



Karin Ichtsak

Participants at the Bering Strait Maritime Symposium.

Less Arctic Ice Brings Opportunities and Concerns

The Bering Strait was once a mostly frozen narrow sea corridor connecting the Pacific and Arctic oceans, but in recent years the arctic ice pack has been shrinking due to warming ocean temperatures. Less ice now makes this an attractive gateway to a shorter northern shipping route between the Pacific and Atlantic oceans. The increased shipping traffic has local residents

concerned—among other issues the large vessels could disrupt their ability to hunt food.

Nome Marine Advisory agent Gay Sheffield initiated and chaired the organizing committee for the first Bering Strait Maritime Symposium in February 2013. The meeting brought together representatives from local villages and government agencies to discuss their concerns about large vessel traffic. Topics included response to oil spills, changes in marine resources for subsistence harvest, boating safety and search and rescue, and international border issues. About 112 people attended the two-day session. Partners included Alaska Sea Grant, UAF Northwest Campus, Kawerak, NOAA Alaska Regional Team, and Pew Environment Group.

Sheffield also acquired a public access Automatic Identification System (AIS) receiving station for Nome. The station collects data on large marine vessels within 12 miles of Nome and uploads the information to a map at www.marinetraffic.com. The information on the website is provided by worldwide volunteers with public-access AIS receivers. Sheffield's reason for acquiring the free community-access AIS was to better understand local ship traffic near Nome. The Bering Strait villages of Diomed and Gamble have expressed interest in setting up a receiving station in their communities as well.

Impacts of Sea Otter Recolonization

The Southern Southeast Alaska Sea Otter Project seeks to provide information to subsistence and commercial fishermen, wildlife and fisheries managers, and the public on the impacts of sea otter population growth in southern Southeast Alaska on important shellfish and invertebrates. Students and faculty from the University of Alaska Fairbanks School of Fisheries and Ocean Sciences, and wildlife biologists from the U.S. Fish and Wildlife Service, have looked at the population, distribution, movement, and diet of sea otters in the region.

The current project, Impacts of Sea Otter Recolonization on Marine Resources and Coastal Communities in Southern Southeast Alaska, is the second of two funded by Alaska Sea Grant. Researchers have collected foraging data on sea otter populations including prey size and type, dive time, and surface intervals. These data are being analyzed in conjunction with sea otter population survey data, information gathered from the public on sea otter sightings, and Alaska Department of Fish and Game fisheries data to provide an estimate of commercially important species being consumed by sea otters.

Throughout both projects, outreach meetings have been held regularly to gather and share information with fishermen and



Deborah Mercy

Antennas on skiff detect tagged sea otters in Southeast Alaska.

other shellfish users. Meetings have taken place on Prince of Wales Island and in Ketchikan, Petersburg, and Kake, as well as with others through videoconferencing. Outreach meetings were most recently conducted in Kake and Petersburg in August and September of 2013. A final workshop focusing on fisheries management responses to sea otter recolonization is planned for spring 2014.

Dear Friends,



Alaskans are intertwined deeply with our coastal and marine resources—in our livelihoods, our recreation, and our culture. They define us and we celebrate the health and beauty of our natural resources.

Adapting to change also defines us. Last year brought improved prices for fish harvests but low returns of king salmon; growing populations of endangered whales but more interactions with boaters; unprecedented loss of sea ice in the Arctic, opening water routes but impacting traditional ways; potential economic development projects but located in sensitive areas. Alaskans need access to the best information, skills, and opportunities to ensure the continued health of our resources and to adapt and respond to change in our environment.

Alaska Sea Grant's program of research, education, and extension works closely with local industry, agencies, governments and tribes, educators, nonprofits, and individual stakeholders to widen our reach and use our energy and funds to tackle the most pressing coastal and marine issues.

Marine Advisory faculty live and work in eight coastal communities across the state. Research sponsored by Alaska Sea Grant addresses important coastal issues and links to our graduate traineeship program, fostering the next generation of scientists and decision makers. Our symposia, conferences, workshops, news releases, publications, videos, and websites inform thousands in Alaska and across the nation.

In this report, we highlight our work in 2012–2013, made possible through the longstanding support of NOAA, the University of Alaska Fairbanks, the School of Fisheries and Oceans Sciences, and almost 200 partners across the state and nation.

I am proud to move into the position of director of Alaska Sea Grant this year and to work with such a strongly committed and passionate staff and faculty.

Sincerely,



Paula Cullenberg, Director
Alaska Sea Grant

Student Career Planning

Inspiring, educating, and training young Alaskans to take their place in numerous marine occupations is of critical importance.

The University of Alaska Fisheries, Seafood and Maritime Initiative (FSMI) is a university–industry–state agency partnership to identify training and education needs for Alaska industries. Paula Cullenberg is the UA FSMI Working Group co-chair. Marine Advisory agents Terry Johnson and Torie Baker are working with university and industry partners to create a statewide workforce development plan for over 50,000 jobs in Alaska.



