengthen our program, including competitive grants, cooperative agreements and donations from industry, and tribal, university, nonprofit, federal, and state partners. Match and other funds average twice the federal dollars received.

With input from our active Advisory Committee, the Marine Advisory extension faculty, Alaska Sea Grant staff and researchers, as well as participation in the NOAA Alaska Regional Team and connections with many partners, we developed the Alaska Sea Grant 2009-2013 strategic plan.

As of July 2013, Alaska Sea Grant has a new director and program management team. Thus the narratives included in your materials for each focus include more complete reporting than found in the PIER reports, particularly in the early years of this reporting period.

The strong connection to marine and watershed resources by Alaskans is embodied in the Sea Grant focus areas. *Safe and sustainable seafood supplies* and *healthy coastal ecosystems* are fundamental to the well-being of all Alaskans. Maintaining the integrity of coastal communities is dependent on *sustainable coastal development* and *resilient coastal communities*. Since Alaska has limited place-based marine educational resources, Alaska Sea Grant chose to highlight *marine literacy and stewardship* as our fifth focus area.

The Sea Grant focus areas also connect Alaska Sea Grant to national issues. Alaska is important to the nation as its premier source of seafood, as a source of energy and mineral resources, as a strategic hub with access to the entire western Pacific region and the Arctic, as a pristine resource for tourism and national heritage values, and as the nation's arctic frontier.

Alaska Sea Grant, Program Summary Report 2010-2013
Focus Area: Safe and Sustainable Seafood Supply

Over 60 percent of America's commercial fish and shellfish is harvested in waters off Alaska. While the fisheries in Alaska are considered some of the best managed in the world, dynamics of fisheries stocks and stress to ecosystems from environmental change and human impacts are not fully understood.

Dozens of coastal communities in Alaska depend on fishing and seafood processing to drive their economies. Commercial fishing and seafood processing are the largest private employers in the state with over 30,000 fishing permit holders and crewmembers and more than 25,000 engaged in seafood processing each year. Seafood processing is Alaska's largest manufacturing industry, accounting for roughly 75 percent of the state's manufacturing employment. In 2011, 162 companies in Alaska processed more than 5 billion pounds of seafood.

Alaska seafood has an international reputation for its quality, freshness, and sustainability. Yet Alaska's seafood is competing in global seafood markets and industry must respond to changing demand and seek the highest return on this resource. High energy costs, long distances to markets, and need for trained workers are all challenges facing this important industry.

Training and technical assistance ensures seafood quality and safety from harvest to plate
Seafood quality and safety is an ongoing issue for commercial and personal use food processors. Alaska's processing industry is remote, seasonal, and diverse with an ever-changing workforce. Small and mid-sized processors face limited training support, limited resources for product analysis, and high energy and production costs.

* Chilling seafood immediately after harvest is common in many fisheries around the country but is still a new practice in a number of salmon fisheries in Alaska. Alaska Sea Grant's Marine Advisory agents collaborated with an industry provider and leveraged state vocational funds to offer onboard refrigeration workshops in two coastal ports each year. The Yukon-Kuskokwim Marine Advisory agent introduced and trained fishermen working on small fishing boats to use slush-ice bags to boost fish quality. More details in 17990, 14341, and 14339.

* From 2010 to 2013, more than 240 Alaskans working at seafood processing plants earned HACCP certification through Alaska Sea Grant's training program. Alaska Sea Grant also offers Better Process Control School annually, the only offering in the state, to processors needing certificate training in thermal processing. More details in 19447.

Innovative seafood products and processing techniques enhance value, support local businesses, and increase utilization of seafood waste byproducts
* Research in pollock oil distillation by an Alaska Sea Grant Marine Advisory seafood specialist resulted in a new product, expanded market opportunities, and increased profits in the largest MSC-certified US fishery, Alaska pollock. More details in 19467.

* Marine Advisory seafood technology faculty, with partial funding from Alaska Space Grant, developed a method for freeze drying pink salmon that reduces moisture content to less than 10

percent and cuts freeze-drying time from 20 hours to about 9. The findings were published in the *Journal of Food Science* and a local processor has purchased a freeze-drying machine to begin production. More details in 14344.

* An Alaska Sea Grant–funded graduate student and Marine Advisory specialists confirmed the existence of a superior-quality broodstock oyster seed that performs well in Alaska. One result was that the student took a job as broodstock manager for Taylor Shellfish Farms in Washington. More details in 19690.

* Results of an Alaska Sea Grant study encouraged oyster farmers to use grow-out bags that allow faster growth and reduce labor costs by 80 percent. Three Southeast Alaska farms have converted to bag culture, and 12 farms had permit modifications approved to enable bag culture. Sealaska Corporation, an Alaska Native corporation, is converting farms to bag culture. More details in 16306.

* Alaska Sea Grant research proved that commercial production of geoduck clams is possible in Southeast Alaska, which prompted the Metlakatla Indian Community to begin their first large-scale commercial geoduck farm. More details in 14324.

* Alaska Sea Grant published the book *A Sustainable Future: Fish Processing Byproducts*, describing innovative products that can be derived from seafood processing wastes, including protein meals, fish oils, solubles, and fish bone.

* In Alaska, where fish waste (bones, skin, offal) is plentiful, putting fish waste to use as local compost is a win-win. Alaska Sea Grant published a bulletin on safe and effective fish waste composting that tells how to compost and describes the benefits as a low-cost, high-nutrient fertilizer for home gardeners. Additional funding is in place now to expand into a community-wide demonstration project in the Bristol Bay area.

Increasing value of Alaska's seafood to industry, communities, and consumers through training and technical assistance

* Marine Advisory specialists helped 12 businesses expand their product offerings, and assisted four new businesses in developing smoked salmon, salmon jerky, mustards and sauces, canned herring, military Meals-Ready-to-Eat salmon entrees, salsas, dried pollock, and halibut skin dog treats. One of those businesses, Crabby Sisters, won third place in the retail category in the 2011 Alaska Symphony of Seafood, beating many established seafood businesses. Pickled Willys, a Kodiak operation, became a successful new business that processes local gourmet and pickled seafood in a national market. More details in 14342 and 17971.

* Safe handling, processing, and preserving seafood is critical to commercial processors and personal harvesters. In 2012 and 2013 Marine Advisory specialists presented three workshops on smoking and salting fish. In all, 50 commercial smokers, regulators, and home processors learned the science and the processes for smoking fish, salmon jerky, and fish sausage. More details in 17992.

* Developing the next generation of seafood processing plant managers is critical for the Alaska seafood industry—current managers are graying and many live outside of Alaska. The Alaska Seafood Processing Leadership Institute (ASPLI) is an ongoing, intensive professional development program designed for rising managers who want to advance their careers in seafood processing. Participants, identified by their companies as potential leaders, engage in the 80-hour program over a six month period. The institute is held every other year with the fifth ASPLI convening in fall 2015. Over 50 seafood processing leaders from 21 companies in Alaska have participated to date in ASPLI.

Strengthen and maintain access to Alaska's sustainable fish populations through fisheries research

* The Alaska King Crab Research, Rehabilitation and Biology (AKCRRAB) program is a collaborative research effort that has made progress in understanding the feasibility of raising king crab in a hatchery to rehabilitate wild stocks. Between 2010 and 2013 the program published 21 peer-reviewed articles, supported 6 graduate students, and built a diverse partnership of 20 groups. Under Alaska Sea Grant leadership, partners conduct experiments, collect broodstock, donate funds, and write grants. In 2014, the first hatchery raised crab were outplanted in the wild to assess survival. The program has built a trusted relationship with the Alaska Department of Fish and Game. More details in 17993, 19655, and 19626.

