

MMS OCEAN SCIENCE

VOLUME 6 ISSUE 2
APRIL/MAY/JUNE 2009

THE SCIENCE & TECHNOLOGY JOURNAL OF THE MINERALS MANAGEMENT SERVICE



**Energy in Motion:
Researching
Designs, Standards
for Wave and
Current Energy-
Generating Devices**

**First Alaska CIAP
Grant Awarded:
Noise Monitoring in
the Chukchi Sea**

**Alaska Native
Hunters and
Whalers Actively
Engage in Satellite
Tracking Studies**

**The Long-Lived
Bowhead Whale**

**Final Rule for
Renewable Energy
Development on
the U.S. Outer
Continental Shelf**



MMS *OCEAN SCIENCE* is published quarterly by the Minerals Management Service to communicate recent ocean science and technological information and issues of interest related to offshore energy recovery, ocean stewardship, and mineral revenues.



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ABOUT THE COVER

Top left: Secretary Salazar touring the Medusa Spar offshore oil production rig in the Gulf of Mexico. Photo courtesy of Tami Heilemann, Department of the Interior-NBC.

Top middle: Devils Tower is located 150 miles southeast of New Orleans in the deep water of the Gulf of Mexico.

Top right: Walrus cow and calf. Photo courtesy of Alaska Department of Fish & Game.

Main photo: Bowhead whales near Barrow, Alaska. Photo courtesy of Julie Mocklin, National Marine Mammal Laboratory, Alaska Fisheries Science Center.

Back page: Background platform image by Gregory S. Boland.

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Publication services provided by Schatz Publishing Group

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www.mms.gov

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KEN SALAZAR, THE 50TH SECRETARY OF THE INTERIOR

Two days after he was unanimously confirmed by the U.S. Senate, Ken Salazar, the 50th Secretary of the Interior, introduced himself to employees of Department of the Interior bureaus in an All-Employees Meeting held in Washington, D.C., reaching employees across the country through teleconferencing lines.

In his mild-mannered tone, Salazar made it clear that he is no newcomer to resource management. His family has ranched and farmed lands in the San Luis Valley of southern Colorado for five generations, a heritage symbolized by his trademark cowboy hat.

“My family’s livelihood depended on the health of our land. Our parents taught us about the importance of water and about the importance of land. Because the sustainability of our family depended on how we took care of our land and our water, they taught us that we had to be responsible stewards of the water, soil, and wildlife around us, so that we could preserve the balance that allows us to ranch and farm, generation after generation.”

Elected Colorado’s 35th U.S. Senator in 2004, Salazar helped craft and pass the Energy Policy Act of 2005 and the Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007. He also served on the Energy and Natural Resources Committee.

From 1999 to 2004, Salazar served as Colorado’s Attorney General, and from 1987 to 1994 was chief legal counsel and executive director of the Colorado Department of Natural Resources, creating the Youth in Natural Resources Program to teach young people about their state’s natural resources.

On March 17, 2009, in a U.S. Senate Committee on Energy



Secretary Salazar accepts a stack of letters from a local fisherman at a town hall event in Dillingham, Alaska. Photo courtesy of Tami A. Heilemann, Department of the Interior.

and Natural Resources hearing on energy development on the public lands and Outer Continental Shelf (OCS), Salazar explained that “Developing these renewable resources requires a balanced and mindful approach that addresses the impacts of development on wildlife, water resources, and other interests under the Department’s management jurisdiction.

“At the same time, we must recognize that we will likely be dependent on conventional sources—oil, gas, and coal—for a significant portion of our energy for many years to come.” He also added that “Continuing to develop these assets, through an orderly process and based on sound science, adds important resources to our domestic energy production.”

Gathering and assessing information for a new comprehensive, environmentally appropriate energy development plan for the OCS has a high priority. In April 2009, to hear interested parties’ positions on energy

development on the OCS, Salazar held four regional public meetings (New Jersey, Louisiana, Alaska, California). He also requested and received from the Minerals Management Service (MMS) and the U.S. Geological Survey, a report on our offshore oil and gas resources and the potential for renewable energy resources, including wind, wave, and tidal energy.

The finalization of the new rule for renewable energy development and production on the OCS is the first step toward a promising vista (see page 15).

Under Secretary Salazar, MMS will continue its mission to manage the ocean energy and mineral resources on the OCS and Federal and Indian mineral revenues to enhance public and trust benefits, promote responsible use, and realize fair value.

FOR MORE INFORMATION
Department of the Interior
www.doi.gov/welcome.html

ENERGY IN MOTION:



RESEARCHING DESIGNS, STANDARDS FOR WAVE AND CURRENT ENERGY-GENERATING DEVICES

Agucadoura Wave Park, the world's first multi-unit wave farm, is still in the experimental stages. Located off the coast of Portugal, its three Pelamis wave conversion units were built by Pelamis Wave Power, a Scottish company. Photo courtesy of Pelamis Wave Power.

Interest in the potential of wave and current energy generation, though not new, has increased as we explore sources of renewable energy. To develop a sound basis for managing and regulating these emerging energy sources, the Minerals Management Service (MMS) is funding research and studies related to the development of renewable energy projects on the Outer Continental Shelf (OCS). Many of these studies and evaluations are carried out through MMS's Technology Assessment & Research Program.

Free Flow Energy, an engineering consulting firm specializing in new technology

hydrokinetics, was contracted by MMS to research and report on design and inspection criteria and standards for wave and current energy-generating devices.