Career Day in Unalaska.

Marine Advisory agents Gay Sheffield and Torie Baker serve on an industry advisory committee for the Northwestern Alaska Career and Technical Center (NACTEC) Fisheries, Seafood and Maritime Vocational training grant. At the group's first meeting in Nome the committee reviewed career preparation and paths for high school students in maritime, seafood processing, and commercial and subsistence fishing.

During the Unalaska City High School Career Day, Marine Advisory agent Reid Brewer informed nearly 200 students about UAF and the School of Fisheries and Ocean Sciences undergraduate program. Brewer organized a workshop on the college experience for high school students, and presented a lecture to 100 10–12th graders titled, "What to Expect in College."

Ketchikan Marine Advisory agent Gary Freitag gave eight 30 minute lectures on careers in marine science and fisheries as part of the University of Alaska Southeast 8th Grade Career Fair to over 160 students from Ketchikan and Craig.

Alaska Sea Grant placed four interns in summer 2013. University of Alaska Anchorage graduate Jake Schultz worked on a fishing vessel energy audit project in Ketchikan, with funding from the Alaska Fisheries Development Foundation. Brigham Young University graduate Dane Berry interned at the Alutiiq Pride Shellfish Hatchery in Seward with funds from the UAF Bristol Bay Campus. Shelby Dresdow of Alaska Pacific University worked with Bree Witteveen in Kodiak as a field intern for the Gulf of Alaska Apex Predator Program. Emily Schmidt, of the University of Montana, was an intern at the Sitka Sound Science Center.

Alaska Sea Grant Key to Success of Small Seafood Processors

Alaska Sea Grant specialists provide consultation and technical support to small seafood businesses throughout Alaska, adding expertise critical for success.

A few years ago an entrepreneur in the Bristol Bay region got her seafood processing license and built a plant in Naknek, called Nakeen Homepack. But she ran into opposition by the local zoning authority who said fish processing was prohibited in her subdivision.

Izetta Chambers, Marine Advisory agent in Dillingham, helped the owner navigate the legal bumps and communicate with managers. Thanks to public support and clarification of covenants, the processor was granted her development permit and operated during the 2012 salmon season. Nakeen processed over 30,000 pounds of packaged salmon and hired five staff.

Last year Chuck Crapo, Brennan Smith, and other seafood technology faculty assisted two dozen Alaska small food and seafood processors in developing products, including smoked salmon, salmon jerky, mustards, vegetable and fruit juices, soups, salmon entrees, salsas, dog treats, barbecue sauces, and flavored salmon oil. Crapo helped processors comply with state and federal food safety regulations by creating HACCP plans (hazard analysis and critical control point). Crapo retired this year after 30 years of teaching, research, and extension work.

Seafood technology faculty Chuck Crapo, Alex Oliveira, and Brian Himelbloom were on a team led by seafood marketing specialist Quentin Fong that helped Pickled Willys LLC become successful and add three full-time employees. Based in Kodiak, Pickled Willys processes seafood into value-added products for a national market. The team assisted Barbara Hughes and Bill “Willy” Alwert by providing training in HACCP, business management, marketing, processing techniques, and quality and safety. This year Pickled Willys sold 2,400 cases of pickled sea-



Chuck Crapo (left) leads an exercise at the Alaska Seafood Processor Leadership Institute.

food valued at \$288,000 wholesale and 4,800 pounds of frozen crab tails valued at \$48,000 wholesale.

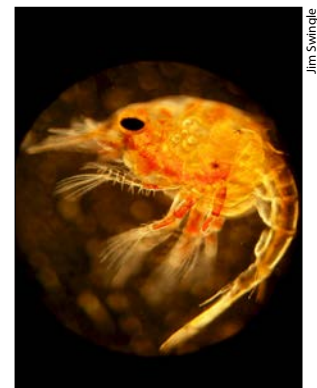
To train future seafood industry leaders, Marine Advisory experts finished up an Alaska Seafood Processor Leadership Institute in 2012 and will teach the fourth ASPLI in October 2013. ASPLI helps the next generation of seafood processing employees develop skills to become effective plant managers, with each institute graduating up to 20 new leaders. ASPLI graduate John Scoblic is now plant manager at Trident in Ketchikan; this summer he oversaw 500 people working 16 hour shifts to process a record pink salmon return.

In 2012 and 2013 Marine Advisory specialists presented three workshops on smoking and salting fish. In all, about 50 commercial smokers, regulators, and home processors learned the science of fish smoking and the processes for cold-smoked fish, hot-smoked fish, salmon jerky, and fish sausage.

