

# BOEM OCEAN SCIENCE

THE SCIENCE & TECHNOLOGY JOURNAL OF THE BUREAU OF OCEAN ENERGY MANAGEMENT

VOLUME 15 ISSUE 4 • AUGUST/SEPTEMBER/OCTOBER/NOVEMBER 2018

## Marine Mammals

**Sharing the Ocean with  
Marine Mammals**

**From Tagging to Traditional  
Knowledge: Marine Mammal  
Studies in Alaska**

**Examining Marine Mammals in  
the Gulf of Mexico**

**Taking a Closer Look at Marine  
Mammals in the Pacific Region**

**Listening for Whales, Dolphins,  
and Porpoises along the Atlantic  
Coast**





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BOEM OCEAN SCIENCE is published by the Bureau of Ocean Energy Management to communicate recent ocean science, technological information, and issues of interest related to offshore energy recovery, marine minerals, and ocean stewardship.

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## ON THE COVER

Bottlenose dolphins near oil and gas platforms offshore the Port of Long Beach, California. Photo by Greg Sanders, U.S. Navy (formerly BOEM).

All photos courtesy of the Bureau of Ocean Energy Management unless otherwise noted.

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## FREQUENTLY USED ABBREVIATIONS

ASAMM	Aerial Surveys for Arctic Marine Mammals
ESA	Endangered Species Act
ESP	Environmental Studies Program
GOM	Gulf of Mexico
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
TK	Traditional Knowledge
UAS	Unmanned Aircraft Systems
USFWS	U.S. Fish and Wildlife Service

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## FOR MORE INFORMATION

Check out the Bureau of Ocean Energy Management website at [www.boem.gov](http://www.boem.gov).



## THE ACTING DIRECTOR'S MESSAGE

BOEM's commitment to provide environmental safeguards as offshore resources are developed highlights the importance of understanding marine mammals and the ecosystems on which they depend. We carefully implement the environmental requirements of the Outer Continental Shelf Lands Act (OCSLA) and many other applicable laws, including the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), and the Endangered Species Act (ESA).

BOEM particularly needs information on the distribution, relative abundance, behaviors, and areas of importance for diverse marine mammal species to understand how resource development might impact them. We use this information in NEPA documents, ESA biological assessments, and other reviews, and we need the information to come from the best available science. Over the last 45 years, our Environmental Studies Program, mandated under OCSLA, has filled many information gaps on marine mammals.

This edition of *BOEM Ocean Science* highlights key marine mammal studies the agency is supporting. To name just a few topics, these include for example: using passive acoustic monitoring to detect animals; using traditional knowledge from Alaska Natives with science collected data during aerial surveys and tagging efforts; studies on sea otters and sea lions in the Pacific Region; understanding manatee movements; and developing seismic mitigation measures in the Gulf of Mexico. In conducting research, BOEM actively leverages funding and closely coordinates with other federal agencies, industry, non-governmental organizations, academic institutions, and tribal communities.

Please enjoy learning about how BOEM has advanced our collective knowledge of marine mammals!

— Walter D. Cruickshank



Pilot whales in the western North Atlantic Ocean. Photo by Carol Fairfield, BOEM.



# Sharing the Ocean with Marine Mammals

Marine mammals are aquatic mammals that rely on coastal and marine ecosystems for their survival. They represent a diverse group with close to 130 species found in every ocean from the cold Arctic waters to warm waters like the Caribbean and in coastal areas worldwide. They have evolved many body forms, sizes, and life history traits to survive and succeed in the aquatic environment. Sizes range from the small sea otter, 4 feet in length and weighing in at 60 to 90 pounds, to the large blue whale, 80 feet and 300,000 pounds. In fact, the blue whale is currently the largest animal on earth. Some marine mammals spend all of their time in the water, while others like seals, sea lions, and polar bears split time between the ocean and land. Some have bodies fully covered with hair (polar bear, seals, sea lions, and sea otters) while others have nearly none (whales, dolphins, porpoises, and manatees). Some eat tiny krill, sea grass, or fish while others feed on other marine mammals.

Perhaps even more impressive than their diversity is the special place marine mammals hold in human culture. Testaments to their importance are found in early Greek mythology all the way to present-day advertisements, media, ecotourism, and zoo and aquaria. Some marine mammals are also vital to native peoples who depend upon them, as they have for centuries, for food, clothing, and cultural practices.

## LEGISLATIVE FRAMEWORK

The U.S. Congress recognized the particular importance of marine mammals through enactment of the groundbreaking U.S. Marine Mammal Protection Act of 1972 (Public Law 92-522; 16 U.S.C. 1361 et seq.). This law was passed in response to concerns about human activities causing significant declines in some marine mammal

populations, mainly from by catch (unintentional capture) during commercial fishing. This was the first legislation to mandate an ecosystem-based approach to marine resource management and is considered one of the most protective environmental statutes to date. Because many marine mammals are also considered endangered or threatened, their protection is often paired with the Endangered Species Act of 1973 (Public Law 93-205; 16 U.S.C. 1531 et seq.). BOEM consults with NOAA

Fisheries and the U.S. Fish and Wildlife Service (USFWS) to ensure that any agency action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of an endangered or threatened species' critical habitat.