* The Ketchikan Marine Advisory agent provides expertise to the Pacific Salmon Commission as a committee member. His leadership in data analysis informs international fisheries catch allocations to ensure sustainable salmon stocks and harvests. More details in 19468.

* Alaska Sea Grant funded a series of pink salmon research projects over 30-plus years to quantify the effects of outbreeding depression. Analyses using data from the decades-long genetics studies revealed an unexpected stock-recruit result, and may be useful in fisheries models as the climate changes. The research supports the genetics policy of the Alaska Department of Fish and Game, which is to try to prevent situations in which outbreeding depression may occur. More details in 19482.

* An Alaska Sea Grant–funded graduate student developed a method for identifying natal streams of Chinook salmon in western Alaska. By matching strontium isotope ratios from fish with ratios in the streams, scientists may be able to determine the origin of salmon caught in the ocean. Such tools are important to maintain salmon biodiversity as stocks change in strength. More details in 19713.

* Alaska Sea Grant researchers found a correlation between seasonal and annual abundances of certain zooplankton species, and the survival rate of pink salmon juveniles that eat them, in Prince William Sound, but they found no correlation in the much larger Gulf of Alaska. The research helps build information on a preferred salmon food source that is under-studied but is susceptible to growing acidification of the ocean. More details in 19482.

* An Alaska Sea Grant–funded graduate student created a multispecies age-structured fisheries assessment model for several fisheries in the Gulf of Alaska. Management strategy simulations demonstrated that multispecies harvest control rules are better than single-species counterparts at

preserving stock abundance while maintaining catch levels. The research has improved on the traditional models used by NMFS and the North Pacific Fishery Management Council.

* Alaska Sea Grant published the book *Community Quota Entities: Workshop Proceedings*, describing how small Alaska coastal communities can use CQEs to build equity to purchase and lease fishing quota. The workshop, cosponsored by Alaska Sea Grant and others, shared information about available resources to form CQEs and build local economies. About 160 copies of the publication have been distributed.

Strengthening the voice of stakeholders in the fisheries regulatory process

* Many Alaskans live in remote coastal communities with a strong reliance on natural resources. But rural Alaskans often do not participate in resource management decisions that affect them because they lack an understanding of the policy and regulatory processes. The Marine Advisory agent for the Bristol Bay region developed a workshop based on the Council on Environmental Quality publication *A Citizen's Guide to the NEPA: Having Your Voice Heard*. The training workshop was presented in 11 Alaska coastal communities to 181 residents, over half of whom were rural and indigenous. The workshop provided residents with needed skills to participate in National Environmental Policy Act and North Pacific Fishery Management Council public processes for subsistence and fisheries resources.

* Alaska residents can propose changes to resource management laws and create new regulations for subsistence, commercial, personal use, sport, and others. To guide residents in the process, Alaska Sea Grant published a bulletin that teaches fishermen and residents how to submit proposals for modifying resource management laws. More details in 19676.

* An Alaska Sea Grant–funded graduate student compared management by emergency order opening (active management) with a fixed fishing schedule. The student reconstructed past sockeye salmon runs from two Alaska rivers, and simulated both strategies on each fishery. The results may help manage low-value, low-intensity salmon fisheries during budget crises.

* The Alaska Young Fishermen's Summit is a series of training, networking, and skill building conferences for new entrants on managing modern commercial fishing businesses. Each fast-paced event includes sessions on public speaking, the state and federal regulatory processes, and business management. After five summits, 41 percent of respondents to a participant survey had attended or testified at a state or federal management council meeting; 48 percent began or intend to begin direct marketing; and 72 percent met with a fisheries manager or biologist.

* Alaska Sea Grant's international Wakefield Fisheries Symposium is a tool valued by researchers. The 26th Wakefield Fisheries Symposium, Ecosystems 2010: Global Progress on Ecosystem-based Fisheries Management, achieved a convergence on broad ecosystem management objectives, principles, approaches, tools, and involvement of stakeholders. In 2012 the 27th symposium, Fishing People of the North: Cultures, Economies, and Management Responding to Change, was the first to focus on the work of anthropologists, sociologists, Native knowledge experts, and other social scientists. The symposium's attendance was the largest in the symposium series, with about 174 people attending from seven nations.

PIER PRP Program Focus Area Report

Alaska Sea Grant

Safe and Sustainable Seafood Supply

Program Focus Area: SAFE AND SUSTAINABLE SEAFOOD SUPPLY

Program Goals

1. Safe, sustainable and sought-after premium seafood supplies providing enhanced, stable economic returns to Alaskan communities.
2. Biologically and economically healthy fisheries which continue to be a long-term major economic force in coastal communities.

JUMP TO REPORT SECTION

Full Text of Impacts
Program Performance Measures
Objectives

Impacts and Accomplishments toward Program Goals

1. **Program Goal: Safe, sustainable and sought-after premium seafood supplies providing enhanced, stable economic returns to Alaskan communities.**
   Impact(s)
   - 19467 - Alaska Sea Grant seafood specialist develops molecular process for new value-added product for the largest US fishery
   - 19447 - Alaska Sea Grant's seafood safety training helps $2.5-billion processing industry deliver safe seafood products
   - 17971 - Alaska Sea Grant helps Pickled Willys LLC launch successful seafood business
   - 16307 - Alaska Sea Grant paralytic shellfish poisoning testing prompts changes in crab processing and likely prevents illness
   - 16306 - Alaska Sea Grant study helps shellfish farmers grow oysters larger and faster with less labor

   Accomplishment(s)
   - 19683 - Alaska Sea Grant publishes bulletin to help seafood processors meet product labeling requirements
   - 17993 - Alaska king crab rehabilitation program succeeds in rearing large numbers of red and blue king crab in a hatchery
   - 17992 - Alaska Sea Grant teaches fish smoking techniques to commercial and home processors
   - 17990 - Alaska Sea Grant brings training for onboard refrigeration systems to Bristol Bay, enhancing seafood quality
   - 17986 - Alaska Sea Grant publishes comprehensive oyster growing manual
   - 14344 - Alaska Sea Grant develops new freeze-drying method that makes use of salmon processing leftovers
   - 14342 - Alaska Sea Grant helps entrepreneur improve product and market the business
   - 14341 - Alaska Sea Grant trains fishermen to maintain refrigeration systems that preserve seafood quality
   - 14336 - Alaska Sea Grant helps start and expand food businesses

2. **Program Goal: Biologically and economically healthy fisheries which continue to be a long-term major economic force in coastal communities.**
   Impact(s)
   - 19705 - Alaska Sea Grant provides scientific and historical advice to streamline Alaska shellfish farm permit process
   - 19690 - Alaska Sea Grant-funded student identifies high-performing oyster for Alaska
   - 19465 - Decisive action by Alaska Sea Grant specialist eliminates regulatory barriers to critical Alaska oyster seed supply
   - 16305 - Alaska Sea Grant efforts likely avert human illness and possible death by monitoring shellfish for toxin

   Accomplishment(s)
   - 19713 - Alaska Sea Grantâ€"funded student develops method to identify Chinook salmon natal streams in Nushagak River
   - 19676 - Alaska Sea Grant publishes bulletin to involve fishermen and residents in law change process
   - 19655 - Alaska Sea Grant research establishes diets that improve lab performance of cultured red king crab pre-Juveniles
   - 19626 - Alaska Sea Grantâ€"funded research confirms cultured red king crab susceptibility to

predators
- 19482 - Data from Alaska Sea Grantâ€"funded long-term research on pink salmon genetics are used in stock-recruit analyses
- 19468 - Alaska Sea Grant expertise supports management, allocation of Pacific salmon stocks between US and Canada
- 14390 - Alaska Sea Grant research contributes to understanding octopus biology
- 14339 - Alaska Sea Grant improves salmon quality for local processors
- 14324 - Alaska Sea Grant geoduck growth study leads to first commercial farming

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Full Text of Impacts and Accomplishments

19713 - Alaska Sea Grant-funded student develops method to identify Chinook salmon natal streams in Nushagak River
Relevance: Managing commercial, sport, and subsistence salmon harvests in mixed stock fisheries is a challenge. The management goal is to allow as much harvest as possible while enabling enough salmon to return to their natal streams to ensure plentiful fish in future years. Currently sonar is used at river mouths to count returning salmon, but managers have no way to follow salmon movement through the system to hundreds of natal streams.