Nutrition and Condition of King Crab Larvae

The project Nutrition and Condition of King Crab Larvae is part of the collaborative Alaska King Crab Research, Rehabilitation and Biology (AKCRRAB) program, coordinated by Alaska Sea Grant. AKCRRAB is investigating the potential for enhancement to restore king crab stocks, which would have economic benefits for the fishing industry and coastal communities throughout Alaska. To improve the hatchery production of healthy juvenile red king crab and juvenile blue king crab, AKCRRAB is taking a multidisciplinary approach to understanding their bioenergetics and optimizing their condition.

Several important milestones reached this year included hatchery production of more than 180,000 juveniles of blue and red king crab from the Bering Sea, Southeast Alaska, and Kodiak Island. Biochemical analyses for larval blue king crab showed that larvae accumulate triacylglycerols (storage lipids) during the feeding stage, followed by a dramatic decrease in these lipids during the nonfeeding stage. This information is useful to improve survival through critical larval transitions and improve juvenile production. Red king crab were fed diets that varied in lipid composition to better understand how dietary lipids affect larval survival and biochemical composition. Biochemical analyses of red king crab larvae will be completed in fall 2013. The use of visual health as an inexpensive indicator of biochemical analysis is promising.



Red king crab larva at the Alutiiq Pride Shellfish Hatchery.

Deborah Mercy

Jim Swingle

By the Numbers

Outreach

	Attendees
Meetings/workshops/conferences	1,836
Public/professional presentations	2,819
K-12 students reached	1,475
Total attendees/students	6,130

Education

	MS	PhD
Students supported*	5	4

* one student was supported for both MS and PhD

Partners

Federal	31
Local, state, and tribal	68
NGO	24
Industry	49
Academic institution	16
International	3
Total	191

Alaska Sea Grant in the news

News releases	21
Media placements	116

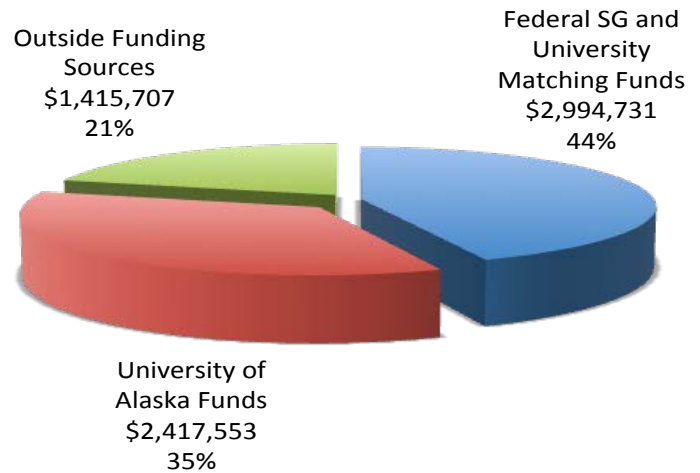
Publications

Peer-reviewed journal articles	8
Graduate degree theses	9
Books/conference proceedings	3
Brochures/fact sheets	4
Newsletter issues	26
Websites maintained	10
DVD	1
Total publications	61

Individual items distributed by ASG	19,235
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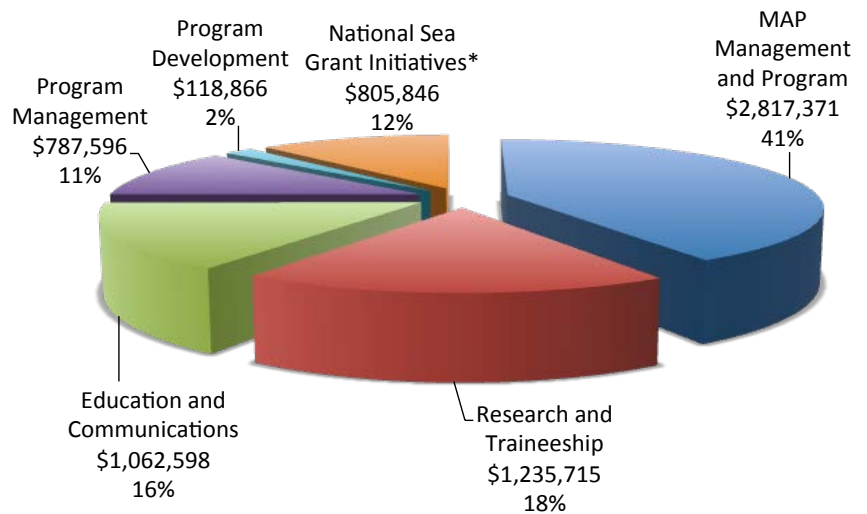
Alaska Sea Grant Funding Sources

Total budget: \$6,827,991
October 2012–September 2013



Alaska Sea Grant Overall Budget Expenditures

Total budget: \$6,827,991
October 2012–September 2013



*climate adaptation, hazard resilience, Bering Strait Maritime Symposium, aquaculture, invasive species

On the Lookout for Marine Invasive Species

In northern latitude cold-water environments, scientists are on the alert for marine invasive species that could impact food webs and commercial, recreational, and subsistence resources. Monitoring, assisting management with data gathering, helping to mitigate, and informing the public about impacts of invasive species are among Alaska Sea Grant Marine Advisory Program activities.