## BOEM MARINE MAMMAL RESEARCH

The intent of Congress to protect marine mammals, and the ecosystems upon which they depend and contribute to, is also inherent to BOEM's environmental stewardship efforts. Over the past four decades, BOEM's Environmental Studies Program (ESP) has funded about 120 marine mammal studies totaling \$132 million. We have studied sea otters, whales, dolphins, seals, sea lions, walrus, and polar bears. Early study topics focused on getting foundational baseline information on marine mammal distribution in U.S.



Polar bears. Photo by Lisa Barry, NOAA Fisheries.

In enacting the MMPA of 1972, Congress found that marine mammals "have proven themselves to be resources of great international significance, esthetic and recreational as well as economic, and it is the sense of the Congress that they should be protected and encouraged to develop the greatest extent feasible..."





Common Dolphin. Photo by Carol Fairfield, BOEM.

Outer Continental Shelf waters, subsistence use of marine mammals by Alaska Natives, and the effects of oil and gas development activities like oil spills and noise. More recent studies look beyond baseline life history information and evaluate potential effects from energy and marine minerals development. It has also included studies of prey and trophic interactions and acoustic communication between marine mammals. Methods for studying marine mammals have also evolved, from the sole use of vessel and aerial surveys to the addition of tagging, passive acoustic monitoring, and satellite imagery.

**Traditional Knowledge (TK)** is a body of evolving practical knowledge based on observations and personal experience of local residents over an extensive, multi-generational time period.

So, why do we study marine mammals? Because we need to understand where marine mammals live and how they use their environment in order

to know how to best protect them. Meeting the Nation's need for energy development and minerals extraction comes with risks to marine mammals, such as vessel strikes, habitat degradation, noise, and accidental oil spills. BOEM's science, as well as other best available information worldwide including traditional knowledge, can inform BOEM's environmental risk assessments and identify protective measures that we then require in permits and leases to eliminate or minimize impacts. Without the science we are left with an unclear picture of what is needed.

BOEM's history with marine mammal research demonstrates the value of good science in understanding the context of an

issue and driving project mitigation decisions that can successfully reduce impacts. The job, however, is never done. There is always more to learn and new methodologies to develop that allow us to dig deeper into scientific questions and get more resolution on the answers. BOEM remains committed to continuing this scientific journey and ensuring appropriate safeguards are in place to protect these revered marine animals.

— Dr. Jill Lewandowski  
Chief, Division of Environmental Assessment  
BOEM Office of Environmental Programs



Juvenile walrus. Photo by Nick Hajdukovich, USFWS.



# From Tagging to Traditional Knowledge: Marine Mammal Studies in Alaska



Satellite image showing the Beaufort and Chukchi Seas off Alaska. Image from Google Earth.

The Alaska OCS Region has spent nearly \$500 million in research throughout Alaska, of which more than \$87 million was spent on marine mammals over the past 40-plus years. Marine mammal research has focused primarily in the Beaufort and Chukchi Seas during the recent decade, but studies are now shifting to the Cook Inlet area in support of recent and planned lease sales. While BOEM supports such studies to promote energy independence and environmental protection through responsible, science-informed management of conventional and renewable energy resources, activities throughout Alaska must also ensure that such events do not impact Alaska Native subsistence activities. We work with various Native organizations to identify information needs, modify survey protocols during subsistence activities, and incorporate Native hunters in ongoing studies.

Two studies, “Satellite tagging of Bowhead Whales: Habitat use, passive acoustic and environmental monitoring” and “Ice Seal Movements and Foraging” conducted by the Alaska Department of Fish and Game, train Native subsistence hunters to deploy specially designed tags on marine mammals. The bowhead whale study is developing an acoustic tag to document ambient environmental soundscape and bowhead vocalization rates associated with specific behaviors, as well as potential disturbances relative to ambient noise levels, including those associated with anthropogenic activities. The ice seal study is showing differences in movements based on species as well as tagging

location, with some seals showing site fidelity.

Traditional Knowledge (TK) is incorporated into many of the Alaska Region’s studies to more accurately describe the relationship of resources to the humans who depend on them for food and for use in ceremonial activities. As part of the ice seal-tagging project, researchers obtained TK through interviews with Native hunters in 11 coastal villages to gather data on the timing of migrations, species distribution and behavior, and the efficacy of hunting methods. Combining TK with environmental data recorded from the deployed tags provides information on where and why traditional areas of seal occurrence have changed with the warmer environmental conditions occurring in the Arctic.