Focusing on wave and current energy conversion equipment and their supporting systems, Free Flow Energy reviewed current technologies, engineering standards, and existing inspection and monitoring approaches and technologies in the U.S. and abroad. The nine-month research project also described safety and regulatory concerns and performed a gap analysis outlining possible modifications to regulations and standards for wave- and current-driven devices on the OCS.

According to the report, the most suitable sites for wave and current energy conversion will have one or more of the following characteristics: a deregulated power market, high electrical kilowatt hour rates, limited electrical power availability from traditional means, strong renewable energy incentives, and/or an existing electrical infrastructure.

The OCS presents design opportunities—unlike tidal flows, current flows are unidirectional—and design challenges. For example, offshore storms and water salinity can confound OCS energy conversion systems' design, implementation, and maintenance.



The Wavebob is an axi-symmetric, self-reacting point absorber, operating mainly in the heave mode. Developed by an Irish company, Wavebob, Ltd., it is specifically designed to recover useful power from ocean wave energy and to be deployed in large arrays offshore. In 2008 Wavebob, Ltd. received the Green Innovation Award in Dublin. Photo courtesy of wavebob.com.

In general, equipment designed for shallow freshwater risks failure when deployed in deep saltwater because of salt-related corrosion and the higher pressures of deeper water.

There is a wide range of technology to harness wave- and current-driven energy systems as resources for generating electricity. Because of the relative infancy of these technologies in the U.S., little research has been done on the OCS to document the technology's durability, structural integrity, overall efficiency, and environmental safety and impacts. Quality design standards, safety factors, and monitoring procedures must be established to ensure the protection of delicate ocean ecosystems.

Companies and institutes in Canada, Denmark, Finland, France, Norway, Portugal, Spain, the United Kingdom, the U.S., as well as Australia, New Zealand, and South Africa, are actively developing and piloting wave and current energy devices.

In April 2009 the Department of the Interior (DOI) and the Federal Energy Regulatory Commission (FERC) entered into an agreement that clarifies the two agencies' responsibilities for leasing and licensing renewable energy projects on the Outer Continental Shelf (OCS). The Memorandum of Understanding sets a process through which the DOI's Minerals Management Service (MMS) and FERC will lease, license, and regulate all renewable energy resources on the OCS. The MMS has exclusive jurisdiction over nonhydrokinetic energy projects, including wind and solar; it also has exclusive jurisdiction to issue leases, easements, and rights-of-way for hydrokinetic projects. The FERC has exclusive jurisdiction to issue licenses and exemptions for hydrokinetic projects on the OCS.

There are no design and construction standards specifically for wave and current energy conversion technology, but the European Marine Energy Centre (EMEC) and International Electrotechnical Commission is working on standards development. The EMEC, in the Orkney Islands of northern Scotland, is the leading test facility for tidal and wave energy equipment.

Some standards now in effect under MMS jurisdiction may be applied to wave and current energy conversion systems, but these apply to structures. For example,

platforms are designed to accept waves in ways that will reduce loading within the carrying capacity of the structure. But wave- and current-driven devices need to absorb and harness this source of energy; they need to be properly and effectively anchored or moored.

The final report noted that further development of these promising energy technologies will entail collaborative engineering standards, cooperation and coordination among developers, companies, academic institutions, and governmental agencies, as well as coordination with international efforts.

FOR MORE INFORMATION

MMS Renewable Energy and Alternate Uses
www.mms.gov/tarprojectcategories/AlternativeEnergy.htm

TA&R Renewable Energy Research and Studies
www.mms.gov/tarprojectcategories/AlternativeEnergy.htm

Free Flow Energy website and report
www.freeflowenergy.com/new_project.html

FIRST ALASKA CIAP GRANT AWARDED: NOISE MONITORING IN THE CHUKCHI SEA



Female ribbon seal. Photo courtesy of Vladimir Burkanov, NOAA.

Through its Coastal Impact Assistance Program (CIAP), the Minerals Management Service (MMS) has awarded a \$330,000 grant to the Alaska Department of Natural Resources. The first installment of the grant is \$150,000. Funds will be directed to the Alaska Department of Fish & Game for monitoring of the sources and levels of anthropogenic (e.g., seismic activity) and natural (e.g., marine mammal calls) noise in the Chukchi Sea.

The Chukchi Sea is important to many species of marine mammals, including polar bears, pinnipeds, such as walruses and ribbon seals, and cetaceans, such as beluga and bowhead whales. These marine mammals are an important

part of the subsistence culture of coastal Alaska Natives.

Future oil and gas development is planned in the Chukchi Sea. Substantial changes in the marine ecosystem, anticipated from climate change, include reduction of the thickness and spatial extent of sea ice. This can change acoustic propagation. Add to that an increase in anthropogenic noise sources from oil and gas activity and vessel traffic, and it's likely that noise levels and sources in the Chukchi Sea will change.

Before increased activities begin, and to gauge how marine mammals' distribution and abundance may be influenced by those activities, it's crucial to establish baseline information.

Hydroacoustic monitoring projects have been carried out in the Beaufort and Bering Seas, but there is little data from the Chukchi Sea.

The three-year project will gather and analyze data and information about existing noise levels and possible impacts on marine mammals.

In February 2009, a workshop was held in Anchorage to prioritize future research objectives, discuss the experimental design of new acoustic studies, including the logistics of instrument deployment, and develop strategies for collaboration and conservation. Participants included members of the oil and gas industry, Alaska Native marine mammal organizations, the North Slope Borough, the State of Alaska, the National Oceanic and Atmospheric Administration, universities, consulting firms, and MMS.

In the first two years of the project, hydroacoustic instruments will record noise, distinguishing among ambient, anthropogenic noises and calls made by marine mammals. During the third year, data will be analyzed, and findings will be documented in a report.