Response: Over several years Alaska Sea Grant-funded graduate student Sean Brennan collected water samples from the main river and tributaries of the Nushagak River in western Alaska. At the same time he collected otoliths from salmon in the bay. Otoliths, the auditory structure of the salmon, contain natural chemicals from the waters where the fish swim. The water samples identified two isotopes of strontium, a natural chemical element. Differences in rock type, age, and weathering create variations in the strontium isotope ratio of the stream, which then becomes incorporated into the otoliths of young salmon.

Results: By matching strontium isotope ratios from otoliths with those in the waterways, scientists may be able to determine the natal streams of salmon caught in the ocean. Such tools are important for the effective conservation of salmon biodiversity and the management of sustainable fisheries.
RECAP: An Alaska Sea Grant-funded graduate student developed a method for identifying natal streams of individual Chinook salmon in the Nushagak River in western Alaska. Back to Goals

19705 - Alaska Sea Grant provides scientific and historical advice to streamline Alaska shellfish farm permit process
Relevance: Many of Alaska's shellfish farming permit regulations were written 20 years ago in the industry's infancy. More regulations have been added since then, but older rules remain in force. Some regulations are biologically unsound and others discourage development of shellfish farms and industry expansion. Data collection methods have not been standardized, producing poor data for regulators.

Response: To encourage interest in new shellfish farms and enable regulators to gather required data about the industry, Ray RaLonde, Alaska Sea Grant Marine Advisory aquaculture specialist, served as a scientific advisor to the interagency committee on aquaculture regulations. He worked with the Alaska Departments of Law, Natural Resources, Fish and Game, and Environmental Conservation to update and simplify permit regulations. RaLonde shared his 25 years of experience in research and development of Alaska's shellfish industry and offered historical context for regulations and evaluating their effectiveness.

Results: Shellfish farming permit regulations were updated and approved and new methods of data collection were created, allowing farmers to be accountable to the state but reducing report writing. Obsolete and unnecessary regulations were removed. The changes improved efficiency for state regulators while preserving essential regulatory management to protect Alaska's marine resources. Conflicts between agencies and farmers have been reduced because of an improved, simpler reporting process that accommodates newer methods of shellfish farming.
RECAP: Alaska Sea Grant provided key information to state agencies, which resulted in new shellfish farming permit regulations that make the regulatory process more efficient and ease the burden on new applicants and existing farmers. Back to Goals

19690 - Alaska Sea Grant-funded student identifies high-performing oyster for Alaska
Relevance: Alaska waters are too cold for Pacific oyster reproduction, requiring Alaska farmers to purchase oyster seed from Pacific Northwest hatcheries for grow-out. Because not all purchased seed grows well in Alaska, the industry needs a unique cold-water oyster brood line for Alaska farmers.

Response: Alaska Sea Grant-funded graduate student Stuart Thomas, in collaboration with shellfish farmers, completed the last three years of a 12-year broodstock development and grow-out project as part of the USDA Molluscan Broodstock Program to identify a high-performing Pacific oyster. Ray RaLonde, Marine Advisory aquaculture specialist, advised Thomas during his research. MAP seafood specialist Alex Oliveira did oyster analysis, and MAP faculty and graduate students prepared oyster samples for testing.

Results: Thomas confirmed the existence of a unique, high-performance Pacific oyster brood line for colder Alaska farms with a significantly improved survival rate, faster growth, more uniformity, and higher yield. Unlike the southern brood lines, these Alaska grown oysters also have higher omega-3 fatty acid and glycogen content, making them more nutritious and sweeter-tasting for the consumer. Alaska oyster farmers who grow oysters from the Alaska broodstock confirm the high-performance traits. As a result of this work, after graduation Thomas accepted a position as the hatchery broodstock manager for Taylor Shellfish Farms in Shelton, Washington.
RECAP: An Alaska Sea Grant-funded graduate student and Marine Advisory specialists confirmed the existence of a high-performance, superior-quality broodstock oyster seed, which performs well for Alaska shellfish farmers. Back to Goals

19683 - Alaska Sea Grant publishes bulletin to help seafood processors meet product labeling requirements
Relevance: Alaska commercial seafood processors must label their product according to state and federal regulations. In addition, the US Food and Drug Administration requires larger companies to state nutritional content on the label. Getting the labels correct is an important part of running a legal and profitable business.

Response: Marine Advisory agent Izetta Chambers wrote a 6-page bulletin that makes clear what information is required on seafood labels-company name, name of seafood, ingredients, permit number, date, weight, and care of product-and how the information should be displayed.

Result: Alaska Sea Grant published the bulletin Labeling Requirements for Alaska Seafood Processors. Requests were filled for about 150 electronic and printed copies in 2013.
RECAP: Alaska Sea Grant published a bulletin to help seafood processors meet state and federal legal product labeling requirements. Back to Goals

19676 - Alaska Sea Grant publishes bulletin to involve fishermen and residents in law change process
Relevance: The Alaska Board of Fisheries meets four to six times each year in different locations around Alaska to address regulations for fishery management and hear public comment. Alaska residents and fishermen can submit proposals to the board to change resource management laws and change or create new regulations for subsistence, commercial, personal use, sport, guided sport, and guided sport ecotourism finfish. Proposals must adhere to guidelines, and testimony can affect whether a proposal is accepted or rejected.

Response: Marine Advisory agent Izetta Chambers wrote a 6-page guide describing how to maximize citizen effectiveness in the Alaska Board of Fisheries process, including which forms to submit, when to do so, and how to prepare oral and written testimony.

Result: Alaska Sea Grant published the bulletin Working with the Alaska Board of Fisheries: Guidance for Fishermen. Requests were filled for approximately 150 electronic and printed copies in 2013.
RECAP: Alaska Sea Grant published a bulletin that teaches fishermen and residents how to submit proposals for modifying resource management laws. Back to Goals

19655 - Alaska Sea Grant research establishes diets that improve lab performance of cultured red king crab pre-Juveniles
Relevance: King crab has been important in Alaska for commercial, sport, subsistence, and community harvest, but many stocks crashed and are now closed to fishing. King crab enhancement has the potential to restore the stocks, which would economically benefit the fishing industry and coastal communities in Alaska. Alaska Sea Grant's success at culturing king crab in the hatchery suggests that enhancement is possible, yet mortality during the last larval rearing stage has been a bottleneck in hatchery production of juveniles.