The gold standard aerial survey, which BOEM and its predecessors have supported for more than 40 years, is the “Aerial Surveys for Arctic Marine Mammals (ASAMM)” with extensive coverage of the Beaufort and Chukchi Seas. ASAMM is the only long-term, broad-scale, time series of data on marine mammal distribution, relative abundance, and behavior that exists for the Alaskan Arctic. Annual species-specific estimates are generated to estimate the number of animals likely to be affected by anthropogenic



Gray whale feeding while a calf swims toward its surfacing mother in the Chukchi Sea. Photo by Cynthia Christman, NOAA.





UAS Navy pilots retrieving the ScanEagle UAS. Photo by Carol Fairfield, BOEM.

activities proposed in the Beaufort and Chukchi Seas.

Considering the geographic extent of the ASAMM surveys and availability of Unmanned Aircraft Systems (UAS), BOEM collaborated with NOAA and the U.S. Navy to test whether a ScanEagle UAS could augment or replace manned aerial surveys. A three-way comparison was conducted off Utqiagvik (formerly Barrow) in the study “Field Evaluation of an Unmanned Aircraft System (UAS) for Studying Cetacean Distribution, Density and Habitat Use”. The study evaluated the cost and effectiveness of visual observations made by marine mammal observers on board aircraft compared with photographic imagery from a camera system mounted in the aircraft and a similar camera system onboard the ScanEagle.

The recently completed “Arctic Whale Ecology Study (ARCWEST)” focused on the Bering and eastern Chukchi Seas, and the “Bowhead Whale Feeding Ecology Study (BOWFEST),” examined the prime feeding area for bowhead whales northeast of Point Barrow in the western Beaufort Sea. Both studies used passive acoustic monitoring to record marine mammal vocalizations along with anthropogenic activity in the area and tags to monitor short- and long-term movements of several whale species. These studies, along with the “Chukchi Acoustic, Oceanography and Zooplankton Study (CHAOZ)” on Hanna Shoal, yielded more than 12,000 days of data. By integrating these datasets, habitat partitioning among marine mammal species became evident. For example, the area northeast of Point Barrow was confirmed as an important bowhead feeding area influenced by bottom topography and currents. These study results emphasize the need for combining visual and acoustic surveys with tagging to fully understand marine mammal seasonal habitat use.

Considering the rapidly changing environmental conditions prevalent in the Arctic, BOEM is supporting two phases of the “Synthesis of Arctic Research (SOAR)” to integrate results from numerous studies. The resultant papers will increase

scientific understanding of inter- and intra-relationships of oceanographic conditions, lower trophic prey species, and marine mammal distribution and behavior in the Chukchi Sea. Papers were published in a special issue of Deep Sea Research II and in Progress in Oceanography. This information enhances BOEM’s capability to estimate future changes in environmental conditions and the associated changes in behavior of marine mammals and their prey.

— Carol Fairfield,  
Marine Mammal Oceanographer  
BOEM Alaska OCS Region



Alaskan native Alexander Nistik prepares to release a young bearded seal that he fitted with a CTD satellite tag near St. Michael Canal, Alaska. Photo by Mark Nelson, Alaska Department of Fish & Game.

### FOR MORE INFORMATION

BOEM's studies in the Alaska OCS Region

<https://www.boem.gov/Alaska-Studies>



# Examining Marine Mammals in the Gulf of Mexico

With an increase in anthropogenic activities, the ocean has become a more noisy habitat for marine animals around the world. This is especially true in the Gulf of Mexico (GOM), a basin supporting energy exploration and development, commercial and recreational fishing, shipping, military operations, and tourism.

Mitigation is an action or effort intended to remedy, reduce, or offset known negative impacts.

The multiple anthropogenic activities increasing man-made noise can mask important sounds to marine mammals. To communicate in the loud environment, marine mammals have changed the frequency at which they vocalize.

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BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) are required to assess potential impacts to protected species, specifically under the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), and the National Environmental Policy Act (NEPA). The West Indian manatee for example, a species inhabiting the GOM, is included as an endangered species under the purview of ESA and receives protection by the MMPA. To better protect species like the West Indian manatee, BOEM is providing insight on how to mitigate potential impacts to marine mammals in the GOM.

BOEM studies in the GOM are exploring the distribution and movement patterns of marine mammals and how human activities affect them. To accurately mitigate and monitor the potential impacts of human actions on marine life, better information is needed on living marine resource abundance, distribution, habitat use, and behavior. BOEM recognized that need and is working with the NOAA Southeast Fisheries Science Center and other partners to conduct the "Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPPS)". GoMMAPPS will conduct multi-year, broad-scale surveys of marine mammals, sea turtles, and sea birds throughout the GOM to improve information about protected living marine resources.

BOEM also partnered with the NOAA Southeast Fisheries Science Center on the "Sperm Whale Prey Acoustic Study (SWAPS)". The study characterized the prey field available to sperm whales in the northern GOM and assessed the spatial and vertical distribution of prey in mesopelagic waters at depths between 300 and 800 meters (984–2,624 ft.). Large vessel surveys were conducted in the northern GOM during summer 2009 and winter-spring 2010. Concurrent marine mammal



Sperm whale in the Gulf of Mexico. Photo by BOEM.





