



NOAA FISHERIES

Alaska Fisheries Science Center

2016 Year in Review



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Year in Review: Behind this Year's Numbers

There is a lot for us to be proud of as we reflect on our accomplishments in 2016.

Our research provides the foundation for marine resource management decisions. Through sustainably managed fish stocks, we can have strong and profitable fisheries, ample jobs and a stable food supply for local communities and the Nation. Alaska fisheries are among the most well managed fisheries in the world. We have the largest U.S. commercial fishery, worth an estimated \$1.8 billion annually.

Alaska waters are also home to diverse populations of marine mammals, providing food and sustaining a way of life for Alaska Native communities that has endured for centuries.

We had another successful field season, conducting fisheries and mammal research surveys and fisheries-dependent data collection through the largest observer program in the Nation. We also produced critical biological, ecological and socio-economic process and modelling studies. With the completion of the Southeastern Bering Sea Regional Action Plan for climate science and the vulnerability analysis, we took another big step to further Ecosystem-based Fisheries Management. Resource managers and Alaska Native hunters and fishermen rely on our data to set sustainable annual harvest limits.

We also designed and tested exciting new technologies and forged international partnerships that are allowing us to more efficiently survey broader areas of the North Pacific and Arctic to refine fish and marine mammal stock assessments and further improve the quality of the information we are providing to stakeholders.

Through our fieldwork, laboratory experiments and modelling projects, we gained new insights about the Arctic and how fisheries and marine species may respond to a changing marine environment. Based on our projections of species abundance and fishing industry response, resource managers will be able to make appropriate management decisions to both sustain marine resources and maximize economic opportunities in the future.

We keep our stakeholders, the public and Congress informed about the work we're doing and why we're doing it through effective communications, education and outreach. The Center's commitment to education means we engage and share the latest science with U.S. students to inspire and give them an edge in future careers in engineering and science. Our efforts targeting K-12 and college students also creates a valuable pipeline to build our future workforce.

A day does not go by that I am not inspired by the incredible talent and commitment of Alaska Fisheries Science Center staff. Your individual contributions make the Alaska Fisheries Science Center a premiere research institution and a great place to work!

Thank you again for all you do! I look forward to another great year!

Douglas DeMaster

Scope of our Mission

Our research supports NOAA Fisheries' stewardship mission to ensure sustainable living marine resources and their habitats in the coastal oceans of Alaska for the economic and cultural benefit of the nation. This region of nearly 1.5 million square miles includes waters in the Gulf of Alaska, Bering Sea, Aleutian Islands, Chukchi Sea and Beaufort Sea. Together, these waters support some of the most important commercial fisheries in the world, large and diverse marine mammal populations and Alaska Native hunting and fishing communities that have endured for centuries. For more read the [Alaska Fisheries Science Center Strategic Science Plan](#).



LEADING
fishing port by volume
Dutch Harbor



LARGEST
commercial fishery in US EEZ
walleye pollock



Ensuring Sustainable Fisheries



Because of our science and the cooperation of our stakeholders, Alaska fisheries are among the most well managed and profitable fisheries in the world. Currently, just a single crab stock in Alaska is considered overfished; that stock's lack of recovery is most likely due to unfavorable environmental conditions. Our research is relied upon by commercial and recreational fishermen, fishery-dependent processing and retail businesses, and Alaska Native communities to maintain their way of life.

We collect biological, ecological and environmental data from our research surveys and from fishing catches. In the laboratory and in the field we study what fish eat, where they live and how fast they grow. We also collect socio-economic data on fisheries and coastal communities. These data are put into models to generate estimates of fish stock abundance and safe catch limits. Resource managers use this information to develop management measures ensuring healthy fisheries over the long term. Healthy marine resources = jobs and food security.

Our primary responsibility is to provide scientific data, analyses and expert technical advice to marine resource managers (i.e., the NOAA Fisheries' [Alaska Regional Office](#), [North Pacific Fishery Management Council](#), [the State of Alaska](#), [the International Pacific Halibut Commission](#), [the Pacific Salmon Commission](#)), Alaska tribal governments, public stakeholders, and U.S. representatives participating in international fishery and marine mammal negotiations. The work of monitoring and assessing fish, crab and marine mammal populations, fisheries and marine ecosystems is mandated by legislation, which includes the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, the U.S Endangered Species Act, and the National Environmental Policy Act.

2016 Highlights:

Standard Vessel Surveys: Bread and Butter for Stock Assessments

Using commercial fishing and research vessels, we collect data to estimate the size of fish stocks in Alaska. Managers use these stock assessments to set sustainable fishing quotas and other management measures to protect Alaska fish stocks and fish habitats. In 2016, we conducted 21 fisheries-independent groundfish and crab surveys in the Gulf of Alaska, Bering Sea and Chukchi Sea, providing information on the abundance, sex, size and age of fish and crabs. We used this information to update 54 fish stock assessments. In as few as 10 days after the surveys were completed, assessment scientists were able to use these data to estimate the size of various fish stocks.