Response: Alaska Sea Grant-funded scientist Ginny Eckert varied the nutritional content of the red king crab larval diet to improve survival and increase hatchery larval production. Eckert and students fed larvae Artemia nauplii enriched with lipid emulsions of essential fatty acids: high DHA, high DHA and EPA, high DHA and AA, and control lipid.

Results: Researchers found similar red king crab larval survival to the glaucothoe stage (pre-juvenile) for all diet treatments. But glaucothoe that had been fed diets enriched with high DHA and EPA and high DHA and AA had more and larger lipid droplets than the high-DHA and control lipid diets. During a stress test measuring response time after exposure to freshwater, those glaucothoe recovered significantly faster than glaucothoe that had been fed high DHA and control lipid, suggesting diet can improve performance during stress. These results will be used to improve diets of hatchery-reared king crab to increase larval production.
RECAP: Alaska Sea Grant researchers found diets that improve performance of red king crab pre-juveniles; these diets may be used to increase survival of hatchery-reared crab larvae. Back to Goals

19626 - Alaska Sea Grant-funded research confirms cultured red king crab susceptibility to predators
Relevance: Crustacean aquaculture is in its infancy compared to fish and molluscan aquaculture. More research is needed to support economically and environmentally sustainable crustacean aquaculture in

the United States. Alaska red king crab is an excellent candidate for stock enhancement because of its high economic value, its depleted populations, and success in large-scale culturing of larvae and juveniles in the hatchery. Determining condition and body size needed for release will aid in evaluating the potential for stock enhancement as a population recovery tool for red king crab. Methodology developed in Alaska will be transferable to closely related species worldwide.

Response: Alaska Sea Grant-funded researchers assessed predation on newly settled red king crabs by tethering them in the field near Juneau and observing them with underwater video cameras.

Result: Scientists identified five predators on red king crab, and found that crabs less than one year old were consumed sooner than older crabs. For crabs in their first year, survival did not vary with body size or month (July or September). Most predation events occurred in daylight. The results suggest that, to minimize predation, planners of stock enhancement efforts should consider crab size and timing of release when developing release strategies.
RECAP: Alaska Sea Grant-funded researchers found that small cultured red king crabs are susceptible to predators, key information that will help inform crab release plans for stock enhancement efforts.

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19482 - Data from Alaska Sea Grant-funded long-term research on pink salmon genetics are used in stock-recruit analyses

Relevance: Hatchery-produced and transplanted fish may interbreed with wild populations, thereby altering the genetic composition of the wild populations. Because wild populations are often evolutionarily adapted to the local environment, the consequence of such interbreeding may result in a loss of fitness in the wild population if the two sources of fish have been genetically isolated, even if their environments are similar. This is called outbreeding depression. Long-term biological data are critical; for example, fish data can be used in fisheries models as the environment changes.

Response: Alaska Sea Grant has funded a series of Auke Creek pink salmon projects designed to quantify the effects of outbreeding depression. Research included stock-recruit analyses of pink salmon to evaluate in-stream production of fry by adult fish from more than three decades of data. Researchers found that at low spawner densities the numbers of fry per adult are large, while high spawner densities produced fewer total fry. There was also a density-dependent relationship between emigrant fry and the numbers of adults they produced. The latter result is surprising because it is often assumed that the "resources" in the marine environment are substantial. Possible explanations are that there is a ceiling on the numbers of salmon fry that can be fed by zooplankton in the estuary, or crowding in the stream before emigration reduces their marine survival. Researchers are pursuing those observations by incorporating environmental variables in the analyses.

Results: Alaska Sea Grant-funded geneticist A.J. Gharrett and students have given pink salmon in Auke Creek, Alaska, unparalleled scrutiny over more than three decades. Consequently, many kinds of data (such as salmon return/emigration information) can be examined in determining the success of pink salmon. The research supports the genetics policy of the Alaska Department of Fish and Game, which is to try to prevent situations in which outbreeding depression may occur.
RECAP: Analyses using data from decades-long salmon genetics studies reveal an unexpected stock-recruit result, and indicate broad potential for data use in fisheries models as the environment changes.

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19468 - Alaska Sea Grant expertise supports management, allocation of Pacific salmon stocks between US and Canada

Relevance: The Pacific Salmon Commission (PSC) plays a major role in management of transboundary salmon stocks between the US and Canada. Composed primarily of Alaska harvests, US salmon fisheries are valued in excess of $400 million ex-vessel annually; British Columbia fisheries produce $22 million. Alaskans must participate in the PSC forum to ensure a fair distribution of allocation and responsibility as defined by the treaty.

Response: Alaska, Washington, Oregon, and British Columbia provide technical information on the conduct of fisheries, preseason expectations, and enhancement activities, which is analyzed by binational technical committees. Since 1986 Gary Freitag has participated in the commission process through his membership in the Chinook Technical Committee. Freitag, the Ketchikan Marine Advisory agent, provides biological, management modeling, and enhancement expertise. In 2013, allocations resulted in 176,000 Chinook salmon for Alaska fisheries, over 258,000 Chinook salmon to Canadian fisheries, and a coast-wide landed catch of over 1.4 million salmon valued in excess of $45 million.

Results: Data required by the commission for annual allocation and conservation decisions are documented in Chinook Technical Committee reports. Dale Kelly, executive director of the Alaska Trollers Association says, "Gary has a talent for distilling complex theories and an array of data into practical, easy to understand materials. He is approachable, informative, and helpful to those of us who seek his counsel on issues."
RECAP: Leadership in key data analysis by an Alaska Sea Grant Marine Advisory agent informs vital international fisheries catch allocations to ensure sustainable Pacific salmon stocks and acceptable harvest levels.

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19467 - Alaska Sea Grant seafood specialist develops molecular process for new value-added product for the largest US fishery

Relevance: Alaska's pollock harvest accounts for nearly 30% in volume of all US seafood landings annually and is the largest MSC-certified US fishery. Traditional product forms include frozen blocks, breaded products, and surimi. With expansion of human food supplement markets worldwide, interest has been high in utilizing pollock in top-quality fish oil for human consumption.

Response: With funding provided by the Alaska pollock industry, Alaska Sea Grant Marine Advisory seafood specialist Alex Oliveira developed a molecular distillation process to purify oil from pollock livers suitable for human consumption. Unlike traditional processing used to purify fish oil, molecular distillation does not require chemicals and generates virtually no processing waste.

Results: In 2013, American Marine Ingredients, a subsidiary of American Seafoods Group in Seattle, released a pollock oil diet supplement, 54'North Omega-3 with Vitamin D3, produced by molecular distillation. American Seafoods holds nearly 45% of the at-sea quota for Alaska pollock and harvests the largest share of the fishery. Richard Draves, American Seafoods vice president of product development, reports 54'North Omega-3 is selling well, and AMI is realizing substantial profits and growth. Research shows that the distillation process can also be used to produce nutraceutical quality Pacific cod liver oil and New Zealand hoki oil.
RECAP: Research in pollock oil processing by an Alaska Sea Grant Marine Advisory seafood specialist resulted in a new product, expanded market opportunities, and increased profits in the largest MSC-certified US fishery. Back to Goals

19465 - Decisive action by Alaska Sea Grant specialist eliminates regulatory barriers to critical Alaska oyster seed supply
Relevance: Oyster seed for Alaska farmers imported from Pacific Northwest hatcheries has seen a 70% shortfall in recent years due to environmental challenges along the US West Coast. Dependent on yearly oyster seed supply to maintain production, Alaska shellfish farmers responded by constructing and operating in-state oyster seed setting facilities. They buy eyed larvae from Pacific Northwest hatcheries, rear the larvae until they are "set," and then sell the seed to farmers. Survival of the Alaska oyster aquaculture industry depends on the success of in-state seed setting operations. However, the state's schedule for dispensing disease certification, required for imported larvae, did not match timing for the Alaska hatcheries and growing season.