Sperm whale. Photo by BOEM.

surveys and mid-water trawl sampling demonstrated strong associations between mesoscale physical features, sperm whales, and their prey. Squid from 32 taxa were collected, and 536 individuals were processed for stable isotope analysis of carbon and nitrogen. Overall, the results suggest changes in stable isotope values consistent with increasing trophic levels of squids over the course of their life history. However, squids with mantle lengths between 31 and 150 mm (1.2 and 5.9 in.) were found to be the sperm whale's dominant prey, likely because these smaller squids are more abundant and easier to capture.

Working with the U.S. Geological Survey, Southeast Ecological Science Center, BOEM conducted a study on northern GOM manatee distribution and the use of patterns and characterization of local resources. Manatees in the northern GOM were tagged with Argos-linked GPS tags that relay locations through a satellite link for remote location determination and transmit sensor data. This method helps BOEM identify habitat hotspots and site fidelity, as well as characterize large scale moves or movements.

Limited data is available concerning ambient noise in the GOM. Working with HDR Inc., BOEM established a long-term passive acoustic monitoring program using moored acoustic recorders installed at permanent stations throughout the GOM. The program helps establish a baseline for ambient noise to compare against potential impacts from future energy-related activities. It will also characterize the sound budget from other types of noise already occurring as well as provide both spatial and temporal information about marine mammals species in the GOM.

BOEM also worked with CSA Ocean Sciences, Inc. to better understand potential impacts to marine mammals and sea turtles from noise generated during seismic survey

activities. The study looks at the effectiveness of mitigation measures and, based on the results, will recommend potential changes to mitigation measures and modifications to protections for marine mammals and sea turtles. The results of BOEM efforts in the GOM region will help create a deeper understanding of the effects of human-induced sound and how those effects can be mitigated.

— Janet Purdy, Schatz Strategy Group



**FOR MORE INFORMATION**

**Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPPS): Marine Mammal Fieldwork and Data Analysis**

<https://opendata.boem.gov/BOEM-ESP-Ongoing-Study-Profiles-2018-FYQ2/BOEM-ESP-GM-16-09b.pdf>

**Sperm Whale Acoustic Prey Study (SWAPS)**

<https://marinecadastre.gov/espis/#/search/study/100098>

**Florida Manatee Movement and Habitat Use in the Northern Gulf of Mexico**

<https://opendata.boem.gov/BOEM-ESP-Ongoing-Study-Profiles-2018-FYQ2/BOEM-ESP-GM-13-07.pdf>

**Passive Acoustic Monitoring (PAM) Program for the Northern Gulf of Mexico**

<https://marinecadastre.gov/espis/#/search/study/100151>

**Seismic Survey Mitigation Measures and Protected Species Observer Reports**

<https://opendata.boem.gov/BOEM-ESP-Ongoing-Study-Profiles-2018-FYQ2/BOEM-ESP-GM-16-01.pdf>



# Taking a Closer Look at Marine Mammals in the Pacific Region

Ocean currents flow across the Pacific supporting a rich diversity of species from the smallest marine mammal, the southern sea otter, to the largest animal that has ever lived, the blue whale. Many of these species live offshore California, in close association with oil and gas production, and in areas being considered for future renewable energy development. BOEM marine mammal studies in the Pacific reflect this diversity of species and energy activities.

The sea otter, once hunted to near extinction, has made a remarkable comeback and is expanding its range into southern California near oil and gas infrastructure and some of the world's most active natural oil and gas seeps. BOEM worked with the U.S. Geological Survey and other collaborating agencies to tag and track sea otters in the Santa Barbara Channel. As in other coastal areas, the study found that male otters forage in slightly deeper water than females and both sexes have a strong preference for areas with persistent kelp canopies, some of which are near active natural oil and gas seeps. Overall, individual sea otters in the Santa Barbara Channel appear to be healthy and strong population growth in the future is expected. Surprisingly, the single greatest threat to sea otters in this area appears to be being bitten by great white sharks.

California sea lions find the offshore oil and gas platforms in the Pacific Region to be quite attractive. Working with the National Marine Fisheries Service (NMFS), BOEM used time-lapse cameras to characterize and quan-



Southern sea otters are expanding their range into oil and gas production areas in southern California. Photo by Greg Sanders.

tify the use of platforms by sea lions. California sea lions haul out (leave the water) on all offshore platforms in the Pacific Region with numbers ranging from 1 to more than 100 animals on each platform at any given time. Northern (Stellar) sea lions, a rare visitor to southern California, were also occasionally seen on the platforms. There were a few sightings of females nursing pups, something that had never been observed outside of known rookery areas. Male sea lions, both adult and sub-adult, were observed year-round. These observations hint at the



Rough-toothed dolphins seen and heard on a recent PacMAPPS cruise. Photo by Greg Sanders.





Tagging a false killer whale during a PacMAPPS cruise. Photo by Greg Sanders.

importance of offshore platforms as places to haul out and rest near offshore foraging areas.