21
surveys
scientific staff
in the field

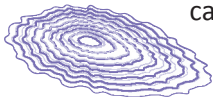
Adding the Human Dimension

1,248
socioeconomic
surveys

Having sustainable fisheries is about having healthy fish stocks and profitable fishing businesses, and preserving traditional ways of life for Alaska Native communities. This year, our scientists conducted socioeconomic surveys of 1,248 Alaska fishing participants and businesses. We updated our Alaska Saltwater Sport Fishing Charter Business Survey, which is designed to collect baseline economic information about the charter fisheries sector in order to evaluate the effects of regulatory changes. We also assessed the level of dependence on marine resources of 334 Alaska communities and their socio-economic well-being to provide marine resource managers with a scientifically sound rapid assessment of community resiliency over time.

Each year, we also produce annual economic status reports for various fisheries that include annual trends in catch and processing value, volume and effort.

Experimental Studies Enhance Stock Assessments



38,068
Otoliths read
for ageing fish

Experimental studies that provide information on the growth and natural and human-caused mortality of fishes helps us better estimate the size of fish stocks. For example, we collect information from otoliths (fish ear bones) to learn more about how long a fish has lived and conditions in the environment. Like the growth rings of a tree, otolith rings record climate variation and growing conditions that occurred during the fish's life. Other studies reveal how well fish and other animals caught as bycatch survive after release, which further helps to refine our stock assessment models and improve estimates of fish and crab stock abundance. [Results for this past winter's growth experiments](#) on Tanner and snow crab are already being used in our assessment models. Laboratory studies on the effects of ocean acidification on commercial fish and crab species is another way that our research helps stakeholders prepare for the future.

Eyes on the Water: Fisheries Observers

Observer data are used to successfully manage dozens of groundfish stocks and to monitor and ultimately reduce the amount of prohibited species caught in groundfish fisheries such as Chinook salmon and Pacific halibut. The goal is to ensure that other fisheries and communities that target Chinook salmon and Pacific halibut are able to catch what they need while ensuring a healthy Alaska marine ecosystem.

48,940
observer/survey
days at sea

In 2016, over 450 observers were onboard fishing vessels collecting data used to monitor populations of threatened and endangered species including Steller sea lions, killer whales, harbor porpoise, and seabirds such as the endangered short-tailed albatross. These data are critical for determining when a marine species should be listed or removed from an U.S. Endangered Species Act list. This year, successful marine resource management led to the delisting or decisions not to list two marine mammal species in Alaska.

Better Accounting for Bycatch and Improving Survivability of Released Fish

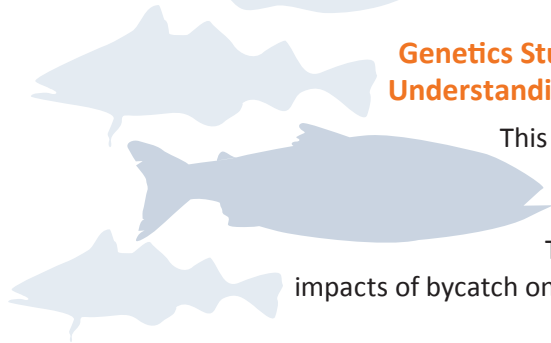
We are continuing to develop better methods for at-sea and dockside sampling to better track Chinook salmon bycatch in Gulf of Alaska trawl fisheries. We are also improving methods to quickly and carefully release Pacific halibut back to sea so more survive to help rebuild this depleted stock and support fisheries that target them.

We also helped to develop abundance-based halibut prohibited species catch caps for use in the eastern Bering Sea, where halibut bycatch has been a limiting factor for some fisheries.



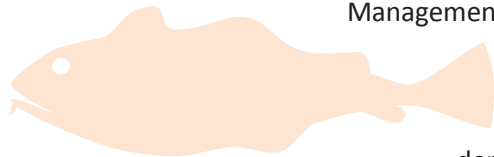
Genetics Studies Increase Understanding of Bycatch Impacts

This year, our genetics laboratory was able to determine the stock of origin of Chinook and chum salmon captured as bycatch in groundfish fisheries in the Bering Sea and Gulf of Alaska. These data help resource managers better understand the impacts of bycatch on local stocks and fishing communities.