This new information is necessary to soundly assess impacts of oil and gas developments projects and to comply with the Alaska Coastal Management Program by avoiding, minimizing, or mitigating those impacts.



Polar bear swimming in the Chukchi Sea. Photo courtesy of U.S. Fish & Wildlife Service.

FOR MORE INFORMATION

MMS press release

<http://mms.gov/ooc/press/2009/press0330.htm>

Alaska Department of Fish & Game, Division of Wildlife Conservation, Marine Mammal Programs

www.wildlife.alaska.gov/index.cfm?adfg=marinemammals.programs

ALASKA NATIVE HUNTERS AND WHALERS ACTIVELY ENGAGE IN SATELLITE TRACKING STUDIES

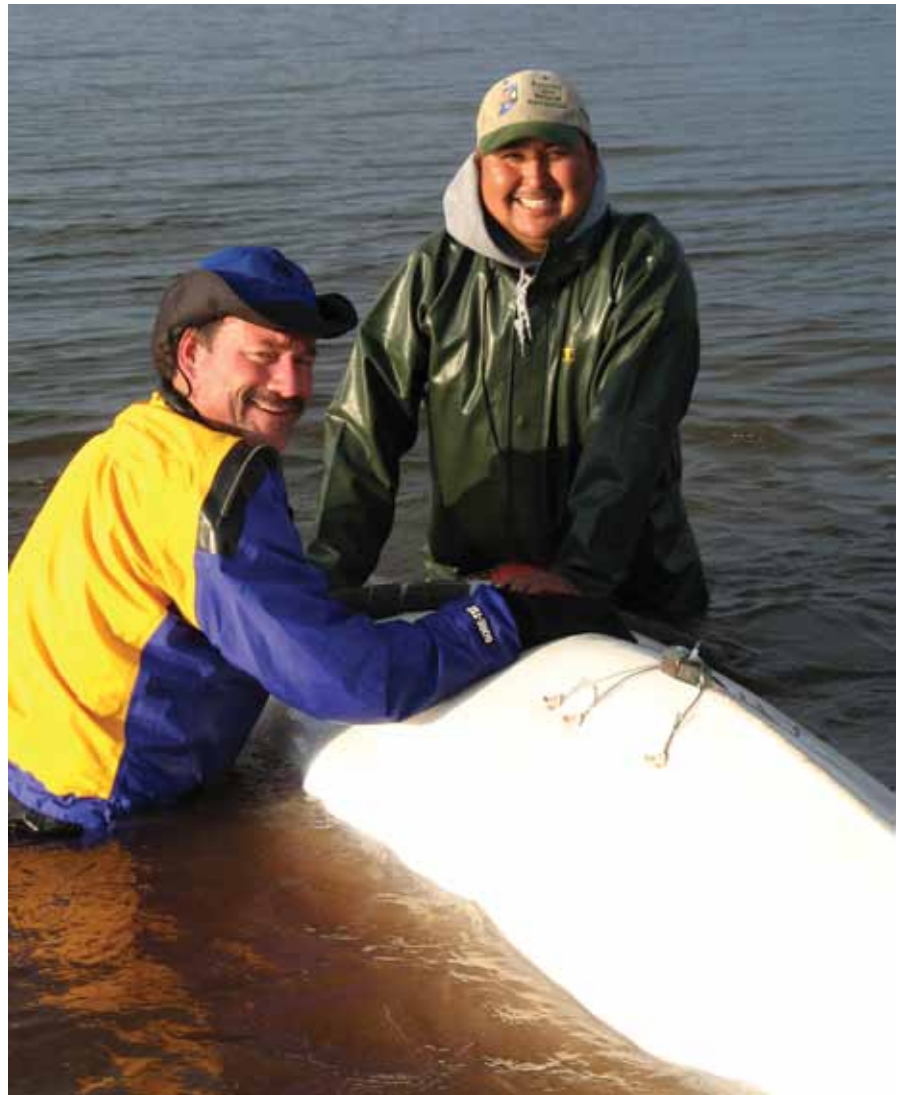
In early March 2009, under several feet of sea ice, protected from the harsh winds and wind chill temperatures of -50° F, a bowhead whale idled in the relatively warm waters of the Bering Strait. This young 30-foot-long whale, poised near the intersection of the Arctic Circle and the International Date Line, is set to dash northward followed by thousands of other bowhead whales though the icy leads of the Chukchi Sea. They're traveling to the abundant feeding areas of the Canadian Beaufort Sea for the summer open-water season.

For the past 6 months scientists have been continuously monitoring this whale's remarkable journey: an annual migratory cycle with a month-long visit to the Bering Sea near the entrance to the Gulf of Anadyr.

This young whale, #2008-8, equipped with a satellite transmitter, has sent scientists more than 2,000 bursts of information about its location and dive history. Its story began on September 23, 2008, at Barrow, Alaska, shortly after Billy Adams' power boat came a few meters away from it, and Harry Brower, Jr., used a modified harpoon to carefully insert a transmitter into the foot-thick blubber on the whale's back.

A New Engaged Approach

Harry and Billy are Alaska Native whalers. Their critical involvement in this Minerals Management Service (MMS)-funded bowhead whale tracking study is an outstanding example of a new approach to marine mammal research in the Arctic: directly involving Native subsistence hunters in handling the animals, deploying equipment, and making and interpreting observations.



Bob Small, Alaska Department of Fish & Game, and Albert Simon, Hooper Bay, with a recently tagged beluga whale. Photo courtesy of Bob Small, Alaska Department of Fish & Game.