Some marine mammals are difficult to see but they can be heard. BOEM funded a study conducted by the NOAA Southwest Fisheries Science Center that deployed Drifting Acoustic Spar Buoy Recorders (DASBRs) to listen for whales and dolphins along the entire west coast. Finding deep-diving beaked whales and sperm whales, including dwarf and pygmy sperm whales, was of particular interest. These whales are notoriously difficult to see and appear to be especially sensitive to human-made sounds. The DASBRs proved to be a highly effective tool for examining deep-diving whale occurrence and distribution while allowing for much more precise estimates of abundance than was previously possible.

Assessing the status and distribution of marine mammal species that travel tens of thousands of miles over their lifetimes is a challenge. BOEM has partnered with NMFS and

the U.S. Navy to conduct systematic surveys of the west coast (California Current ecosystem) and the Hawaiian archipelago as part of a collaboration known as the Pacific Marine Assessment Program for Protected Species, or PacMAPPS. This partnership uses all the tools in the toolbox for detecting and surveying for marine mammals across the Pacific. Visual and acoustic surveys are supplemented with opportunistic collections of skin samples (biopsies), photos for identification catalogues, and tagging of individual animals. The resulting data help BOEM understand the ecological context for areas being considered for offshore energy development and how marine mammals may interact with proposed offshore activities.

— Greg Sanders, U.S. Navy (formerly BOEM)



Pacific oil and gas platforms provide a convenient place to rest for sea lions. Photo by Greg Sanders.

#### FOR MORE INFORMATION

**Southern Sea Otter Range Expansion and Habitat Use in the Santa Barbara Channel, California**

<https://espis.boem.gov/final%20reports/5586.pdf>

**Characterizing and Quantifying California Sea Lion Use of Offshore Oil and Gas Platforms in California**

<https://espis.boem.gov/final%20reports/5571.pdf>

**Passive Acoustics Survey of Cetacean Abundance Levels (PASCAL-2016)**

<https://www.boem.gov/BOEM-2018-025/>

**Cetacean and Seabird Data Collected During the Hawaiian Islands Cetacean and Ecosystem Assessment Survey (HICEAS)**

<https://www.boem.gov/2018-044/>

**Pacific Marine Assessment Partnership for Protected Species (PacMAPPS)**

<https://www.boem.gov/PC-17-04/>



# Listening for Whales, Dolphins, and Porpoises along the Atlantic Coast

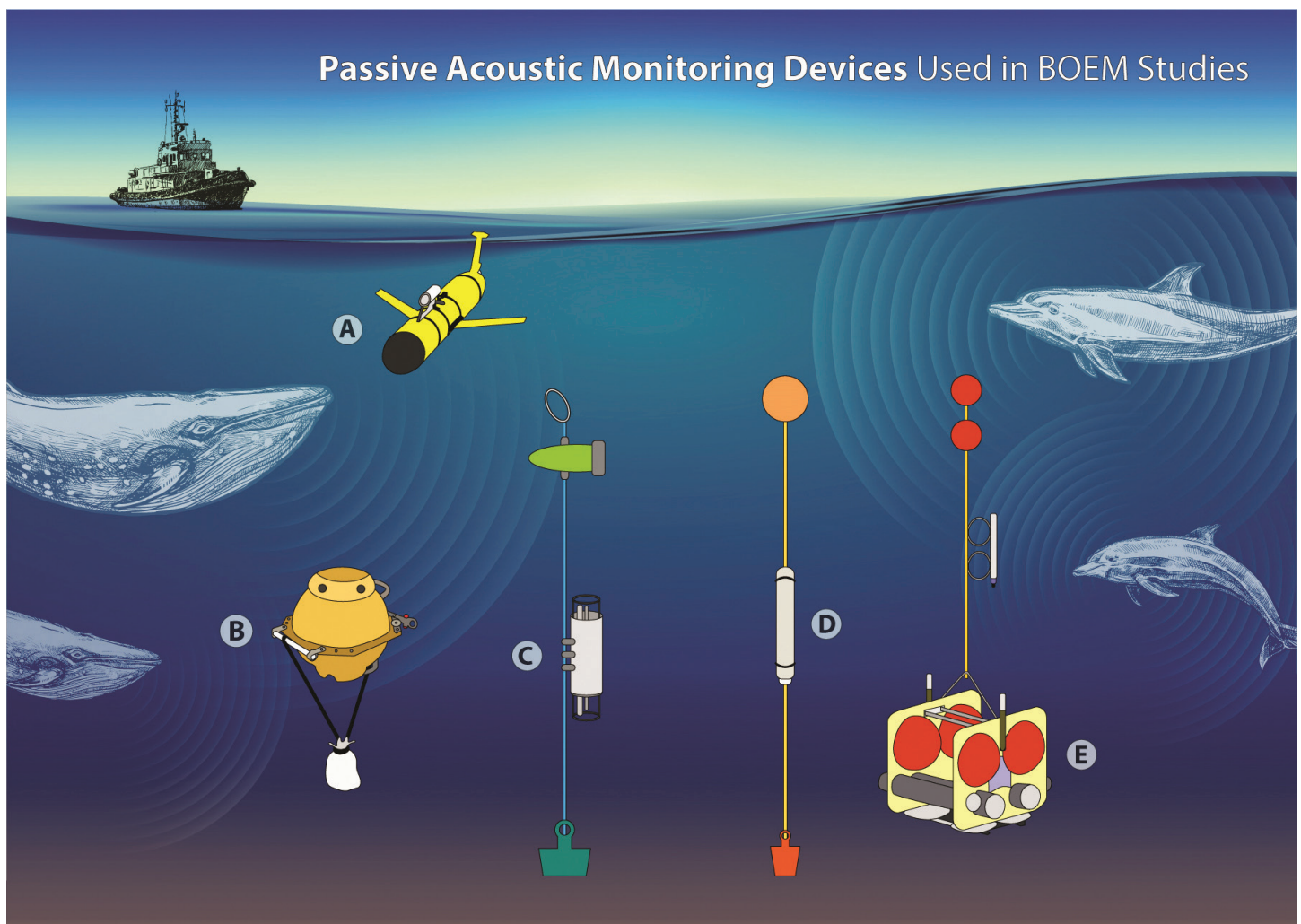
Traditionally, marine mammal scientists have looked for cetaceans (whales, dolphins, and porpoises) using binoculars while standing on the deck of a ship or through the window of an airplane. However, marine mammals can only be seen when they are at the surface in relatively calm weather during the day, so what are they doing the rest of the time?