In 2010, Ketchikan Marine Advisory agent Gary Freitag coordinated a partnership between Alaska Sea Grant and the Smithsonian Environmental Research Center (SERC), which was awarded multiyear National Sea Grant funding for an Alaska program on Early Detection and Rapid Response for nonindigenous marine species. They are looking for European green crab, tunicates *Didemnum vexillum* and *Botrylloides* sp., and other invasives.

In 2012–2013, Freitag continued tunicate sampling programs in Kotzebue, Barrow, and Sitka, while Kodiak Marine Advisory agent Julie Matweyou and Unalaska agent Reid Brewer oversaw tunicate and green crab monitoring in their harbors. *Didemnum vexillum* and *Botrylloides* sp. are present in Southeast Alaska, but green crabs have not yet been detected in the state. This year samplers are on the lookout for invasive species associated with tsunami debris from Japan, particularly in the Aleutians and Pribilof Islands.

In 2013 Allen Marine resumed a program to engage tourists in marine sampling, and Freitag trained employees in monitoring methods for green crabs. Freitag and scientists from SERC deployed over 100 plates in the Ketchikan area to sample for invasive tunicates, for the “Bioblitz” workshop held in September.



Invasive tunicate *Botrylloides violaceus* (on knife) found near Ketchikan.

Marine Mammal Stranding Response

Alaska Sea Grant Marine Advisory faculty processed 188 marine mammal coastal strandings, 12 of them alive, from 2010 to 2013. During a 2.5 year NOAA Prescott Grant, four Marine Advisory agents were trained to respond to marine mammal strandings from Southeast Alaska to the Bering Strait. Agents recruited student and public participation in the responses, sometimes involving carcass necropsy, skeletal reconstruction, and live release.



Gay Sheffield.

As marine mammal specialist Kate Wynne compiled the facts at the end of the grant period, one event drew particular attention.

“Having Gay Sheffield involved at the time of the Bering Strait Unusual Mortality Event allowed her to play a key role connecting subsistence harvesters with national/international

pathologists attempting to identify an unusual disease,” Kate said.

The UME disease affected all four arctic species of ice-associated seals in western and northern Alaska, eastern Russia, and western Canada. In the Bering Strait region, Sheffield, the Marine Advisory agent in Nome, connected subsistence harvesters with national and international biologists, pathologists, and resource managers as they attempted to identify the disease characterized by delayed hair growth, skin sores, and lethargic seals. Working closely with the North Slope Borough Department of Wildlife Management, Eskimo Walrus Commission,

and coastal communities, Sheffield provided reports, specimens, and even entire carcasses for research.

Sheffield worked long and hard to explain to authorities in the nation’s capital the unique food security and human health concerns held by Alaskans who rely on marine mammals as subsistence food. At the same time she interpreted federal issues and reported on the progress of the investigation to coastal community members in the Bering Strait region. The seal sickness remains a mystery, but Sheffield has bridged a human gap by communicating the needs of each group that were at times frustratingly baffling to the other.

Sheffield also played a pivotal role in late 2012 during a wildlife oiling on St. Lawrence Island. When contacted by hunters about oiled birds and seals she notified the U.S. Coast Guard and other agencies and organizations. The USCG partnered with Sheffield and local residents to support an effective response. The source of the oil was not determined.



A diseased seal.

Education—A Top Priority

Education, formal and informal, is a top priority for Alaska Sea Grant. Marine education specialist Marilyn Sigman participated in several educational events and programs.

The Alaska Science and Engineering Fair included an ocean science component sponsored by the Alaska Center for Ocean Sciences Education Excellence (COSEE), with 44 competitors representing 28 Alaska communities.

The third of three Scientist-Teacher Marine Ecosystem workshops about the Arctic Ocean, Bering Sea, and Gulf of Alaska ecosystems was held in Barrow. Scientists, Alaska Native educators, and Elders shared their knowledge and collaborated in the development of lesson plans. Cosponsors included COSEE, Alaska Sea Grant, North Pacific Research Board, the Arctic Research Consortium of the U.S., and the Alaska Ocean Observing System.

Alaska hosted 300 educators at the National Marine Educators Association annual conference, co-chaired by Sigman. She also presented half-day training workshops on science communication skills at the Alaska Marine Science Symposium, at Communicating Science courses at UAF Fairbanks and Juneau campuses, and at a pre-conference workshop for the 2013 Wakefield Fisheries Symposium.



Reid Brewer teaches marine mammal biology.



Gary Freitag monitors an ROV with students in Ketchikan.

Alaska Sea Grant co-sponsored the annual Salmon-in-the-Classroom professional development workshop for rural Alaska teachers. The workshop features ways to extend learning via classroom salmon incubation and teaching activities from Alaska Sea Grant's *Alaska Seas and Rivers* curriculum. Partners were the Yukon River Panel Restoration and Enhancement Fund, Pacific Salmon Commission, Alaska Cooperative Extension Service, UAF Center for Cross-Cultural Studies, U.S. Fish and Wildlife Service, and Alaska COSEE.