Lori Quakenbush, Alaska Department of Fish & Game (ADF&G) is lead on this study and an architect of the new approach. Since August 2006 her team has deployed satellite transmitters on 28 bowhead whales. Lori spent over a year building consensus among Native whalers and their supporting organization, the Alaska Eskimo Whaling Commission (AEWC), and winning commitments of whalers' involvement in field activities. Her efforts were furthered

by cooperation of the North Slope Borough (NSB, the local governmental unit) and critical support from senior wildlife biologists, particularly Craig George, from the Department of Wildlife Management.

When two teams of Native whalers, led by Harry Brower, Jr., Billy Adams, and Lewis Brower, tagged 13 bowhead whales in just 4 days in September 2008, the value of the consensus was proven. The transmitters of those whales

Without the direct involvement of local Alaska Native hunters and whalers, these valuable studies would likely not be possible, or certainly would be greatly diminished.

have been broadcasting for 7 months and are providing the first documentation of the bowheads' winter and spring activities in the Chukchi and Bering Seas.

The active participation of the whalers in an MMS initiative also resolves potential political and logistical problems associated with high-profile studies of this kind. Alaska Native people living a subsistence lifestyle harvest marine mammals, especially bowhead and beluga whales, walrus, and bearded seals. Local development, including industrial activities associated with oil and gas, is often seen as potentially threatening to their traditional ways of life.

This view sometimes extends to scientific research. Native hunters and Native Commissions, such as the AEWC and the Eskimo Walrus Commission, have expressed concerns about the potential of research projects to directly interfere with annual hunts by displacing or sensitizing animals and so making them harder or more dangerous for hunters to obtain.

If the community believes the research is not worthwhile or will negatively impact their hunting, researchers face serious obstacles. Such concerns have made it difficult and expensive to undertake tagging and behavioral studies of bowheads and thus studies have been limited.

But when the hunters and whalers are involved in developing



Left to right: Mikkel Jensen (Greenland Institute of Natural Resources), Craig George (NSB Wildlife Biologist), and whalers Anthony Edwardson, Harry Brower, Jr., and Billy Adams discuss tagging bowhead whales at Barrow, Alaska. Photo courtesy of Lori Quakenbush, ADF&G.

and planning the study, the results benefit all parties: a greater shared understanding of the importance of the study results and also a study design that reduces interference with subsistence activities.

For relatively invasive research studies (such as tagging bowheads) to succeed, the cooperation and support of potentially-affected Alaska Native stakeholders are essential.

Direct involvement gives the Alaska Native community a partnership in the findings and a voice in how the project develops. Moreover, the Native community offers valuable expertise. They are familiar with the region and the distribution and behavior of marine mammals, and have local knowledge of weather, ice conditions, and other safety hazards. Perhaps most important, the Native community calls on their traditional knowledge to interpret observations by using what is known from the past. Working with local communities is also cost effective, compared with studies that use aircraft and large vessels.

Alaska Natives Help Scientists Advance Research

A number of MMS-supported cooperative projects have been undertaken in recent years or are now underway. The first notable study of this type was conducted 1998-2002 by ADF&G biologists Kathy Frost and Lloyd Lowry, NSB biologist Robert Suydam, and Native beluga hunters from Point Lay. Native subsistence hunters harvest beluga whales when they enter Kasegaluk Lagoon near their village in late June and early July. The whales are driven into shallow water where they can be instrumented with satellite-linked transmitters that record location and dive information. Twenty-three belugas were equipped and monitored by ARGOS satellites for up to 154 days. One noteworthy observation was that 5 of 9 adult males tagged early in their northward migration traveled through 90 percent pack ice cover to reach 79°N-80°N latitude by late July/early August. Researchers were surprised that these whales penetrated so far northward and into the ice pack.



Tagging a bowhead near Tuktoyaktuk, Canada. Photo courtesy of Bob Small, Alaska Department of Fish & Game.



Tagging walrus, using crossbows. Photo courtesy of Lori Quakenbush, Alaska Department of Fish & Game.

Alaska Native whalers are also key in field activities of another major MMS-supported study: the Bowhead Whale Feeding Study, conducted by the National Marine Mammal Laboratory (NMML). Dave Rugh, with NSB biologist Craig George, assembled a team of Barrow whalers to conduct boat surveys of bowheads and other marine mammals in the Beaufort Sea. During 2008, data from 18 surveys helped the research team estimate the timing and extent of local habitat use. Alaska Native whalers from Barrow also helped deploy passive acoustic and oceanographic instrumentation and moorings, assisted with bowhead diet and health studies by providing bowhead tissue samples from whales taken in the subsistence harvest, and helped calibrate data on whale length from aerial photography.

Two village-based studies of pinnipeds began in 2009. The first, led by Peter Boveng of the NMML, actively involves Alaska Native hunters in satellite-tagging bearded seals near villages along the Chukchi Sea coastline. During this 5-year study, 100 or more seals are expected to be tagged; local Alaska Natives have critical roles in boating, seal capture, and tagging. The

tags will provide data about seal movements and behavior.

In the second study, led by Quakenbush, Alaska Natives from coastal villages will learn to tag walrus with satellite transmitters and will tag over 100 animals during the next 5 years. The tagged walrus will help us better understand their movements and other behaviors, especially hauling out on beaches near the villages. Natives will conduct periodic surveys along the coastline. This is important because, as a result of diminished summer sea ice thought to result from global climate change, large groups of walrus are beginning to assemble on beaches where they have not previously been observed.