Technology is now available to get closer to answering this question. Scientists can take advantage of the sounds cetaceans make and design ways to listen for them when they cannot be seen. As it turns out, cetaceans have distinct calls or sounds they make to communicate. Although not all the vocalization types or individually identifiable characteristics of calls have been pinpointed, most can be distinguished to the species level. Baleen whales produce low to mid-frequency sounds and some baleen whales—humpback whales for example—produce lengthy, complex

“songs.” Toothed cetaceans generally produce higher frequency vocalizations and also use these sounds to navigate and find food. For example, sperm whales use clicks, creaks, and buzzes to find prey in the deep ocean.

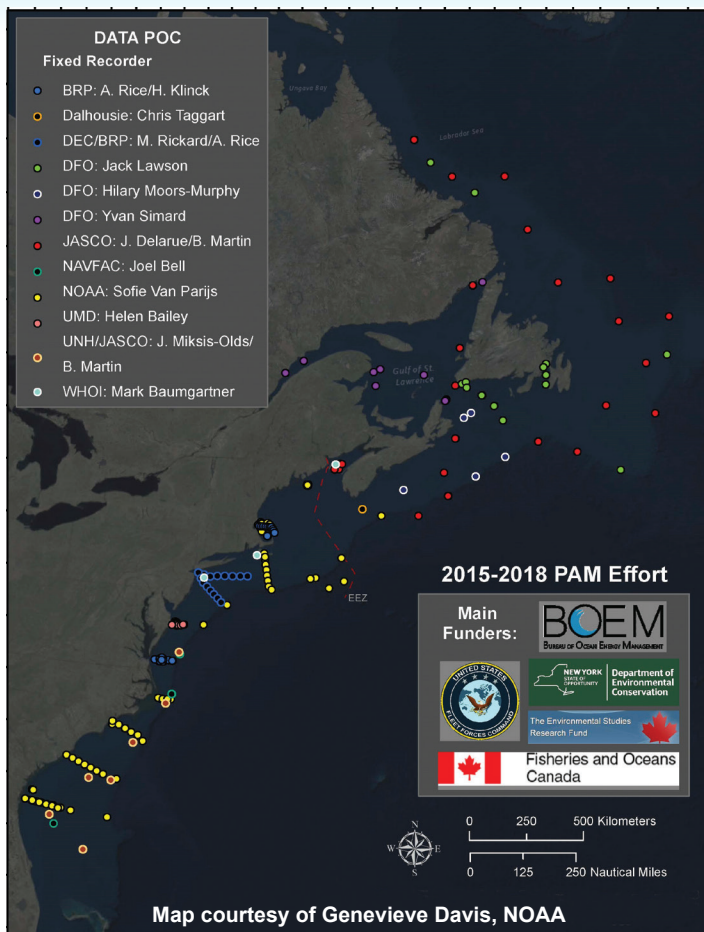
## HOW DOES BOEM DO IT?

Listening devices called hydrophones (underwater microphones) can record these sounds when placed on the seafloor, suspended in the water column, or towed behind a vessel. Several types of instruments exist that listen in different ways, including Marine Acoustic Recording Units (MARUs), High Frequency Acoustic Recording Packages (HARPs), and Cetacean Porpoise Detectors (C-PODs). These instruments can collect data continuously for several months before the hard drives are filled to capacity or the batteries run down. At the end of the study period, the



Passive acoustic monitoring devices used in BOEM studies: A) Slocum glider, B) Marine Acoustic Recording Units (MARU), C) Autonomous Marine Acoustic Recorder (AMAR), D) Cetacean Porpoise Detector (C-POD), and E) High Frequency Acoustic Recording Package (HARP)





acoustic gear is retrieved, and the data are downloaded and processed to find out what was heard.