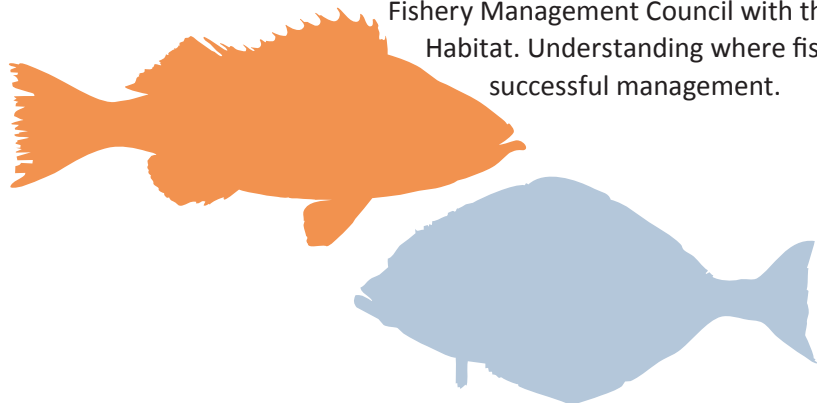
Understanding Market Forces on Alaska Seafood

We worked with the McDowell Group and the Pacific States Marine Fisheries Commission to produce a [new publication](#) to provide the North Pacific Fishery Management Council with insights into the range of market forces that may affect the value of Alaska seafood. Authors examine impacts of market forces on Alaska seafood including the production and global supply of king crab, Atka mackerel harvests in Japan, demand for fish oil for human consumption, currency exchange rates (such as fluctuations in the value of the dollar), changes in Atlantic cod production and changes in consumer preferences for some species.



Protecting Fish Habitat

This year our scientists helped define Essential Fish Habitat descriptions and establish habitat impact assessment protocols to assist resource managers at the North Pacific Fishery Management Council with their five-year review of Essential Fish Habitat. Understanding where fish spawn, grow and feed is key to their successful management.



Department of Commerce Bronze Medal



Alaska Fisheries Science Center staff Paul Packer, Julie Blair, Glenn Campbell, Farron Wallace, Craig Faunce, and Heather Weikart (retired) received a Department of Commerce Bronze Award for developing an online Observer Declare and Deploy System (ODDS) to automate the observer selection process, improving customer service and the management of fisheries off Alaska. The Bronze Medal Award is the highest honor award granted by NOAA's Under Secretary for Oceans and Atmosphere, and recognizes superior performance by federal employees.

NOAA Fisheries Economics & Human Dimensions Program Best Papers – 2016

Four out of the six research and policy papers selected as the Best Papers in Economics and Human Dimensions for 2016 were awarded to center staff.

Best Research Papers



First Place

Kasperski, S. 2015. Optimal Multi-species Harvesting in Ecologically and Economically Interdependent Fisheries. *Environmental and Resource Economics*, 61(4): 517-557.

Third Place

Himes-Cornell, A. and S. Kasperski. 2015. Assessing Climate Change Vulnerability in Alaska's Fishing Communities. *Fisheries Research* 162: 1-11.

Best Policy Papers



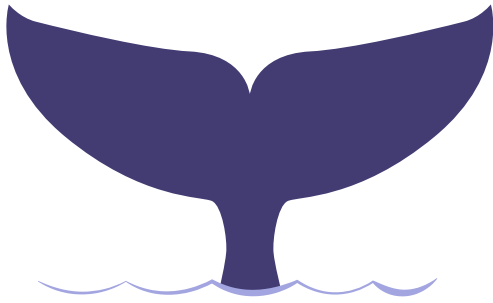
First Place

Wallmo, K. and D. Lew. 2016. A comparison of regional and national values for recovering threatened and endangered marine species in the United States. *Journal of Environmental Management* 179 (2016) 38e46. doi:10.1016/j.jenvman.2016.04.053

Third Place

Seung, C. and J. Ianelli. 2016. Regional Economic Impacts of Climate Change: A computable General Equilibrium Analysis for an Alaska Fishery. *Natural Resource Modeling*, V 29 (2): 289-233

Protecting Marine Mammals



Our marine mammal research involves collecting information that agency managers and other constituents need to make informed management decisions to comply with the Endangered Species Act, the Marine Mammal Protection Act and other relevant statutes to protect whales, seals, porpoises and sea lions in Alaska. In Alaska, some marine mammal populations remain a primary food source for many Alaska Native communities.

2016 Highlights

Regular Monitoring of Marine Mammal Populations in Alaska Waters

marine mammal acoustics studies

7.2 TB passive acoustics data
400 GB sonobuoys data



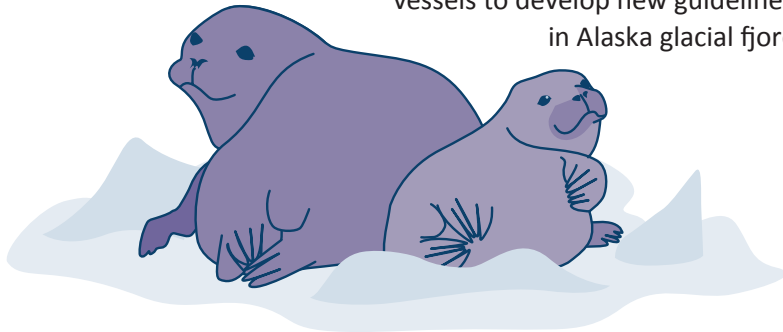
With support from Bureau of Ocean and Energy Management, we conducted a multi-disciplinary survey of the Bering and Chukchi seas that involved passive acoustic monitoring, biological and physical oceanographic sampling, and a visual survey for marine mammals and seabirds. We also continued our long-term aerial survey of Arctic marine mammals. All these efforts provide important information on marine mammal behavior, movements and health.