The Alaskan Arctic is changing. The Alaska Native communities that have lived there for generations are experiencing significant challenges as a result of climate change and associated reduction of sea ice. At the same time, increases in oil and gas development, shipping, tourism, and other human activities are expected. In the Arctic, the need for sound science in decisionmaking has never been greater.

The MMS understands that the Alaska Native community has a key role in advancing marine mammal science and research, which is critical to responsibly managing the rapidly-changing environment of the Arctic.

FOR MORE INFORMATION

MMS, Alaska OCS Region

www.mms.gov/alaska/

Alaska Native links

www.mms.gov/alaska/native/aknative.htm

Alaska Fisheries Science Center, National Marine Mammal Laboratory, NOAA

www.afsc.noaa.gov/nmml/

North Slope Borough

www.north-slope.org/

Alaska Department of Fish and Game

www.adfg.state.ak.us/

Alaska Eskimo Whaling Commission

www.uark.edu/misc/jcdixon/Historic_Whaling/AEWC/AEWC.htm

THE LONG-LIVED BOWHEAD WHALE



Bowhead whale, relative to average adult male. Photo courtesy of www.whales.org.

Known as the “ice whale” by the Eskimo and as the Greenland right whale by 19th-century whalers, the bowhead whale (*Balaena mysticetus*) lives exclusively in the Arctic Ocean and sub-Arctic waters around pack ice, usually in shallow water. Bowheads winter near the southern limit of the pack ice, then move north in the spring as the ice breaks up and recedes.

These blue-black whales have a white “chin strap” band around the lower jaw. The high, arched upper jaw is shaped like an archer’s bow. Like some other baleen whales, bowheads have no dorsal fin.

Among large whales, the bowhead is the best adapted to living in freezing waters. It has a blubber layer almost 2 feet (0.6 meters) thick, the thickest of all whales. To break through the ice to breathe, bowhead whales use their massive heads, which are about 30-40 percent of their entire body length.

The bowhead whale may be the longest lived mammal on our planet. Embedded weapon fragments and chemical analyses show that a bowhead whale’s lifespan exceeds 100 years.

As the third largest whale in the world (after the blue and the fin), the bowhead has the longest baleen of any whale. An adult’s baleen plates can reach 14 feet long (4.3 m) and 12 inches (30 centimeters) wide.

Mature adults can weigh over 60 tons (54,431 kilograms) and reach 40-60 feet long (14-18 m). Adults reach sexual maturity at about age 20. Typically solitary, bowheads form large groups in which they travel and feed.

Bowhead whales are slow swimmers (and so prime hunting targets) and slow breeders. An adult female calves once every 3-4 years; the gestation period is 13-14 months. Usually born during the northward spring migration, calves are dependent on their mothers for up to a year.

Predators of bowhead whales are few: humans and killer whales. Threats include ship strikes, entanglement in fishing gear, contaminants, anthropogenic (human-caused) noise, and habitat loss.

As early as the 15th century, bowheads were hunted commercially in the north Atlantic; in the north Pacific commercial hunting began in the 1840’s. Before then, the historic population, worldwide, was estimated at about 30,000-50,000. Current abundance is estimated at 7,000-10,000 worldwide.

The bowhead population now has only five stocks, each with distinct migration patterns based on food supply and the condition of the polar ice cap. The Spitsbergen stock (north Atlantic) has been reduced from an estimated 2,400 to fewer than 100; the Baffin Bay-Davis Strait and the Hudson Bay-Fox Basin stocks, once at an estimated 12,200, are now estimated at 450.

The Sea of Okhotsk (north Pacific) stock was reduced from about 3,000 to its current 150-200.

Only the Bering-Chukchi-Beaufort stock is found within U.S. waters. Before commercial exploitation, the stock consisted of 10,400-23,000 whales. It is currently estimated at 6,400-9,200 and is increasing 3.2 percent per year.

In the U.S., bowhead whales are listed as endangered under the Endangered Species Act and as depleted under the Marine Mammal Protection Act. They are also listed by the Convention on International Trade in Endangered Species. Commercial and subsistence hunting of bowhead whales is prohibited by the International Whaling Commission (IWC). However, the IWC made an exception for subsistence hunting by 10 Alaskan Native villages, who are among the indigenous peoples who have hunted bowhead whales for food and fuel for hundreds of years.

The Minerals Management Service’s (MMS’s) Bowhead Whale Aerial Survey Project (BWASP) annual surveys began in 1987. Now conducted through the National Marine Mammal Laboratory, BWASP provides real-time data on bowheads’ fall migration across the Alaskan Beaufort Sea and monitors trends in behaviors, distribution, habitat, and relative abundance.

Another MMS-funded program, the Bowhead Whale Feeding Ecology Study (BOWFEST) focuses on late summer oceanography and prey densities in relation to whale distribution and abundance. Results will help us understand bowhead behavior and distribution to better protect this endangered species.

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Cetacea
Suborder:	Mysticeti
Family:	Balaenidae
Genus:	<i>Balaena</i>
Species:	<i>mysticetus</i>

FOR MORE INFORMATION

Bowhead whale aerial surveys (BWASP, BOWFEST), National Marine Mammal Laboratory

www.afsc.noaa.gov/NMML/cetacean/bwasp/index.php

“Bowhead Whales May Be the World’s Oldest Mammals,” Alaska Science Forum

www.gi.alaska.edu/ScienceForum/ASF15/1529.html

Bowhead whale surveys, MMS, Alaska OCS Region, Kids Corner

www.mms.gov/alaska/kids/shorts/bwasp/bwasp.htm

NOAA Fisheries, Alaska Regional Office

www.fakr.noaa.gov/protectedresources/whales/bowhead/

The Minerals Management Service (MMS) is proud of the people whose work helps protect our Nation's precious resources. *Ocean Science* recently spoke with Dr. Chuck Monnett, Marine Ecologist in MMS's Alaska OCS Region.