Response: Alaska Sea Grant Marine Advisory aquaculture specialist Ray RaLonde visited all shellfish hatcheries in the Pacific Northwest, acquired their production schedules, and wrote a scientifically sound disease certification proposal to the Alaska Department of Fish and Game allowing Alaska facilities to receive larva shipments early enough to meet their needs.

Results: In 2013 ADFG staff approved RaLonde's proposal for 2014 shipments, giving Alaska hatcheries access to certified oyster seed on a schedule that matches the Alaska farming season. Without this change in timing, testing, and shipping of eyed larvae, Alaska farmers would miss an entire growing season, resulting in an estimated $500,000 loss in revenue.
RECAP: The Alaska Department of Fish and Game approved an Alaska Sea Grant proposal to modify import regulations, bringing oyster seed to Alaska in time for the growing season and assuring annual production and revenue to the industry. Back to Goals

19447 - Alaska Sea Grant's seafood safety training helps $2.5-billion processing industry deliver safe seafood products
Relevance: To ensure safe seafood for consumers, the US Food and Drug Administration in 1997 established strict regulations for handling seafood, requiring companies to have an approved Hazard Analysis and Critical Control Point plan. Nearly 25% of FDA warning letters in early 2014 went to the seafood industry; many addressed deficiencies in HACCP plans. Alaska produces over 60% of the nation's seafood with a workforce of more than 50,000. In 2012, seafood processing in Alaska accounted for $2.5 billion in gross processing revenue.

Response: Alaska Sea Grant Marine Advisory seafood specialists have been primary providers of HACCP training to the Alaska seafood industry for nearly 20 years. Faculty teach classes in both urban and remote locations to maximize training opportunities for locally owned operations. Most attendees work at or own seafood-processing companies, or are fishermen. Processors developing their HACCP plans depend on this training, and the Alaska Department of Environmental Conservation regularly refers producers to the class. State environmental health officer Aaron Poloni says, "ASG's HACCP training is absolutely vital to the safety of Alaska seafood and, hence, the state's economic success in this sector."

Results: Between 2008 and 2013, over 400 Alaskans have earned HACCP certification through ASG's program. A survey of over 140 participants, with 18% responding, shows this training is particularly important to start-up Alaska companies grossing under $250,000 with less than 10 employees. Nearly 80% of start-ups used HACCP training before their first inspection and to develop their own HACCP plan.
RECAP: Alaska Sea Grant's HACCP training helps assure safe seafood worldwide and contributes to the commercial success of Alaska's number-one private employer. Back to Goals

17993 - Alaska king crab rehabilitation program succeeds in rearing large numbers of red and blue king crab in a hatchery
Relevance: From the mid-1960s to the early 1980s, Alaska's king crab fisheries in the Gulf of Alaska

and in the Bering Sea sustained a multimillion-dollar industry that was the envy of the world. But by 1983, these once massive crab populations were all but gone. Despite more than a quarter century of closed or tightly restricted fisheries, their populations have not recovered.

Response: To investigate the feasibility of using stock enhancement techniques to assist the natural recovery of red and blue king crab stocks, Alaska Sea Grant in 2006 joined with key private and public partners to create the Alaska King Crab Research, Rehabilitation and Biology (AKCRRAB) program. The program conducts extensive research aimed at hatching and rearing wild red and blue king crab in a large-scale hatchery setting. The coalition of state, federal, and stakeholder groups views the effort as important to the region's long-term economic development and sustainability.

Results: Following many years of advances, AKCRRAB scientists succeeded in understanding the biological and environmental requirements for raising large numbers of red and blue king crab in a hatchery and tested the performance of hatchery-raised juveniles in the field for the first time.
RECAP: After several years of research, scientists in the Alaska King Crab Research, Rehabilitation and Biology (AKCRRAB) program have succeeded in rearing large numbers of red and blue king crab in a hatchery.

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17992 - Alaska Sea Grant teaches fish smoking techniques to commercial and home processors

Relevance: Processing seafood is both a business opportunity for Alaskans and an important step in preserving the catch by subsistence and personal harvesters for their families, some of whom eat up to 400 pounds of seafood per year. Safe handling, processing, packaging, and preserving are critical to food safety and security across Alaska.

Response: A comprehensive workshop to train Alaskans in the science, art, and business of smoking, drying, and salting fish had not been offered for several years. Kodiak-based Alaska Sea Grant Marine Advisory Program faculty presented two 3-day workshops in 2012 at the Kodiak Seafood and Marine Science Center. Through extensive hands-on activities and classroom lectures, students learned principles for safe processing of seafood and had the opportunity to produce cold- and hot-smoked fish, dried fish, fish jerky, fish sausage, and salted and pickled fish. Thirty-four students attended the two sessions. Taste tests allowed students to evaluate the characteristics of products they produced. Some products were thermally processed in jars and cans to demonstrate safety principles for canned products produced at home and commercially.

Results: On post-workshop evaluations a majority of attendees rated the value of the workshop as very good (highest score). Students highlighted the hands-on pilot plant activities, which composed the major portion of the 24-hour workshop, as most useful. Topics emphasized as most important were the production of safe-to-eat products and the actual processing steps. Regulatory issues were of interest to seafood industry professionals. Attendees found take-home consulting materials highly valuable. Student feedback on the potential application of gained knowledge to future endeavors revealed intent to teach and/or advise the public in areas of seafood safety and processing, to start a small business, to apply information to a current job, or to preserve subsistence foods at home.
RECAP: Alaska Sea Grant workshops on smoking and salting fish improved attendees' knowledge about techniques for safe handling and processing of seafood for commercial or home use.

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17990 - Alaska Sea Grant brings training for onboard refrigeration systems to Bristol Bay, enhancing seafood quality

Relevance: Chilling fish at the point of harvest is the fundamental first step in producing high-quality seafood. In the past three years, refrigerated saltwater systems (RSW) use has dramatically increased aboard Bristol Bay gillnet vessels due to new equipment financing programs available through processors, economic development associations, and the State of Alaska. Bristol Bay is the world's largest sockeye salmon fishery with runs in excess of 30 million fish annually with an ex-vessel value of over $120 million. In the last year, over 50 percent of the 1800 boats are chilling their catch either through icing or RSW.

Response: Since 2005, the Alaska Sea Grant Marine Advisory Program has provided onboard marine refrigeration training to seiners and other gear groups on a rotating port schedule throughout Alaska. These classes, which are taught by a senior industry technical expert, are always full, and evaluations continue to be extremely positive.

Results: After a successful offering in March 2012 in Homer, and recognizing the increase in RSW use in Bristol Bay, MAP agent Torie Baker was able to bring the class to the remote Bristol Bay region for the first time, to help harvesters increase production efficiency, quality, and profits in the world's largest sockeye fishery. Partnering with the Dillingham Bristol Bay Campus, a total 35 students attended two courses during Feb. 1, 2012-Jan. 31, 2013.
RECAP: Alaska Sea Grant expanded onboard refrigeration system training to Bristol Bay to help harvesters increase production efficiency, quality, and profits in the world's largest sockeye fishery.