Ensuring Sustainable Subsistence Harvests

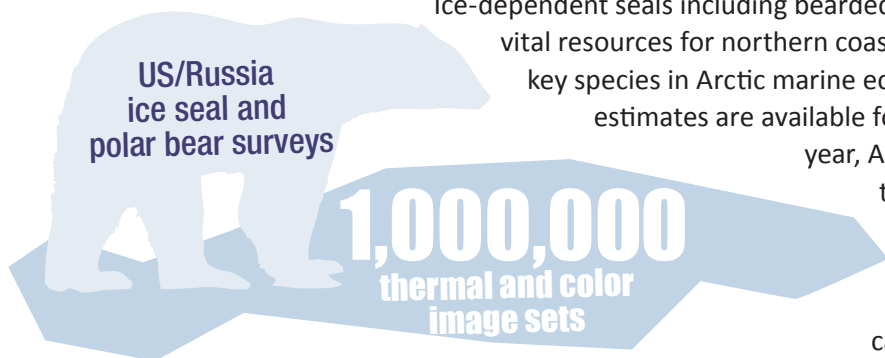
Our scientists also provided information and analyses used to implement new regulations for the northern fur seal subsistence harvest.

Minimizing Disturbance of Harbor Seals in Glacial Fjords

Resource managers used our research on disturbance of harbor seals by cruise tourism vessels to develop new guidelines for safe vessel operation and seal viewing in Alaska glacial fjords.



U.S.-Russia Comprehensive Studies of Ice-Dependent Seals and Polar Bears



Ice-dependent seals including bearded and ringed seals and polar bears are vital resources for northern coastal Alaska Native communities and are key species in Arctic marine ecosystems, yet no reliable abundance estimates are available for vast portions of their ranges. This year, Alaska Fisheries Science Center scientists

teamed up with the Russian Federation on [a comprehensive survey](#) of bearded and ringed seals in the Chukchi Sea. Scientists used infrared cameras together with high-resolution photographic cameras to detect mammals. Our

goal was to develop the first reliable abundance estimate for these two species. We also combined efforts with the U.S. Fish and Wildlife Service to conduct the first joint aerial survey of both ice-dependent seals and polar bears. Declining sea-ice in northern latitudes makes it even more imperative that we conduct research like this to better understand these ice-dependent animals.



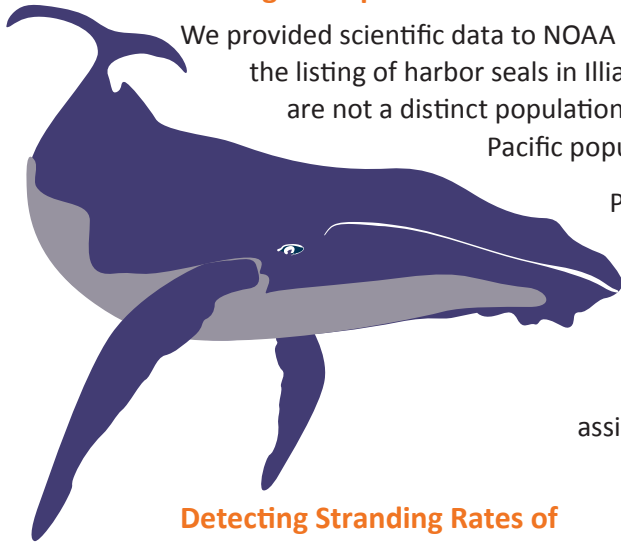
Tracking Endangered Species Act Listed Species

In 2016, we updated high-priority population abundance assessments for the critically endangered Cook Inlet beluga whale —NOAA Fisheries’ “Species in the Spotlight”— and the endangered western stock of Steller sea lions. Our routine aerial surveys provided current information to resource managers so they could provide required recommendations to other federal government agencies and businesses enabling them to carry out their activities while minimizing impacts on these critically endangered marine species.

New Steller Sea Lion Habitat Identified on West Coast and More

We compiled past research and new analyses of Steller sea lion satellite-track location data and inputted these data into new habitat-use models. NOAA Fisheries’ Critical Habitat Review Team used our results to complete its evaluation of Steller sea lion critical habitat. Information on a new Steller sea lion rookery on the Washington coast contributed to the Post-Delisting Monitoring Program for the eastern stock of Steller sea lions.