## WHAT HAS BOEM LEARNED?

Over the past 10 years, BOEM has funded the placement of various instruments at several locations along the Atlantic coast, from Massachusetts to Georgia. While these instruments were collecting data at different times and locations, putting all the data together begins to tell a story about where certain cetacean species are most often found, sometimes how many there are and what they're doing, and can also reveal changes in distribution over time. Most notably, data combined from these and other studies have demonstrated changes in the distribution of the highly endangered North Atlantic right whale across the eastern seaboard of North America during the past decade (2004–2014). The persistence of this species in the mid-Atlantic throughout the year was not previously known.

## HOW WILL BOEM USE THIS INFORMATION?

This information will help identify the least impactful time of year to conduct offshore energy-related activities. For example, the installation of wind turbines may disturb protected species because of the sound generated by construction and associated vessel traffic. By focusing BOEM-related activities

during times when protected species are less likely to be present, potential impacts should be reduced.

Additionally, these data provide information on the background (ambient) sound levels in an area. For example, crashing waves and weather can be heard underwater, as well as the biological sounds made by marine mammals, fish, and snapping shrimp. Human-made sounds also contribute to the soundscape, such as vessels traveling from port to port. By analyzing these ambient sound levels, BOEM can gain a better understanding of the anticipated contribution that BOEM-related activities could make to the existing ocean soundscape.

These data assist BOEM in developing mitigation strategies and therefore play an important role in helping BOEM ensure that any OCS energy and marine mineral activities are conducted in an environmentally responsible way.

— Mary Boatman and Desray Reeb  
BOEM Office of Renewable Energy Programs

## FOR MORE INFORMATION

### Baseline Bioacoustic Characterization for Offshore Renewable Energy Development in the North Carolina and Georgia Wind Planning Areas

<https://www.data.boem.gov/PI/PDFImages/ESPIS/5/5474.pdf>

### Characterization and Potential Impacts of Noise Producing Construction and Operation Activities on the Outer Continental Shelf: Data Synthesis

<https://www.data.boem.gov/PI/PDFImages/ESPIS/5/5413.pdf>

### Atlantic Marine Assessment Program for Protected Species: 2010-2014

<https://marinecadastre.gov/espis/#/search/study/100019>

### Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles

<https://www.boem.gov/RI-MA-Whales-Turtles/Determining-Offshore-Use-by-Marine-Mammals-and-Ambient-Noise-Levels-Using-Passive-Acoustic-Monitoring-offshore-Maryland>

### Understanding Whale Presence in the Virginia Offshore Wind Energy Area using Passive Acoustic Monitoring

<https://www.boem.gov/Understanding-Whale-Presence-Virginia-Offshore-Wind-Energy-Area-Using-Passive-Acoustic/>



# Spotlight on a BOEM Science Team

IT IS AMAZING WHAT YOU CAN ACCOMPLISH IF YOU DO NOT CARE WHO GETS THE CREDIT.

-Harry S Truman

BOEM's Alaska OCS Region has taken a team approach to tackling issues involving marine mammals to achieve a more dynamic, comprehensive assessment of data needs, biological analyses, and development of mitigation measures to ensure protection of these species and their unique habitats.



Craig Perham, Carol Fairfield, and Chris Crews (left to right).

Craig Perham (left) and Chris Crews (right) work in the Alaska OCS Region's Environmental Assessment Section drafting and revising National Environmental Policy

Act-related (NEPA-) Environmental Impact Statements, Environmental Assessments, and Endangered Species Act (ESA) Biological Evaluations. Carol Fairfield (center) works in the Region's Environmental Studies Section where she collaborates with Chris and Craig to develop and manage studies focused on marine mammals and their habitat use in areas of interest throughout Alaska to supply information needed for their assessment work.

## Why did you decide to work for BOEM?

Chris had previously worked in Alaska and wished to move back with his family after working for the Bureau of Land Management (BLM) in Wyoming as a wildlife biologist. Craig joined the BOEM marine mammal team to explore new Arctic opportunities. Carol moved from the East Coast to further advance Arctic marine mammal science, intrigued by the effects of climate change on the Arctic marine ecosystems.