In Ketchikan, Marine Advisory agent Gary Freitag received state funding through OceansAlaska for an underwater remotely operated vehicle (ROV) to teach high school students about marine stewardship. In all, 80 students viewed marine debris, a cove empty of sea life due to pollution, and vibrant areas full of marine organisms in their natural habitat.

Freitag offered ROV assistance to scientists to take samples at a recently discovered underwater crater, aboard an Allen Marine Tours boat. Nine students and six experts were among the first humans to get a real-time view of the volcano that blew its top about 10,000 years ago. The crater is now covered by 150 feet of water in Behm Canal.

Each year Alaska holds a regional competition for high school students as part of the National Ocean Sciences Bowl. Petersburg Marine Advisory agent Sunny Rice has co-coached the Petersburg team with teacher Joni Johnson since 2009.

In February 2013, Rice accompanied Petersburg's two NOSB teams to Seward for the quiz bowl and research paper competition, and came away all smiles. The Petersburg Omnipotent Octopi took first place in the research paper and third place overall, and two Petersburg students received \$5,000 University of Alaska scholarships from Icycle Seafoods. Marine Advisory agent Reid Brewer coached the Unalaska team, which placed 6th overall among 25 teams.

Alaska Sea Grant has supported the Alaska NOSB competition since it began in 1998 by maintaining the Alaska Tsunami NOSB website, offering awards, and coaching and supporting individual teams.

Supported Students

Graduate Students

Christopher Manhard

Manhard's PhD research examines the effects of hybridizing seasonally isolated subpopulations of pink salmon that spawn in the same stream in Southeast Alaska. Of primary interest is whether a fine-scale genetic barrier, for example one that occurs within a brood line and location, can facilitate local adaptation. Manhard earned his master's this year, also with support from Alaska Sea Grant.



Sean Brennan

For his PhD research, Brennan is building a detailed strontium isotope map of the Nushagak River watershed that describes variation of the isotope tracer in river waters and in otoliths of rearing and spawning Chinook and coho salmon, non-migratory slimy sculpin, and seasonally migratory arctic grayling. Brennan will use this baseline information to identify the natal sources of Nushagak River Chinook salmon incidentally caught during the Nushagak Bay sockeye fishery.



Ilona Kemp

Kemp's PhD research focuses on marine anthropology in southwestern Alaska. She is interested in the cultural significance of herring fisheries and the relationship among fisheries, marine mammals, and climate change.



Zac Hoyt

Zac Hoyt continued his PhD research investigating the impacts of sea otters on commercial fisheries in Southeast Alaska, including monitoring the locations of radio-tagged sea otters and meeting with residents of communities affected by sea otters. He completed a landmark in his graduate career, the comprehensive exam for the PhD in fisheries, successfully demonstrating mastery of content for his dissertation project.



Asia Beder

Asia Beder began a master's degree program in fisheries in January 2013 and spent her first semester working at the Alutiiq Pride Shellfish Hatchery in Seward on the nutrition and condition of Alaska red king crab larvae. She learned crab hatchery techniques and reared larvae for her thesis project investigating larval diets. Beder moved to Juneau in the summer, where she collected juvenile crab and participated in a shrimp survey with the Alaska Department of Fish and Game.



Ayla Doubleday

Doubleday has defended her thesis, "Seasonal and Interannual Patterns of Larvaceans and Pteropods in the Coastal Gulf of Alaska, and Their Relationship to Pink Salmon Survival." She analyzed zooplankton data that had been collected from 2001 to 2011 in the Gulf of Alaska.



Jennifer Stoutamore

Stoutamore is studying genetic population structure of blue king crab in Alaska and Russian waters, using genetic markers. The results will be useful for fishery management and to aid in recovery efforts, by identifying genetically distinct populations. She is also studying blue king crab mating structure, which can be used by fishery managers to maintain a sustainable fishery by keeping enough males in the population.



Graduates

Tammy Hoem-Neher *(funded prior to 2012–2013)*

Hoem-Neher completed her doctorate at the University of Alaska School of Fisheries and Ocean Sciences in December 2012. Her dissertation is "The Influence of Estuarine Habitats on Expression of Live History Characteristics of Coho Salmon Smolts in South-Central Alaska." She accepted a position with the NOAA Kasitsna Bay Laboratory working as the Gulf Watch Alaska science coordinator in April 2013.



Rachael Wadsworth *(funded prior to 2012–2013)*

Wadsworth helped complete the Alaska Regional Marine Research Plan with Keith Criddle as part of her master's degree research. She is currently working as a fishery policy analyst for the National Marine Fisheries Service in Long Beach, California, where she writes U.S. regulations to implement international agreements for management of highly migratory species.