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17986 - Alaska Sea Grant publishes comprehensive oyster growing manual

Relevance: Because Alaska shellfish aquaculture is a young and growing industry, technology training is a high priority.

Response: The ongoing work of Ray RaLonde, Alaska Sea Grant Marine Advisory Program aquaculture specialist, included developing, documenting, and disseminating best management practices for farming oysters.

Results: Alaska Sea Grant published the Alaska Oyster Growers Manual, 4th edition, co-authored by MAP aquaculture specialist Ray RaLonde, as a downloadable PDF. With over 295 pages in 36 chapters, this manual is specifically tailored for Alaska's cold waters. It is a comprehensive manual on farming oysters in Alaska for new and established oyster growers.
RECAP: Alaska Sea Grant published a comprehensive manual on farming oysters in Alaska for new and established oyster growers. Back to Goals

17971 - Alaska Sea Grant helps Pickled Willys LLC launch successful seafood business
Relevance: Globalization of seafood markets challenges Alaska producers to compete in international markets. The industry must respond by developing new products that are safe, nutritious, and easy to prepare. Producing high-quality value-added products requires conforming to safety regulations and processing controls. The success of small businesses also depends on good business practices and marketing.

Response: Pickled Willys LLC, based in Kodiak, Alaska, is a small start-up company that processes locally caught seafood into a host of value-added products for a national market. Over a three-year period, Quentin Fong, Alaska Sea Grant Marine Advisory Program marketing specialist in Kodiak, along with seafood quality specialist Chuck Crapo and seafood scientists Alex Oliveira and Brian Himelbloom, provided expert assistance to Barbara Hughes and Bill "Willy" Alwert, two of the co-founders of Pickled Willys. Alaska Sea Grant provided HACCP training, business management and marketing training, and technical assistance in smoking and other processing methods, and assisted in the development of quality and safety standards and procedures. The team also helped the company navigate state and federal regulatory requirements.

Results: Pickled Willys LLC launched in 2011, selling specialty pickled seafood products. Aside from their own retail operation in Kodiak, their products are sold in 13 retail markets across six states. The company has three full-time employees with a payroll of $190,000 at their main retail store in Kodiak. This year they sold 2,400 cases of pickled seafood valued at $288,000 wholesale and 4,800 pounds of frozen crab tails valued at $48,000 wholesale.
RECAP: Alaska Sea Grant experts helped Pickled Willys LLC-which processes locally caught seafood into a host of value-added products for a national market-become a successful new local business with three employees. Back to Goals

16307 - Alaska Sea Grant paralytic shellfish poisoning testing prompts changes in crab processing and likely prevents illness
Relevance: Paralytic shellfish poisoning (PSP) in Alaska is an ongoing problem. In 2010, two people died and five people became seriously ill across the state. The most problematic PSP case occurred in Haines, where a person ate the viscera of cooked Dungeness crab and developed classic PSP symptoms, according to the Alaska Department of Epidemiology. The person partially recovered and was released from the hospital, but died the next day from heart failure. The poisoning incident remains a confirmed PSP case in Alaska Department of Epidemiology records.

Response: Alaska Sea Grant tested blue mussels and Dungeness crab from the area of the fatality and found extremely high levels of PSP toxin in both species. The findings prompted Alaska Sea Grant Marine Advisory Program aquaculture specialist Ray RaLonde to consider that Dungeness crabs may be feeding on blue mussels, causing their viscera to become toxic. If true, there could be a danger for local commercial crab harvests. To test the link, Alaska Sea Grant initiated a study in 2011 with funding provided by the Environmental Protection Agency. The study provided information on PSP toxin levels in Dungeness crab in Tiayasanka Harbor, near Haines, site of the 2010 fatality, and determined that PSP toxin levels found in blue mussels were correlated with the high levels found in crab.

Results: The results prompted the Alaska Department of Environmental Conservation and the Alaska Department of Fish and Game to more closely examine commercially harvested crab. State testing of commercially caught crabs near Haines found high concentrations in viscera, causing the state to immediately require that commercially caught crabs not be sold alive or cooked with viscera (whole-cooked), and that processing occur to remove the viscera before sale. For the first time the Alaska Department of Fish and Game posted a PSP advisory on their website recommending that all recreationally and subsistence harvested crabs be cleaned of their viscera before consumption.
RECAP: In 2011 Alaska Sea Grant found high levels of the paralytic shellfish poisoning toxin in Dungeness crab near Haines, Alaska, leading to a ban on the sale of live and whole commercially caught Dungeness crab from that region, and a state advisory that recreationally and subsistence harvested crabs be cleaned of their viscera before consumption. Back to Goals

16306 - Alaska Sea Grant study helps shellfish farmers grow oysters larger and faster with less labor
Relevance: In 2007, a review funded by Alaska Sea Grant and USDA found that logistical and financial challenges of shellfish farming in Alaska put farmers at considerable risk of failure. Among the challenges in Alaska are more time needed to grow a market size oyster in cooler waters, and higher

cost of labor.

Response: In 2009, a two-year study was initiated to test intertidal bag culture as a faster method of growing oysters that would require less manual labor. Four Alaska oyster farmers participated. Traditional grow-out methods, including raft and tray culture were compared to the bag system. Farmers constructed their grow-out bags, followed operational procedures, and recorded costs of their labor. Ray RaLonde, the Alaska Sea Grant Marine Advisory Program aquaculture specialist, collected and measured oysters, tracked bag design changes, collected cost information, analyzed data, and wrote the final report.

Results: The material costs for grow-out bags are 67 percent less than for other grow-out gear types, and labor costs for gear maintenance during one year of grow-out are reduced by 80 percent. While labor required for the initial bag construction was six times greater than for constructing rafts and trays, the high construction labor cost was offset by the labor saved on maintenance. The bag system produced oysters of significantly greater size and quality, and works best in the first year of growth. Information about gear construction, culture procedures, and economics was presented to shellfish farmers and others at the 2011 Shellfish Aquaculture Technology Workshop and the 2012 National Shellfisheries Association annual conference. Three Southeast Alaska farms have converted to bag culture, and twelve farms have had permit modifications approved to enable bag culture. Sealaska Corporation, an Alaska Native corporation, is converting existing farms to bag culture and planning for new farms that were initiated during major expansion into oyster farming in 2009 to incorporate bag culture.
RECAP: Results of an Alaska Sea Grant study encouraged Alaska oyster farmers to use grow-out bags that allow faster oyster growth and reduce maintenance labor costs by 80 percent. Back to Goals

16305 - Alaska Sea Grant efforts likely avert human illness and possible death by monitoring shellfish for toxin
Relevance: Paralytic shellfish poisoning (PSP) is a significant human health problem in coastal Alaska. People died from PSP on the Alaska Peninsula and the Aleutian Islands in 1980, 1990, and 1995. Little was known about concentrations of the PSP toxin in local subsistence harvested clams, mussels, and other shellfish, and few communities had tested local shellfish. Sharing the harvest with family and friends outside the region has extended PSP risk beyond the local communities.

Response: The Alaska Sea Grant Marine Advisory Program (MAP) in 2006 partnered with the Aleutian Pribilof Islands Association (APIA) to initiate a region-wide monitoring and education program. MAP and APIA trained residents to collect bivalve samples for PSP testing along subsistence harvest beaches in nine communities. The effort included education, development of a quality assurance plan, and regular communication of test results to participating and non-participating communities in the region by the Alaska Department of Environmental Conservation. Presentations about the project were given at several forums attended by rural Alaskans. The most effective resource for community outreach was the local shellfish-sampling technician. Providing continuous training to a local, reliable, and trusted citizen is an extremely effective means of community education.