Endangered Species Act Decisions



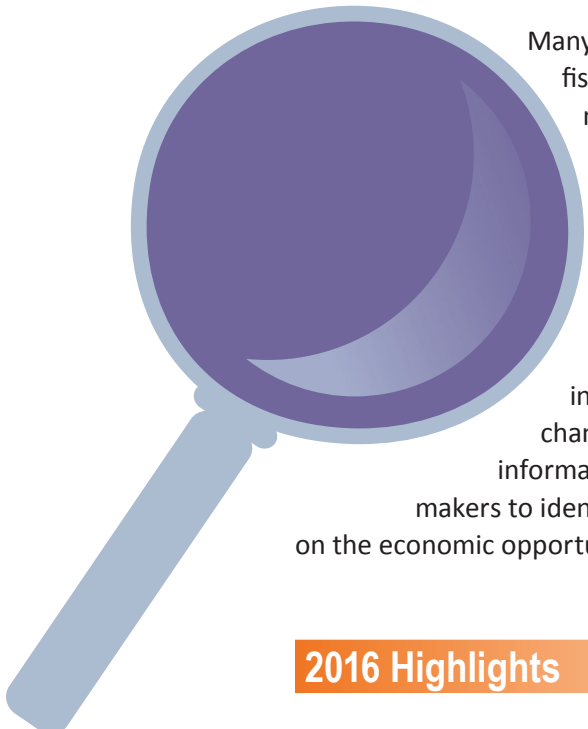
We provided scientific data to NOAA Fisheries resource managers who concluded that the listing of harbor seals in Iliamna Lake, Alaska, was not warranted because they are not a distinct population of harbor seals, but rather part of the larger North Pacific population.

Previous research and new analyses of humpback whale abundance and stock structure in the North Pacific contributed to an agency decision to de-list, or down-list, specific Distinct Population Segments of this species (Final Rule published in September 2016) and will further assist managers in subsequent stock assessments.

Detecting Stranding Rates of California Sea Lion Pups

Resource managers used our assessments of California sea lion pup birth and growth rates to prepare for probable standings of sea lions along the California coast in 2016. Since 2013, high numbers of emaciated sea lion pups have been stranding annually along the California coast, prompting NOAA to declare this an “Unusual Mortality Event” (an unexpected event involving a significant die-off of a marine mammal population).

Monitoring a Changing Environment



Many factors, both natural and human-caused, affect populations of fish, crab and marine mammals and marine ecosystems. Although natural factors cannot be controlled, and many human-caused factors are also outside the control of NOAA Fisheries, the scientific information collected and maintained by NOAA Fisheries informs and advises policymakers and managers.

Understanding and predicting the health and productivity of marine ecosystems informs sustainable development. In the laboratory and in the field, Center scientists broke new ground in understanding more about Alaska ecosystems and how a changing marine environment may affect marine species. Having information like this at the ready enables policymakers and decision-makers to identify ways to sustain these valuable resources while capitalizing on the economic opportunities derived from them.

2016 Highlights

Monitoring Third Consecutive Year of Warmer than Average Water Temperatures



In 2016, we conducted groundfish, crab and lower trophic level surveys of the eastern Bering Sea during a third consecutive warm year. We provided information from these surveys to the State of Alaska and the North Pacific Fishery Management Council for stock assessment and fishery evaluations. Data from these surveys continues to enhance our understanding of how warm and cold periods affect fisheries recruitment and food webs.

Predicting the Size of Future Fish Stocks



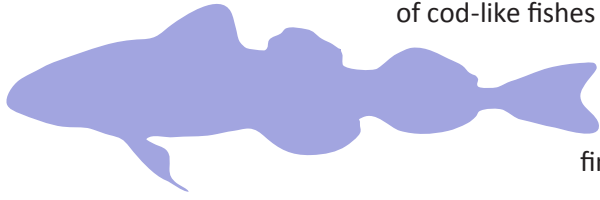
We entered our second year of a three-year climate-modeling project (the Alaska CLIMate Project or ACLIM). This multi-disciplinary project combines physical oceanography and fisheries science to project what the Bering Sea ecosystem will look like under different climate and fishing scenarios. This information will be invaluable to resource managers in making decisions about how best to maximize fish production in the future.