Justin Carney

Carney worked on the project Low-Intensity, Low-Cost Management of Salmon Fisheries. He successfully completed his master's degree requirements, defended his thesis, and graduated in spring 2013.



Maximizing Value to Commercial Fishermen and Fishing Communities

Helping commercial fishermen improve business includes providing current information, support, and training—a top priority for the Alaska Sea Grant Marine Advisory program. Residents maximizing return from local resources is one way to strengthen fishing communities around the state.

Marine Advisory agent Torie Baker continued to partner with Integrated Marine Systems to offer two daylong onboard refrigeration workshops to 30 participants in Naknek and Dillingham. Immediate refrigeration of catch is a critical step in preserving quality and getting premium prices. Chilled catch is becoming standard operating procedure for Alaska's fleet.

Marine Advisory faculty Julie Matweyou, Chuck Crapo, and Quentin Fong worked with the Alaska Marine Conservation Council and fishermen on ways to differentiate jig-caught cod products from other fishing gear types in the marketplace.

Media specialist Deborah Mercy updated nine short videos about how to preserve the quality of Alaska salmon harvested by gillnet fisheries. Dillingham Marine Advisory agent Izetta Chambers published two Sea Grant bulletins: *Working with the Alaska Board of Fisheries: Guidance for Fishermen* and *Labeling Requirements for Alaska Seafood Processors*.

At the 33rd annual ComFish Alaska trade show, Julie Matweyou moderated the panel discussion “Gulf of Alaska Trawl Bycatch Management and Catch Share.” Quentin Fong gave a presentation on Hong Kong seafood markets and Terry Johnson

presented a talk on fishing vessel energy efficiency.

Lowering energy costs by reducing fuel consumption on fishing vessels is the objective of a project being undertaken by the Marine Advisory Program, several commercial fishermen, and the Alaska Fisheries Development Foundation. Marine Advisory agent Terry Johnson is part of the team working on the three-year project.

Volunteers are conducting do-it-yourself energy audits on their fishing boats, testing various fuel catalysts and additives and hydrogen generators. The project hired an intern in summer 2013 for two weeks to record energy used with hydraulic equipment and electronics on a tender boat. The hope is that smaller generators can replace larger generators, that hydraulics can be replaced by electric motors, and that more boats can switch from ice to refrigerated seawater systems in their boat holds.



Onboard refrigeration workshop.

Shellfish Culture

Alaska Sea Grant has responded to the increased interest in growing shellfish in Alaska. In fall 2012 we published the fourth edition of the *Alaska Shellfish Growers Manual*, by Ray RaLonde and others. The manual includes regulations and oyster growing information based on 21 years of culture in Alaska, and serves as a textbook for aquaculture training. Much of the growing information is gleaned from work funded by Alaska Sea Grant.

Stuart Thomas completed a master's degree in fisheries in 2012, supported by Alaska Sea Grant. Thomas identified lines

of oysters that perform well in the cooler waters of Alaska, with the result that oyster yields increased by over 30 percent. This year the shellfish industry was so impressed with Thomas's work that they organized a Molluscan Broodstock Program panel of researchers and farmers, funded by shellfish farmers, to continue breeding the high-performance oysters. After graduation, Thomas accepted a position as the broodstock manager at Taylor United Shellfish Farms in Shelton, Washington.

In Ketchikan, OceansAlaska has begun producing much needed supplies of oyster and geoduck seed to Alaska shellfish growers. Within the next two years OceansAlaska has a capacity to produce 5 to 10 million oyster spat and up to 100,000 geoduck seeds. This comes at a critical time when Alaska growers have been unable to obtain seed from Washington hatcheries. Ketchikan Marine Advisory agent Gary Freitag is president of the OceansAlaska board of directors. Recently he assisted with securing an endorsement from the Ketchikan Borough Assembly to grant OceansAlaska \$334,000 in operating expenses and \$50,000 to create a hatchery.

Blue mussel culture is also a potential profit-making product for shellfish growers. The Alaska State Legislature funded a blue mussel demonstration project for Halibut Cove, coordinated by RaLonde. A workshop was held in fall 2012, one of several that will culminate in a manual for growing blue mussels in Alaska.



A shellfish farmer in Halibut Cove.

Humpback Whale Interactions with Fishermen: Progress on Deterrents

The humpback whale population in Alaska has been increasing by 6 to 10 percent per year. As their numbers have increased in Southeast and Southcentral Alaska, so has the potential for interactions with boaters and fishing gear. Fishermen need a legal, safe, and effective way to reduce the frequency and severity of whale entanglement, which can injure the whale and reduce fishing time.

Marine Advisory marine mammal biologists Kate Wynne and Bree Witteveen have coordinated efforts to determine if acoustic alarms can decrease entanglement, by documenting the sound characteristics of Australian-made “F3” pingers in different habitats and recording responses of tagged whales to the pingers.