OS: Tell us about your background, what you did before you joined MMS.

CM: Before I came to MMS, I spent 3 years in the Hawaiian Islands working as a wildlife biologist and refuge manager for the U.S. Fish & Wildlife Service. As manager for the Hawaiian Islands National Wildlife Refuge, I monitored seabirds, sea turtles, monk seals, and several indigenous endangered species.

My Ph.D. is in Ecology, my dissertation, funded by MMS, is about sea otter ecology in Prince William Sound. After graduate school I lived in Prince William Sound and continued researching sea otter behavior. When the Exxon *Valdez* oil spill occurred I was monitoring 57 sea otters that had been radio-instrumented and living in bays just east of the location of the spill. For the next 3 years I researched the spill's effects on sea otters.

OS: What specifically do you do?

CM: MMS focuses on potential effects of oil and gas development on marine mammals in Alaska. They hired me as a Marine Ecologist in Alaska 10 years ago. I work in the Environmental Studies Section, providing direction to and oversight of research studies of marine mammals in Alaska. Until recently I did field research myself: on polar bears, bowhead whales, and other Arctic marine mammals. Most of my time now is spent designing studies for other biologists to conduct, making sure they have the resources necessary to complete their work, and reviewing and sharing their results. I review reports and keep in frequent contact with biologists. It's exciting to be one of the first people to find out about their discoveries and to have access to near real-time data being reported through satellites.

OS: What groups and agencies do you work with?

CM: Federal science agencies like the National Marine Fisheries Service, U.S. Fish & Wildlife Service, and National Oceanic and Atmospheric Administration, and State agencies like the Alaska Department of Fish & Game. I also work with scientists from many fields, like physical oceanography, climate change, marine mammal science, telemetry, acoustic monitoring, and aircraft operations. They, in turn, work for various entities, including University of Alaska, University of



Dr. Monnett (far left) with aerial survey crew.

Washington, Oregon State University, Wood's Hole Oceanographic Institute, and University of Alberta. I also work with stakeholders, including environmental organizations, Native groups, and oil companies.

OS: What's most exciting to you about the work you do?

CM: I like being on the cutting edge—applying new technologies to solve very challenging research problems. Studies that combine satellite tracking applications with passive acoustic and oceanographic monitoring are giving us exciting new insights about Arctic ecology.

OS: What do you find most rewarding, or most challenging, about your work?

CM: The most challenging part of my work is getting diverse people to communicate, find common ground, and cooperate to solve important problems. The biggest reward comes when they do just that!

OS: How does your work contribute to MMS's mission?

CM: MMS has oversight of environmentally sound exploration and production of our Nation's energy resources on the Outer Continental Shelf. I like to think my work contributes substantially to the "environmentally sound" element of that goal.

OS: Right now what's your pet project, and why?

CM: MMS is supporting a number of multidisciplinary studies in the Alaskan Arctic that involve bowhead whales. I'm encouraging investigators from different disciplines to work on synthesizing complex findings to address emerging issues that are associated with climate change and expanding industrial development.

MMS-INDIA COOPERATION AND EXCHANGE IMPROVES ENVIRONMENTAL AND HUMAN SAFETY

Through its International Activities Program, the Minerals Management Service (MMS) engages in initiatives that promote better integration of safety and environmental concerns into offshore development decisionmaking. Key activities are assisting with needs assessments, monitoring and developing safety and environmental standards, and exchanging technical information with our counterparts in other nations.

With over 15 percent of the world's population and a growing economy, India is a significant consumer of oil and natural gas. Imports meet some of India's energy needs, but domestic oil and gas exploration, production, refining, and distribution are also undertaken in and offshore India.

In 2005, tragedy struck India's largest offshore oil and gas field, the Mumbai (Bombay) High field, which is in the Arabian Sea about 100 miles (160 kilometers) west of the Mumbai coast. The field had been in operation since 1974. The Mumbai High North platform (MHN), a 30-year-old, 7-story steel structure, was an oil and natural gas processing complex with a crude production capacity of 80,000 barrels per day.

In July 2005 a support vessel lost control, collided with the MHN, and broke a riser that carried oil from the undersea wells to the MHN. The leaking crude oil caught fire; gas, under high pressure, began to escape and ignited.

Within two hours, the entire platform had collapsed into the sea, leaving only a few foundation piers. Of 384 personnel, 11 people died and 11 others were reported missing.

After the MHN accident, India moved quickly to form a 30-member body of state and private entities tasked with



MMS Inspector Chet Miller (center) with engineers from India's Oil Industry Safety Directorate during inspection training on an oil and gas platform offshore southern California.

developing safety regulations and inspection procedures: the Ministry of Petroleum and Natural Gas' Oil Industry Safety Directorate (OISD). The OISD requested assistance, specifically from MMS, in developing regulations and procedures.

In 2006, the OISD and MMS signed a Memorandum of Understanding (MOU) for cooperation and information exchange related to safety and enforcement issues in regulating offshore oil and natural gas exploration and development. The Indian Government is self-funding its participation in the MOU; MMS participation is made possible through funding from the U.S. Trade and Development Agency.

Since the MOU was signed, MMS provided significant time reviewing and commenting on the OISD's initial set of 174 rules for improving offshore safety. In July 2008, the OISD was codified by the Indian Parliament as the primary regulatory body to ensure onshore and offshore safety in upstream and downstream oil and gas operations, and the draft 174 rules were promulgated into law.