Fish Growth Affected by Ocean Acidification and Warmer Water Temperatures



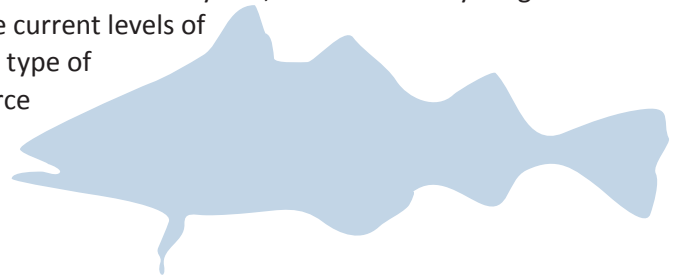
Our laboratory experimental programs in Newport, Oregon, and Kodiak, Alaska, provided new insights this year into the impacts of ocean acidification on key fish and crab species from the North Pacific (red and blue king crab, and northern rock sole). We also successfully reared Arctic cod in a laboratory environment for the first time.

Arctic cod is a cold-water fish that is a keystone species in Arctic food webs. As a result, scientists have been able to describe and compare the temperature-dependent growth of cod-like fishes in the eastern Bering and Chukchi seas. This knowledge will help predict potential winners and losers in changing environmental conditions and allow fishing businesses that are dependent on these resources to make informed financial decisions about their future.



Ongoing Studies Look at Effects of Environmental Conditions on Fish Populations

An important line of Center research increases our understanding of the environmental and biological factors that regulate fish populations and helps us predict population trends. For example, fish populations could be high now, but if our research tells us that environmental factors are not favorable for the survival of young fish, managers may decide to set more conservative catch limits. A classic example of this is research for pollock in the eastern Bering Sea. When water temperatures are warmer than average, fewer pollock grow to maturity due to decreased availability of their nutrient-rich prey. Young pollock cannot store enough fat to make it through their first winter. When the eastern Bering Sea experiences many consecutive warm years, recruitment of young fishes may not be sufficient to offset the current levels of fishing and natural mortality. Having this type of information makes it possible for resource managers to adjust their management actions to ensure a stable supply of fish and fishing jobs in the future.



Arctic Research

The Arctic has critical long-term strategic, ecological, cultural, and economic value. The Center has a unique role in the NOAA mission regarding the Arctic. We are on the frontline in carrying out three key strategies in the NOAA Arctic Action Plan: 1) Strengthen foundational science to understand and detect Arctic climate and ecosystem changes; 2) Improve stewardship and management of ocean and coastal resources in the Arctic; and 3) Advance resilient and healthy Arctic communities and economies.

This year we rolled out the Alaska Regional Action Plan for the Southeastern Bering Sea to meet climate information requirements as called for in the NOAA Fisheries Climate Science Strategy. This includes a multiyear program to investigate how the Arctic Large Marine Ecosystem will respond to a changing climate so that local communities and the nation can better capitalize on potential economic opportunities while ensuring responsible development that sustains marine resources and marine ecosystems.

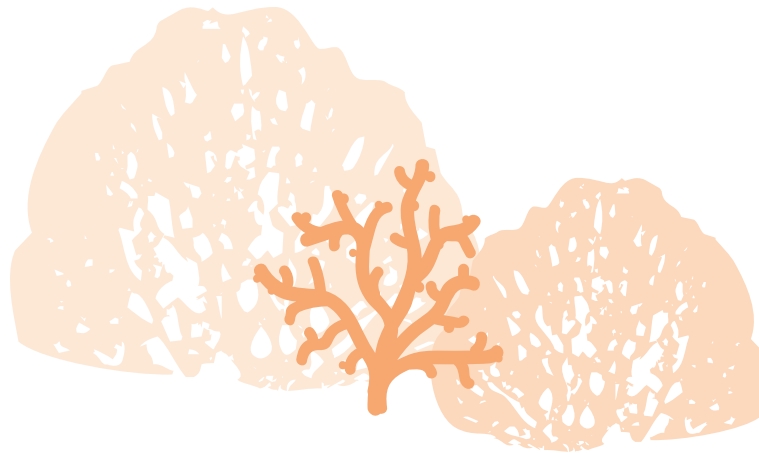
The Center and its partners received funding from the North Pacific Research Board and the Bureau of Energy and Ocean Management to conduct a multiyear integrated ecosystem research program to investigate changes occurring in the Arctic Large Marine Ecosystem. NOAA continues to support the international Distributed Biological

Observatory with Center scientists adding to the time series of measurements made at key geographical locations.

Center leadership remained engaged in several ongoing strategic efforts to coordinate research and monitor the Central Arctic, participating in the [Fourth Meeting of Scientific Experts on Fish Stock in the Central Arctic in Tromso, Norway](#), and providing critical scientific support to the U.S. Chairmanship of the Arctic Council. As a result, we are now expanding a joint U.S.-Norway research initiative on bearded seals to include participants from across the Arctic. Center leadership is also co-chairing the new ICES Protection of the Arctic Marine Environment Working Group on Integrated Ecosystem Assessment of the Central Arctic Ocean.