In 2013 Wynne and Marine Advisory agent Sunny Rice contacted salmon fishermen in Juneau, Petersburg, and Haines to discuss means of determining the effectiveness of pingers and assessing potential acoustic impact on whale foraging habitat. Wynne and Rice will use this insight to develop a series of fleet meetings in Southeast and Southcentral Alaska before the 2014 salmon season, when they will distribute logbooks and questionnaires to fishermen for voluntary pinger-use reporting. Simul-

taneously, Wynne will work with the National Marine Fisheries Service (NMFS) to develop a collaborative research plan to address NMFS concerns about F3 pinger effects on humpback feeding habitat. Resolving these concerns is critical to fishermen’s legal authorization to use pingers to reduce the potential for whale entanglement.



F3 pinger (about 5 inches long) used to deter marine mammals.

Arctic Science and Policy at 28th Wakefield Fisheries Symposium

Scientists should ask themselves, “Who needs to know what I know?” suggested Fran Ulmer at the 28th Wakefield fisheries symposium last March in Anchorage. Ulmer, chair of the U.S. Arctic Research Commission and former lieutenant governor of Alaska, emphatically advised researchers who have knowledge of sea changes in the Arctic to relay that knowledge to legislators, industry, community members, and investors. This can be a major positive step toward policy making and readying the state and nation for new environmental conditions, she believes.

Ulmer made the comments at the symposium, Responses of Arctic Marine Ecosystems to Climate Change, coordinated by Alaska Sea Grant. Franz Mueter, UAF assistant professor, chaired the 3.5 day event, which featured talks by 45 arctic researchers.

Student presentation award winners were Lauren Divine (best student poster), and Adrian Gall (best student oral presentation), both of UAF School of Fisheries and Ocean Sciences.

Many challenges were expressed by scientists: sea ice is at a record low, ocean acidification is on the rise, extreme weather is occurring around the globe, and marine life populations from algal blooms to polar bears are in major flux.

“Are there going to be commercial fisheries in the Arctic, and if so which species?” Anne Hollowed of the NOAA Alaska Fisheries Science Center posed the question during her talk about the movement of fish and shellfish from subarctic to arctic waters. At this point, the answer seems to be—not yet.

“The symposium was really engaging and I came away with ideas, collaborations and new colleagues. Very productive!” said one conference participant. About 140 people attended from the United States, Canada, Norway, and China.

Symposium sponsors and partners are Alaska Department of Fish and Game; Department of Fisheries and Oceans Canada, Pacific Biological Station; Institute of Marine Research, Norway; NOAA Alaska Fisheries Science Center; North Pacific Fishery Management Council; North Pacific Research Board; The Pew Environment Group; University of Alaska Fairbanks, School of Fisheries and Ocean Sciences; U.S. Arctic Research Commission; and the U.S. Bureau of Ocean Energy Management.

Alaska Sea Grant has been sponsoring and coordinating the Lowell Wakefield Fisheries Symposium series since 1982. The series has addressed subjects that are timely and key to the understanding and management of commercially harvested marine species. The symposia and the published proceedings books continue to make an important contribution to fisheries management in Alaska. In 2013 *Fishing People of the North: Cultures, Economies, and Management Responding to Change* was published, the proceedings of the 27th Wakefield symposium.



Deborah Mercy



Fishermen in Cordova practice life raft procedures.

Keeping Mariners Safe

Marine safety is an ongoing issue for Alaska Sea Grant. Marine Advisory agents have been trained as Alaska Marine Safety Education Association (AMSEA) instructors to conduct drill classes for mariners in their communities.

This year AMSEA awarded Cordova Marine Advisory agent Torie Baker with a 2012 Blue Ribbon for her work in safety education for recreational and subsistence boaters. Baker coordinated boating safety information and displays at the annual Cordova Health Fair, which drew over 250 people. She also led a Boating Without the Boys class, an AMSEA curriculum on small vessel handling, navigation, and safety for women boaters; conducted a salmon tender vessel crew safety orientation; and organized a personal flotation device display at the 13th annual Cordova Salmon Jam Small Fry event. Baker also coordinated commercial fishing safety training for the Cordova fleets and was among the top AMSEA trainers for the year. Since 2005 when Baker began teaching the AMSEA drills class, 54 percent of Cordova fishermen have been trained.

Baker is one of two Alaskans on the national U.S. Coast Guard Commercial Fishing Vessel Safety Advisory Committee. At a meeting in Washington, DC, the committee finalized recommendations for national commercial fishing safety training requirements and criteria for regional safety programs. Jerry Dzigan, AMSEA director and Marine Advisory affiliate faculty, is chair of the committee.

Marine Advisory agent Julie Matweyou co-taught two AMSEA fishing vessel safety drill conductor classes before the January Kodiak crab season and in May. Topics included practice in conducting mandatory monthly onboard safety drills, a tour of the USCG Kodiak base flight rescue hangar, and pool training. Unalaska Marine Advisory agent Reid Brewer taught drill classes to fishermen in Unalaska and Gay Sheffield co-taught marine safety in Nome.