Results: The monitoring program found significant concentrations of PSP toxin in shellfish throughout the region, particularly in King Cove, Unalaska, Sand Point, and Akutan. In 2008, when shellfish in King Cove revealed levels of 1,084 micrograms of PSP toxin per 100 grams of shellfish tissue, the community stopped harvesting and sharing shellfish with family and friends. In 2010 a statewide PSP outbreak occurred, resulting in five reported illnesses and two fatalities in Southeast Alaska. Thanks to the MAP-APIA monitoring program, which found an increase in toxin in the Alaska Peninsula and Aleutian Islands region and then warned communities statewide, illness and fatalities were averted that year. Residents of the Alaska Peninsula and Aleutian Islands region communities have not eaten local shellfish since the outbreak. For their efforts project leaders Ray RaLonde and Bruce Wright received the 2012 Outstanding Achievement Award from the Alaska Forum on the Environment.
RECAP: Alaska Sea Grant's collaborative program to train Aleutian Island community residents to monitor for the presence of paralytic shellfish poisoning (PSP) toxin raised public awareness and likely averted human illness and possible death. Back to Goals

14390 - Alaska Sea Grant research contributes to understanding octopus biology
Relevance: Octopuses are currently regulated as shellfish by the state of Alaska and as part of the "other species" group of groundfish by the National Marine Fisheries Service (NMFS). Both agencies have identified a strong need for better information to adequately prepare stock assessments for species in this group.

Response: In 2010, Alaska Sea Grant Marine Advisory agent Reid Brewer began a research partnership with the North Pacific Research Board (NPRB) to learn more about the biology and ecology of the giant Pacific octopus, the world's largest octopus species. The giant Pacific octopus is the species most frequently captured by commercial fishing activities on the Bering Sea shelf. The Alaska Sea Grant component of the project tested the feasibility of visible implant elastomer (VIE) tags as a tool to track and monitor octopus behavior. Brewer attached VIE tags to 1,153 octopus, and recovered data from 138 tagged octopus.

Results: Tagging research jointly funded by NPRB and Alaska Sea Grant is expected to estimate octopus mortality rates and local abundance that will be used in future stock assessments. Some of the

octopus specimens collected during the research were dissected to collect additional data on life history.

RECAP: Alaska Sea Grant research contributed to understanding octopus life history and ecology, information that may be used by fishery managers to assess stocks. Back to Goals

14344 - Alaska Sea Grant develops new freeze-drying method that makes use of salmon processing leftovers
Relevance: Each year, Alaska fishermen catch about 30 million pink salmon, the most abundant and least expensive salmon species. Most of the catch is packed into cans or made into frozen block fillets. Finding new value-added uses for pink salmon is a goal of both industry and Alaska Sea Grant.

Response: With funding from USDA, Chuck Crapo, Alaska Sea Grant Marine Advisory seafood quality specialist, with colleagues Alexandra Oliveira, associate professor of seafood chemistry at the University of Alaska Fairbanks, Duy Nguyen from the University of Nha Trang, Vietnam, and Peter Bechtel, USDA Subarctic Agricultural Research Unit, developed a new freeze-drying process that cuts the freeze-drying time from 20 hours to about nine hours. The new process involves a technique for heat-treating the raw material to make the moisture in the salmon easier to remove.

Results: Researchers used the new method to make freeze-dried salmon cubes using meat from discarded salmon bellies. The result is a tasty salmon product that can be used in soups, salads, and many other foods.
RECAP: Alaska Sea Grant researchers and partners developed a new, faster freeze-drying process that turns pink salmon into value-added products with a long shelf life for use in soups, salads, and many other foods. Back to Goals

14342 - Alaska Sea Grant helps entrepreneur improve product and market the business
Relevance: Starting up a seafood business requires expertise in product development, marketing, and business management. To be successful, small businesses need help increasing their product value and marketing their products.

Response: Alaska Sea Grant's seafood experts helped Crabby Sisters, a new business in Kodiak that produces gourmet king crab cakes, improve their products, packaging, and marketing efforts. Chuck Crapo, Alaska Sea Grant Marine Advisory Program (MAP) seafood quality specialist, and Quentin Fong, MAP seafood marketing specialist, delivered marketing and business planning workshops specifically tailored to the company, set up taste-tests, and provided introductions to raw material suppliers.

Results: In a recent letter to the University of Alaska, partners Brooke McLaughlin and Meghan Clark stated, "We have worked extensively with Quentin Fong, Chuck Crapo and their graduate students for over the last one and a half years. They have guided us step by step with their expertise and mentorship. Without their support, we would not have brought our product to market in the manner we did." In early 2011, Crabby Sisters won third place in the retail category in the prestigious Alaska Symphony of Seafood products show.
RECAP: Alaska Sea Grant seafood experts helped the business Crabby Sisters improve their products and increase their sales. Back to Goals

14341 - Alaska Sea Grant trains fishermen to maintain refrigeration systems that preserve seafood quality
Relevance: Chilling fish onboard the fishing vessel is a fundamental step in producing high quality seafood. Many fishermen use refrigerated saltwater systems (RSW), including nearly 80 percent of Alaska salmon seine vessels comprising 600 boats harvesting 300 million pounds of pink salmon each year. Maintaining and troubleshooting refrigeration systems in harsh onboard environments is essential to delivering quality seafood and receiving top prices. But maintenance training is not readily available in most communities.

Response: Since 2005, Cordova Marine Advisory Program (MAP) agent Torie Baker and Petersburg MAP agent Sunny Rice have teamed up with Integrated Marine Systems to provide marine refrigeration workshops in Alaska fishing communities. Classes are always full. During 2010, some 50 skippers and crew took this eight-hour course, and evaluations continue to be extremely positive.

Results: As one Petersburg seiner stated, "I've been fishing for over 35 years, and this class has finally given me the answers I need to run and troubleshoot one of the most important and mysterious pieces of equipment on my boat. Thank you, MAP."
RECAP: Alaska Sea Grant responded to an increased use of onboard marine refrigeration with workshops that helped fishermen understand, troubleshoot, and maintain their units, which saved fishermen time and money, and resulted in the delivery of high quality seafood to the marketplace. Back to Goals

14339 - Alaska Sea Grant improves salmon quality for local processors
Relevance: Over 700 commercial salmon fishermen live and work in Alaska's remote Kuskokwim River Delta communities working hundreds of miles of river in small, open skiffs. Most fishermen in the region do not carry onboard ice nor have refrigeration for their small fishing boats.

Response: In 2010, Terry Reeve, Alaska Sea Grant Marine Advisory agent in Bethel, the largest

community in the region, worked with Kuskokwim Seafoods LLC, Coastal Villages Seafoods, and fishermen to introduce slush-ice bags to boost fish quality. Reeve was instrumental in sourcing 1,000 slush-ice bags for fishermen, and training fishermen in proper use of the bags for the 2010 and 2011 salmon harvest seasons. Slush-ice for the bags was provided by the processors.