21st Ecosystem Report: Alaska Marine Ecosystem Considerations

Each year, the center assembles a comprehensive report of research conducted by academic and government scientists, [Alaska Marine Ecosystem Considerations](#). This research provides a picture of the health and productivity of distinct large marine ecosystems by monitoring various indicators (e.g., temperature, lower trophic level biomass, biomass of forage fishes, changes in current patterns that transport fish and crab larvae, and unusual phenomena such as coccolithophore blooms), generating a “report card” of indicator condition. This report and other efforts by Center scientists to develop integrated ecosystem assessments enables fisheries managers at the North Pacific Fishery Management Council to better understand and consider how changes in the environment affect the species they are managing and plan for the future to promote sustainable development.



Innovative Science: Technology Enhancement and More

We are always looking for more efficient ways to explore the ocean environment and to track fish catches. We collaborate with fishermen, engineering companies and academic institutions to design and test new technologies and better, more cost-effective methods for gathering data. Through these efforts, we are able to explore areas of the ocean that are difficult or costly to survey with traditional research methods.

2016 Highlights

Advancements in Electronic Monitoring Technologies in Alaska Fisheries

Our North Pacific Observer Program continued to develop and test new and innovative electronic monitoring technologies by deploying stereo and chute camera systems on fishing industry and government survey vessels. We made considerable headway testing hardware and developing the necessary applications to automate species identification and estimate their length. These same technologies are simultaneously being developed for underwater identification and length determination of fish in assessment surveys.

Developing electronic monitoring technologies (standard cameras) on the small hook and line halibut fleet make it possible to collect valuable biological data on small fishing vessels where placing human observers poses challenges. The goal is not to replace observers, but rather to collect data on small vessels where data are currently lacking. Staff also participated in the International Seabird conference illustrating challenges and opportunities of electronic monitoring for seabird identification. The goal is to perfect electronic monitoring technologies so that costs to the industry and the nation can be reduced without sacrificing data quality.

Saildrone: Charting New Course for Ocean Research

This summer two unmanned wind- and solar-powered [Saildrones](#) were launched to learn more about critically endangered North Pacific right whales, track feeding behavior and the relationship between [northern fur seals and their prey species](#) and to determine the effectiveness of new low-power fisheries acoustic transducers (echo sounders) in monitoring fish populations in the Bering Sea. Low energy technologies can help augment our vessel surveys and enable us to gather needed information on commercial fish stock abundance in areas that are costly or hazardous to survey year-round.

The project represents a partnership among the Alaska Fisheries Science Center, [NOAA Research's Pacific Marine Environmental Laboratory](#); [Saildrone, Inc.](#); [Simrad AS/Kongsberg Maritime](#); [Greeneridge Sciences, Inc.](#); and the

[U.S. Marine Mammal Commission](#). To announce the start of the survey, NOAA Fisheries hosted its first-ever live [YouTube broadcast](#).

Underwater Acoustics to Enhance Fish Survey Capacity

We successfully expanded the use of bottom-mounted upward-looking echosounders to augment ship-based, acoustic-trawl surveys (where we use sound waves to estimate fish abundance). The moored echosounders provide information to determine timing of peak spawning for walleye pollock, which will help optimize timing for our pre-spawning pollock assessment surveys via research vessels. Our ongoing research with the moored sounders suggests that it may be possible to generate survey-comparable estimates of walleye pollock abundance and that we might be able to use this technology successfully in important walleye pollock spawning grounds, such as the Shelikof Strait area in the Gulf of Alaska.

Novel Life History Tags and eDNA to Study Marine Mammals



In conjunction with a research cruise to study harbor seals in the western Aleutian Islands, where the species' numbers have declined dramatically in the past three decades, the Center conducted a collaborative project with the Alaska SeaLife Center and SeaWorld. We deployed novel life-history transmitter tags on wild harbor seals to investigate rates and causes of mortality and female reproductive rates. The Center also added new information to its long time-series of data on the abundance and distribution of harbor porpoise from two Southeast Alaska surveys during July and September.

100 eDNA
water samples
harbor porpoise identification

We also implemented a project using environmental DNA to increase our understanding of the population structure of harbor porpoise. This information is of particular interest to commercial fisheries operating in the region.

Next Generation Autonomous Underwater Vehicles

We used "smart" robotic [submarines](#) to follow acoustically-tagged marine animals (salmon and crab) to collect information about their environment and behavior. Working with Rutgers University, the Center has been field-testing and refining protocols for tracking animals. The information gained may provide a cost-effective means for studying of a variety of marine populations in habitats that are difficult to survey.

NOAA Administrator's Award



The Center's Scott McEntire was awarded a NOAA Administrator Award for the development of practical underwater cameras and sensors for conservation engineering and cooperative research in support of fisheries management. NOAA Administrator Awards recognize employees who have demonstrated exceptional leadership, skill and ingenuity in their significant, unique, and original contributions that bring unusual credit to NOAA, Department of Commerce and the Federal Government.