Addressing Shellfish Toxin Risks

Recreational and subsistence harvest of shellfish in Alaska is at high risk because paralytic shellfish (PSP) toxins are present in many parts of the state. Aquaculture specialist Ray RaLonde and Kodiak-based Marine Advisory faculty Julie Matweyou and Brian Himelbloom continued efforts to analyze PSP field test kit accuracy, which could decrease testing costs. The team is using Kodiak-harvested shellfish to test the ELISA process (enzyme-linked immunosorbent assay) against the high performance liquid chromatography method with support from the North Pacific Research Board.

Matweyou also is providing technical assistance to the Kodiak Island Borough School District to conduct a Recreational Shellfish Beach Monitoring Pilot Program, with funding from the Alaska Department of Environmental Conservation. Matweyou has trained teachers and high school students on beach sampling protocols and bivalve identification for the communities of Ouzinkie, Port Lions, and Old Harbor. She has met with village mayors and tribal councils, organized shellfish collection trips, sent the samples to the lab, provided PSP test results to volunteers, and assisted volunteers with outreach.

RaLonde and Matweyou have made numerous PSP presentations around the state, and Matweyou trains undergraduates at the University of Alaska Anchorage Kodiak College in PSP research protocols.



Old Harbor residents collect shellfish samples for PSP testing. Inset: Mussel meat to be ground up and tested for PSP toxin.

In the Aleutians, Marine Advisory agent Reid Brewer sampled mussels every month during the past year for PSP testing, in cooperation with the Aleutian Pribilof Islands Association.

Ray RaLonde coauthored an article that presents the state of knowledge of harmful algal blooms along the west coast of North America: A.J. Lewitus et al., 2012, Harmful algal blooms along the North American west coast region, *Harmful Algae* 19:133–159. The article was published to help meet the need for integration of HAB outreach, research, and management. Harmful algal blooms, a global threat to living marine resources and human health, have increased markedly in frequency and distribution over the last 10–15 years.

Community-Based Marine Mammal Conservation in Bristol Bay

The University of Alaska Fairbanks, Bristol Bay Native Association (BBNA), and three member tribes—the villages of Port Heiden, Chignik Lagoon, and Togiak—are working to better document what local people know about the ecology and habitat of marine mammals in the Bristol Bay and Alaska Peninsula area. The Alaska Sea Grant-funded project is “Collaborative Research: Building Capacity for Community-based Marine Mammal Conservation in Bristol Bay.”

“In Yupik (Eskimo) language,” said Chanda Meek, principal investigator, “our project is called *Imarpim Ungungsit*, which means ‘marine mammals.’”

BBNA has conducted similar research projects, but this one includes training in field research, including interviewing in a scientific way. “We held a class in spring 2013 that many of our partners received college credit for, and one of the most interesting discussions we held included talking about the differences and similarities between how local people and scientists observe the world in order to come to conclusions,” said Meek.

Meek and her fellow researchers see this project as “an excellent way to build everyone’s capacity to work together and conduct successful, locally relevant research.” In exchange for sharing research methods, BBNA and the tribes trained science researchers in local geography, history, and cultural context, and shared traditional knowledge of marine mammals.



Top: Mark Kosbruk, of Port Heiden, and PhD student Ilona Kemp discuss sea otters. Middle: BBNA database manager Michael Knapp presents GIS training.

Using Strontium Isotope Ratios to Track Salmon Migration in the Nushagak River

Thanks to innovative research funded by Alaska Sea Grant, scientists may be able to identify the stream origin of king salmon stocks in the Nushagak River in southwestern Alaska.

PhD candidate Sean Brennan, advised by professor Matthew Wooller with the School of Fisheries and Ocean Sciences, is developing a strontium isotope map to track natal origins of king salmon. By analyzing the strontium isotope composition in a fish’s otolith (ear bone), and comparing it to Nushagak tributary waters, they can identify different geographic locations in the watershed where a king salmon may have originated.

Brennan has painstakingly measured the ratio of strontium isotopes (each isotope having a different number of neutrons) in the Nushagak River and streams, and in salmon otoliths. The unique strontium isotope ratios occur naturally in the watershed and come from bedrock. The isotope ratios are incorporated into otolith rings, which are added throughout a fish’s life. These stream isotope ratio “signatures” provide researchers useful insight into where the fish have spent their time.



PhD candidate Sean Brennan.

Brennan’s preliminary work has recognized nine different “strontium isotopic” stocks of king salmon in the Nushagak River. He and others are mapping river water chemistry in other areas of Alaska as well, with a goal of identifying salmon stocks and their origins throughout Alaska. Brennan will wrap up his research in spring 2014.

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Unalaska MAP agent Reid Brewer and Dillingham agent Izetta Chambers left MAP in 2013, and those positions are currently vacant.

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