Results: Kuskokwim Seafoods processed 400,000 pounds of salmon in 2010, and 800,000 pounds in 2011. Almost all Kuskokwim River fishermen used the slush-ice bags. Reeve reported that they were firm believers in using the new slush ice bags that cut down on fish handling, sped up delivery at the dock, and dramatically improved fish quality. Reeve also partnered with Washington Sea Grant and conducted workshops with the Washington Lummi Indian Tribe, which spurred the tribe to order 350 slush-ice bags for their fishermen.
RECAP: Alaska Sea Grant worked directly with fishermen and seafood processors to introduce slush-ice bags that improved salmon quality on the Kuskokwim Delta. Back to Goals

14336 - Alaska Sea Grant helps start and expand food businesses
Relevance: Alaska seafood processors provide an array of products to local, state, national, and international markets. Alaska seafood processing jobs in 2011 totaled 27,100, and the economic output was estimated at more than $2 billion. To be successful, all new and existing products must meet federal requirements for safe processing, and businesses require access to product development and labeling expertise.

Response: Alaska Sea Grant provides assistance to Alaska seafood processors developing new seafood products. Alaska Sea Grant technical experts ensure that new and existing seafood/food operations have access to food safety and product development expertise, thus meeting state and federal regulations. Chuck Crapo, Alaska Sea Grant Marine Advisory Program (MAP) seafood quality specialist, and Quentin Fong, MAP seafood marketing specialist, worked with small Alaska seafood processors to develop food products such as smoked salmon, dried salmon jerky, mustards and barbecue sauces, canned herring, military Meals-Ready-to-Eat salmon entrees, salsas, dried pollock, halibut skin dog treats, pickled fish, crab tails, and salmon oil. Crapo provided analysis of food and seafood products to ensure food safety and accurate labeling, specifically measuring salt content, water phase salt, water activity, additive levels, and other factors critical to product safety.

Results: As a result of MAP engagement with entrepreneurs, 12 existing businesses expanded their product offerings, and four new seafood businesses were established this reporting period.
RECAP: Alaska Sea Grant expertise directly helped 12 existing businesses expand their product offerings, and helped establish four new businesses. Back to Goals

14324 - Alaska Sea Grant geoduck growth study leads to first commercial farming
Relevance: Geoduck farming is a huge business with a global demand valued more than $100 million each year. In North America, most geoduck clams are farmed in Washington state and British Columbia. Southeast Alaska, with its hundreds of miles of intertidal area, represents an opportunity for business and employment diversification for the region's coastal communities.

Response: Ray RaLonde, aquaculture specialist with the Alaska Sea Grant Marine Advisory Program, with assistance from the Annette Island Reserve Department of Natural Resources and the Alutiiq Pride Shellfish Hatchery, recently completed a seven year growout study to test the feasibility of geoduck farming on Annette Island, home to about 1,500 people of the Metlakatla Indian Community, a predominantly Tsimshian Indian community in Southeast Alaska.

Results: The growout study successfully tested geoduck culture practices, and provided growth and survival data for cultured geoduck clams. Metlakatla community leaders are now beginning their first large-scale commercial geoduck farm.
RECAP: Alaska Sea Grant research proved that commercial production of geoduck clams is possible in Southeast Alaska, which prompted the Metlakatla Indian Community to begin their first large-scale commercial geoduck farm. Back to Goals

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Program Performance Measures (2010 - 2013)

Program Performance Measure	Program Plan Target (2010-2013)	Reported	Program Comments
Alaskan, national and international attendance at Lowell Wakefield Symposium	100	412	2012 - A Wakefield Symposium was not held during the reporting year.
Inventory growth of permitted intertidal geoduck farms (%).	300	112	2010 - No seed available. 2011 - No seed available.
Number of HACCP classes offered.	12	26	

Number of participants in HACCP classes.	420	272	
Number of small business consultations and resulting use of information	60	42	2010 - Significant but data not available. 2011 - Significant but data not available.
Percentage of shellfish farmers who participated in community training and planning session who significantly modify their practices	30	120	2010 - Premature. No Data. 2011 - Premature. No Data.
Percentage of shellfish farmers who receive training in new or improved practices as a result of community training and planning sessions	75	216	2010 - Close to 100% over 2 years. 2011 - Close to 100% over 2 years.
Proportion increase in per unit net value of oysters (%).	20	50	2010 - No data in 2010. 2011 - No data in 2010.
Proportion increase of oyster farmers following best practices for quality standards (%).	50	90	2010 - Premature in 2010 2011 - Premature in 2010
Proportion of fishermen trained in entanglement prevention and response best practices.	100	37	2010 - Premature in 2010 2011 - Premature in 2010 2012 - We would like to change the wording to say: Proportion of fishermen trained in entanglement prevention and response best practices.
Proportion of shellfish farmers using best practices financial tools (%).	60	105	2010 - Estimate. No data. 2011 - Estimate. No data.
Refrigeration classes offered in coastal communities with new funding support.	8	6	2010 - 2 funded per year 2011 - 2 funded per year

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Program Objectives (2010 - 2013)

Program Objective	Achieved (yes/no)	Program Comments
Assist in research targeting expanding geoduck production in the state	Yes	
Cod fishing begins in Norton Sound if economically viable.	No	2011 - Economic analysis has been done, but it hasn't been used yet. 2012 - Economic analysis has been done, but it hasn't been used yet. 2013 - Economic analysis has been done, but it hasn't been used yet.
Conduct research on the interaction of marine mammals and other species with fisheries and fishermen.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Conduct research to improve the value of Pacific oysters.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Contribute to the development of leadership in the seafood industry.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Coordinate information related to climate impacts or development impacts on fisheries.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Develop training and publications to improve value of Alaska seafood.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Engage in and support collaborative research	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Produce and distribute information on seafood processing byproducts	Yes	
Produce and distribute publications on maintaining quality for specific seafood species.	Yes	

Produce publications to inform stakeholders about current fisheries research and management.	Yes	2011 - Not a ASG program. 2012 - Board of Fisheries publication. 2013 - Board of Fisheries publication.
Promote research on seafood processing byproducts.	Yes	
Shrimp fishermen prepared to harvest returning stocks of shrimp.	Yes	2012 - TAA training and business plans for shrimpers. 2013 - TAA training and business plans for shrimpers.
Small processors are able to operate in compliance with HACCP.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Strengthen the voice of local residents and industry stakeholders in the fisheries regulatory process through outreach activities.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Support community based lectures and presentations to increase understanding of ongoing fisheries research and management and to identify local issues.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Support research and mapping efforts focused on coastal and habitat distribution and dynamics.	No	2011 - D-not an explicit objective. 1 grad student supported. 2012 - Not an explicit objective. 1 grad student supported. 2013 - 1 grad student supported (RR/11-04) but withdrew from the PhD program
Support research into climate change impacts to fisheries and habitat.	Yes	2011 - No proposals. 2012 - No proposals. 2013 - Konar melting glaciers Litzow regime shifts Misarti sockeye salmon.
Support research into enhancement of crab stocks in order to rebuild	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Support research to better understand ocean role in marine survival of salmon stocks and to improve forecasting.	Yes	2011 - No proposals. 2012 - Wooler proposal looks at forecasting salmon via strontium levels (forecasting used broadly to mean stock ID which can be rolled into forecasting) 2013 - Wooler proposal looks at forecasting salmon via strontium levels (forecasting used broadly to mean stock ID which can be rolled into forecasting)
Transfer information about access related management decisions to community groups and others. Transfer information about impacts on communities back to managers.	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Work with shellfish farmers to implement quality standards and prevent disease outbreaks	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.
Work with the Alaska Seafood Marketing Institute to improve seafood quality	Yes	2011 - ongoing 2012 - Ongoing. 2013 - Ongoing.