Communicating Science

Critical to the success of our science endeavors is effective communications to build support for the research and then to share research results. We do this by maintaining an ongoing dialogue with fishermen, environmental organizations and Congress and through broader public outreach and education to students, teachers and parents. Such interactions go a long way in promoting mutual trust and respect, a hallmark of Alaska fisheries management.

2016 Highlights:

Stakeholder Engagement Highlights

A big part of our job each year is communicating with the fishing industry, environmental community members and others interested in our research through in-person meetings, collaborative research, phone conversations, office visits, conferences and the Council process. Center staff also work closely with Alaska Native organizations and communities to discuss the rationale for aerial and vessel surveys of bearded seals, ringed seals, polar bears, fish and crab stocks and plankton communities. The goal is to maintain a dialogue and identify ways to minimize disturbance on marine life and Alaska Native hunters and fishermen. To help with this effort, we produced a comprehensive map of all our marine mammal surveys and research projects, posted it on our website and shared it with 426 Alaska Native coastal organizations, agencies, and corporations. (<http://www.afsc.noaa.gov/datamaps/nmmlresearch/index.html>).

Social Media and Web-Based Platforms

The use of social media and web-based platforms is helping us reach remote villages and Native communities throughout Alaska and people around the world with news and information about our research. There were more than 32,000 page views of our science blog, “Dispatches from the Field,” and more than 890,000 social media impressions generated. We conducted four Tweet Chats on Twitter this year on topics ranging from why we study fish stomachs/diets to research that is enabling the cruise ship industry to visit glacial fjords while minimizing disturbance on harbor seals. We also held three Google Hangouts with classrooms in Anchorage and St. Paul, Alaska, to engage students in our research. This year, we made publicly accessible, through our website, two new databases that track long-term diet data for key Alaska marine fish species and environmental conditions affecting Alaska marine ecosystems. These data can be used by scientists, students and teachers to conduct their own studies and experiments.



K-12 Students and Teachers

We reached over 10,000 students and teachers through programs that bring students into our labs for field trips, and take scientists into classrooms. Our long-term educational programs provide a pipeline to keep students engaged in science from kindergarten through high school and beyond. At our Auke Bay Laboratories, in Juneau Alaska, we do this during our annual Sea Week, Sun to Sea Camp, and Southeast Alaska Regional Science Fair activities. In Kodiak, Alaska, we reach students through a partnership with the local community and school, the Ocean Science Discovery Program. Scientists visit Anchorage-area schools each January during the Alaska Marine Science Symposium. We also reach out to Alaska Native communities through events like Bering Sea Days, a school-based event in the Pribilof Islands, which brings scientists, students, teachers and the community together for interactive science learning. Other Alaska Native communities reached in 2016 included Metlakatla and Yakutat. NOAA Science Camp, a summer science camp for middle and high schoolers now in its 14th year, provides hands-on learning experiences to roughly 130 youth each year.



AFSC education efforts reach **10,021** K-12 students and teachers *plus*

33,723 members of the general public

General Education

This year our scientists and educators reached over 33,700 people through community festivals, summer camps, lab tours, events at museums and aquariums, and public seminars. Our Kodiak Laboratory hosted over 15,000 visitors this year, many of them cruise ship visitors from around the world. Our Auke Bay Laboratories staff in Juneau reached over 2,700 people this year through lab tours, seminars, community events and summer camp visits. We also participate each year in Seattle’s Fall Fishermen’s Festival and Pacific Marine Expo, as well as Kodiak’s COMFISH and Juneau’s Ted Stevens Day. We also share our science with large audiences at Seattle Aquarium and Pacific Science Center events.

Publications

This year Center scientists authored 128 research publications in peer-reviewed journals as well as produced numerous in-house technical and program reports. To view [our publications](#), visit the Alaska Fisheries Science Center website.



Video and Broadcasts

We are exploring new ways to reach audiences through video and live online broadcasts. We conducted NOAA’s first live YouTube broadcast in collaboration with NOAA Fisheries’ Ocean Media Center and NOAA Research’s Pacific Marine Environmental Laboratory to talk about our partnership using autonomous, wind- and solar-powered vessels, Sairdrones, to study the Bering Sea ecosystem. To date, over 3,000 people have viewed this broadcast. The video “Why the Little Fish Matter,” featuring our research on the Arctic nearshore environment, was shown at 11 film festivals.

3,000 views



Sairdrone Research Live Youtube Broadcast



U.S. Secretary of Commerce
Penny Pritzker

Administrator of National Oceanic and Atmospheric Administration and Undersecretary of Commerce
Dr. Kathryn Sullivan

Assistant Administrator for Fisheries
Eileen Sobeck

December 2016

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Alaska Fisheries Science Center
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