In February 2009, OISD engineers visited the MMS Pacific OCS Region and the Gulf of Mexico OCS Region for shadow inspection training. During the 2-week visit, MMS staff in California and Louisiana provided detailed information about the



The Mumbai High North platform.



Mumbai High North on fire, July 2005.

legal framework, regulations, and inspection and enforcement tools used that help ensure clean and safe operations and proper metering of U.S. Outer Continental Shelf (OCS) oil and gas production.

To see how inspections are carried out, OISD engineers met with MMS staff in District offices and accompanied MMS inspectors

The MMS's regulatory program is a globally-recognized system that includes prescriptive regulations, industry standards, and performance measures. These are the basis for safe and environmentally sound OCS operations. At key stages of the exploration and development process, lessees are required to complete a number of plans and permits. The MMS inspectors perform onsite evaluations of equipment and operational practices to assure that field activities are conducted in accordance with approved documents.

and engineers on routine inspections of offshore facilities. Guest engineers learned first-hand about audits and safety management systems being used by oil and gas operators working on the OCS.

Now MMS and the OISD are working closely on a revised audit mechanism to inspect India's offshore operators. The OISD's regulations and guidelines will provide a well-reasoned and enforceable regulatory regime that operators will find transparent and consistent with international best practices. To further this effort, MMS will carry out a joint audit on operators in India later this year. Also, in May 2009 India's sister

agency, the Directorate General of Hydrocarbons (DGH), plans to sign an MOU with MMS on cooperation in tendering, resource evaluation, and methane hydrates research.

The MMS's International Activities Program demonstrates MMS's understanding that our shared planet needs protection and that international cooperation can help protect our oceans and the people engaged in energy exploration and production. As a steward of the ocean environment, MMS grasps the importance of protecting our natural resources and ensuring that energy activities are conducted safely both globally and domestically.

FOR MORE INFORMATION

MMS International Activities Program

www.mms.gov/international/InternationalBrochure.htm

MMS International Activities with India

www.mms.gov/international/india.htm

MMS press release

www.mms.gov/ooc/press/2009/press0217.htm

Mumbai High North Platform fire

www.mace.manchester.ac.uk/project/research/structures/strucfire/CaseStudy/HistoricFires/Other/default.htm

U.S. Department of Energy, Energy Information Administration: India

www.eia.doe.gov/emeu/cabs/India/Background.html

DEPARTMENT OF THE INTERIOR PARTNERS IN CONSERVATION AWARDS

Two partnership projects nominated by the Minerals Management Service (MMS) received Department of the Interior's Partners in Conservation Awards on May 7, 2009. These awards reaffirm the Department of the Interior's (DOI) and MMS's commitment to our ocean historical and natural resources.

Such partnerships lead to exceptional contributions in protecting and conserving our Nation's ocean resources and help MMS fulfill its resource management mission.

The Battle of the Atlantic Expedition

This collaboration among Federal, State, and academic entities is a multiyear project to research and document shipwreck sites that were sunk off the North Carolina coast during the World War II Battle of the Atlantic. The summer 2008 expedition surveyed, photographed, and documented American, British, and German naval vessels (including German U-boats) and merchant vessels in the area known as the Graveyard of the Atlantic. The wrecks are war graves and were left undisturbed, consistent with U.S. and international policy.

The partners are East Carolina University, Gray's Reef National Marine Sanctuary, MMS, National Oceanic and Atmospheric Administration, National Park Service, North Carolina Aquarium on Roanoke Island, North Carolina Department of Cultural Resources, and University of North Carolina Coastal Studies Institute.



Attending the award ceremony were, left to right: Nathan Richards, East Carolina University; Joseph Hoyt, NOAA; John Wagner, East Carolina University; Steven H. Sellers, East Carolina University; Walter Cruickshank, Acting Director, MMS; Ned Farquhar, Deputy Assistant Secretary for Land and Minerals Management, DOI; Ken Salazar, Secretary of the Interior; Dave Ball, MMS; David Alberg, NOAA; Tane Casserley, NOAA; David Conlin, National Park Service.

Flower Garden Banks Long-term Monitoring

Through a partnership with the National Oceanic and Atmospheric Administration's (NOAA) Office of National Marine Sanctuaries and academic and private sector scientists, MMS has monitored the Flower Garden Banks in the northwestern Gulf of Mexico for many years. Careful management and monitoring helps keep these reefs among the healthiest in the world.

The Flower Garden Banks is the northernmost coral reef in the western hemisphere. They are capped with reef-building corals that are home to a variety of marine life.

The MMS's stewardship program for the East and West Flower Garden Banks began in the early 1970's. In 1992, the Flower Garden Banks National Marine Sanctuary was designated; Stetson Bank was added in 1996. The Flower Garden Banks National Marine Sanctuary is south of the Texas-Louisiana border.

The partners are Boston University Marine Program; Dauphin Island Sea Lab; Geo-Marine, Inc.; MMS; NOAA's Office of National Marine Sanctuaries; and PBS&J Environmental Sciences.



Attending the award ceremony were, left to right: Ken J.P. Deslarzes, Geo-Marine, Inc.; Thomas E. Ahlfeld, MMS; Gregory S. Boland, MMS; Walter Cruickshank, Acting Director, MMS; Ned Farquhar, Deputy Assistant Secretary for Land and Minerals Management, DOI; Ken Salazar, Secretary of the Interior; G.P. Schmahl, NOAA Office of National Marine Sanctuaries; James E. Sinclair, MMS; Donald R. Deis, PBS&J Ecological Sciences; William F. Precht, PBS&J Ecological Sciences.