## How has your education and experience prepared you for your job?

These three team members each have a Bachelor of Science degree, while Craig and Carol also completed master's degrees. Craig focused on home range, habitat selection, and movements of lynx in eastern interior Alaska for his graduate thesis. He also served as the U.S. Fish and Wildlife Service (USFWS) Incidental Take Coordinator where he worked closely with oil and gas operators on the North Slope of Alaska on polar bear and walrus issues, gaining a better understanding of how industry works within the



Bowhead with tiny calf. Photo by Laura Ganley, NOAA.



confines of the Arctic environment. Carol, who completed her master's thesis on right whales along the eastern U.S. coast, had limited Arctic experience before joining BOEM, though she previously served as the Protected Species Studies Coordinator for BOEM's predecessor agency (Minerals Management Service) Headquarters. Her previous multi-disciplinary research helps her design ecosystem studies to decipher habitat needs for marine mammals in the Arctic. Chris started a master's degree program in Rangeland Ecology, focusing on grazing ecology and disturbance regimes. His education, melded with his experience working at BLM on permitting alternative energy development, mining, ranching, easements, and wildlife habitat development, cultivated his skills for developing NEPA-related products for the bureau.

### What do you enjoy most about your job?

Carol loves the experience she is gaining working with Alaskan Native villages and entities to integrate Traditional Knowledge into western science studies to help explain the changes that are being recorded in the Arctic. Chris enjoys the challenge of updating NEPA and ESA analyses with new information to more accurately explain the potential impacts of the bureau's decisions, while debunking misconceptions and wrongly interpreted science. Craig relishes the welcoming atmosphere of his colleagues.

### What project was your most memorable?

While working at BLM, Chris convinced one of the ranch operators to switch his livestock practices from grazing in riparian areas to grazing in uplands, which others had unsuccessfully tried to do for a quarter of a century. Chris' analyses of potential impacts of the proposed Liberty development project in the Beaufort Sea is one of his greatest achievements: he compared audiograms (i.e., a measure of a species hearing sensitivity across frequencies to the frequency content and intensity of anthropogenic noise sources to more accurately evaluate acoustic impacts on marine mammals, which was a novel approach for the Region and BOEM. Craig developed a protocol to use Forward Looking Infrared (FLIR) imagery from hand-held and aerial platforms to detect polar bear dens for mitigation of winter oil and gas activities to ensure dens were not disturbed. He also trained dogs to sniff out maternal polar bear dens, which proved more effective than using FLIR imagery, though both techniques continue to be used today. Carol was involved in the first multi-institutional Northwest Atlantic right whale individual identification catalog which has been greatly expanded over the years to include data from numerous researchers operating along the entire eastern coast of the U.S. One of her policy highlights was drafting a letter for President Clinton's signature to discourage U.S. importation of Canadian harvested polar bear pelts as a mechanism to protect this species from exploitation by non-Native large



Carol flying over the Beaufort Sea during the ASAMM study. Photo by BOEM.

game hunters.

### What advice would you share for working as a team, as opposed to alone, as a scientist?

Craig feels that though teamwork can be challenging at times, the division of labor is beneficial and a comprehensive end product where everyone on the team has a voice, is worth the extra effort to ensure many view-points are included. Carol emphasizes that by working as a team on a project, the sum of the outcome will be much greater than the sum of the parts that could be attainable working alone. Chris offered some great advice on working as a team: recognizing that everyone is unique and should not be judged or made to conform, to help others and worry less about what others are doing, focus on the role you have, and to follow the Golden Rule. We are striving to create a team bond through laughing together, tackling problems from alternate perspectives, recognizing individual talents, and appreciating the opportunity to work toward a common goal.



Beluga whales in Alaska. Photo by Lisa Barry, NOAA.



## BOEM OCEAN SCIENCE

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# New Waves

Late-Breaking News & Information

## BOEM's Renewable Energy Program - Engaged and Informed

December ushered in the Massachusetts offshore wind energy auction, resulting in a “bidding bonanza” with \$405 million in winning bids from three companies seeking to develop three lease areas totaling 390,000 acres. The bureau now has 15 active wind energy leases from Massachusetts to North Carolina covering nearly 2 million acres. BOEM anticipates auctions in the New York Bight in the near future.

Recently, BOEM approved seven Site Assessment Plans and is in the process of reviewing two Construction and Operations Plans on the East Coast, moving the Nation one step closer to seeing renewable energy from federal waters. On the West Coast, BOEM is partnering with the State of California to help identify potential areas for future offshore wind development. This past October, BOEM issued a Call for Information and Nominations offshore California to help assess industry interest for developing offshore wind projects and to obtain public input.



Public scoping meeting in Narragansett, RI, Nov. 8, 2018.  
Photo by Solomon Odom, BOEM.

To facilitate planning for these future offshore wind opportunities, BOEM and California created the California Offshore Wind Energy Gateway to help inform the public on data used in the decision-making process and assist BOEM in identifying appropriate areas for offshore wind energy development.

These initiatives and others contribute to BOEM's informed approach to responsibly developing offshore wind energy. BOEM continues to actively engage with its stakeholder community to ensure the United States has access to offshore wind for generations to come.

### FOR MORE INFORMATION

Office of Renewable Energy Programs  
<https://www.boem.gov/Renewable-Energy/>  
California Offshore Wind Energy Gateway  
<https://caoffshorewind.databasin.org/>