FOR MORE INFORMATION

Battle of the Atlantic Expedition, National Marine Sanctuaries, NOAA

<http://sanctuaries.noaa.gov/missions/battleoftheatlantic/>

Flower Garden Banks National Marine Sanctuary, NOAA

<http://flowergarden.noaa.gov/about/about.html>

Department of the Interior, Partnerships

www.doi.gov/partnerships/ccawards.html

FINAL RULE FOR RENEWABLE ENERGY DEVELOPMENT ON THE U.S. OUTER CONTINENTAL SHELF

On April 22, 2009—Earth Day—President Obama announced that the U.S. Department of the Interior (DOI) had finalized the long-awaited regulatory framework for renewable energy production on the Outer Continental Shelf (OCS). According to Secretary of the Interior Ken Salazar, “This new framework will enhance our energy security and create the foundation for a new offshore energy sector that will employ Americans developing clean and renewable energy.”

The Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf Final Rule (Final Rule) establishes a program for granting leases, easements, and rights-of-way for orderly, safe, and environmentally responsible renewable energy development activities on the OCS. The Final Rule and Notice of Availability of the Final Environmental Assessment were published in the *Federal Register* on April 29, 2009.

In this exciting new arena, the Minerals Management Service’s (MMS) Environmental Studies Program and Technology Assessment and Research Program have crucial roles in ensuring safety and environmentally responsible use of renewable OCS resources. These programs’ extensive investigations and research will inform MMS’s management of renewable energy activities.

The MMS has been an active partner with New Jersey and Rhode Island, which have been active in planning efforts to help

determine OCS areas appropriate for development.

Several other nations use offshore wind farms and are investing in developing other renewable resources, such as current and wave energy. Initiatives researching European experiences with offshore renewable energy will yield information about possible similar activity in U.S. waters. We also have opportunities to partner with and learn from other nations’ expertise in offshore renewable energy.

To avoid conflicts among users and maximize the economic and ecological benefits of the OCS, the Final Rule will be applied in conjunction with interagency-led planning activities, such as spatial planning incorporating ecosystem-based science and stewardship, socioeconomics, research, and modeling. The Council on Environmental Quality will help coordinate this interagency effort; MMS and the National Oceanic and Atmospheric Administration (NOAA) will have key roles.

A Memorandum of Understanding (MOU) signed by the DOI and the Federal Energy Regulatory Commission (FERC) on April 9, 2009, paved the way for the Final Rule’s publication. The MOU clarifies the agencies’ jurisdictional responsibilities for leasing and licensing renewable energy projects on the OCS.

Under the MOU, MMS has exclusive jurisdiction regarding the production, transportation, or transmission of energy from nonhydrokinetic renewable energy projects, including wind and solar.



President Barack Obama at the Trinity Structural Towers manufacturing plant in Newton, Iowa, April 22, 2009. The green facility builds towers for wind energy production on the site of a former Maytag plant east of Des Moines. Photo courtesy of Daywire/Getty Images.

The FERC has exclusive jurisdiction to issue licenses for the construction and operation of hydrokinetic projects, including wave and current, but companies must first obtain a lease through MMS.

The MMS and FERC will work together to develop policies and regulations for OCS hydrokinetic projects and will coordinate to ensure that hydrokinetic projects meet the public interest, including the adequate protection, mitigation, and enhancement of fish, wildlife, and marine resources and other beneficial public uses.

The Final Rule and the MOU ensure that developing renewable energy on the OCS happens efficiently, in an environmentally responsible manner, and with appropriate benefit to the people of the United States.

FOR MORE INFORMATION

Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf; Final Rule (30 CFR 250, 285, 290)

www.mms.gov/offshore/AlternativeEnergy/PDFs/AD30RenewableEnergy04-22-09.pdf

Renewable Energy Program, MMS

www.mms.gov/offshore/RenewableEnergy/index.htm

MMS OCEAN SCIENCE
Minerals Management Service
Mail Stop 5431
1201 Elmwood Park Boulevard
New Orleans, LA 70123

Prstd Std
US Postage
PAID
Nia. Falls, NY
Permit No. 28

MMS: A steward of the ocean environment

NEW WAVES

Late-Breaking News & Information

Central Planning Area Lease Sale 208

On March 18, 2009, Secretary of the Interior Ken Salazar opened the bidding for Central Planning Area Lease Sale 208, his first lease sale as the newly-confirmed Secretary of the U.S. Department of the Interior. Held at the Superdome in New Orleans, Louisiana, the sale of 348 blocks off the coast of Alabama, Louisiana, and Mississippi garnered bids for leases covering approximately 1.9 million acres of the Outer Continental Shelf in the Gulf of Mexico.

Lease Sale 208 generated \$933,649,315 in bids, including \$703,048,523 in high bids. Seventy companies submitted 476 bids on 348 blocks. The deepest block to receive a bid is in the Lloyd Ridge area at a depth of 9,961 feet (3,036 meters).

The lease sale included the 181 South Area, designated for revenue sharing in the 2006 Gulf of Mexico Energy Security Act (GOMESA).

Through GOMESA, coastal states and specified counties and parishes will receive 37.5 percent of the oil and gas leasing revenues. The Land and Water Conservation Fund will receive 12.5 percent of the allocated revenue.

Secretary of the Interior Ken Salazar examines a lease sale map with Lars Herbst, MMS Gulf of Mexico Regional Director and Chris Oynes, MMS Offshore Energy and Minerals Management Associate Director.



FOR MORE INFORMATION

Central Gulf of Mexico Lease Sale 208 information
www.gomr.mms.gov/homepg/lseale/208/cgom208.html