OCS Scientific Committee Meeting
April 29 – May 1, 2009
Sheraton Hotel
Anchorage, Alaska

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Official Proceedings

Wednesday, April 29, 2009

Introduction

The Outer Continental Shelf (OCS) Scientific Committee is chartered under the Federal Advisory Committee Act to advise the Secretary of the Department of the Interior (DOI) on the feasibility, appropriateness, and scientific value of the Minerals Management Service's (MMS) Environmental Studies Program (ESP). Its April 2009 meeting was called to order by the Chair, Dr. D. Michael Fry. Dr. James Kendall, Chief of the Environmental Division and Executive Secretary of the Committee, explained that the work the Committee does is extremely important for MMS's studies planning process and that overviews of ongoing activities would be presented including the Alaska, Gulf of Mexico, Pacific, and Headquarters' environmental concerns, the status of the regions, and what the ESP is proposing to do.

MMS Director's Presentation and Discussion with the Committee

Presentation by Mr. John Goll

Mr. Goll thanked the members of the Committee for the opportunity to meet in Alaska.

He said MMS was established 1982 and, since that time, has regulated production of about 11 billion barrels (Bbbl) of oil and 119 trillion cubic feet of natural gas (TCFG), which is a very sizeable amount in contributions to the country. During this time, MMS has collected and disbursed over $200 billion and collected great amounts of environmental and socioeconomic information so that activities can be done safely.

The 5-Year Oil and Gas (O&G) Leasing Schedule. One of the major challenges that the offshore program is facing is meeting the requirements of the current 5-Year O&G Leasing Schedule for 2007 – 2012. This schedule opens up about 48 million acres of offshore land for exploration and has proposed 21 lease sales in eight planning areas which include 12 leases in the Gulf of Mexico region and up to eight leases in the Alaska region plus a small triangle area off the Virginia coast in 2011. Within that program, it is estimated that about 10 Bbbl of oil and about 45 TCFG could be produced over a 45-year period and generate about $170 billion in net benefits to the Nation. The MMS has prevailed in a lawsuit on its approaches taken on climate change, baseline data, endangered species consultation, and basically the National Environmental Policy Act (NEPA) issues of the Schedule. However, the Court has requested that the Secretary reevaluate the environmental sensitivity section of the OCS Lands Act (OCSLA), rebalance that section, and create a program, whether it remains the same or is adjusted.

Renewable Energy Program. Another major challenge is the development of the Renewable Energy Program which was delegated to DOI and then re-delegated to MMS through the Energy Policy Act (EPAct) of 2005. On April 22, 2009, President Barack Obama directed MMS to finalize the framework to grant leases, easements, and rights-of-way for orderly, safe, and environmentally responsible renewable energy development activities. This has generated tremendous interest in communities along the coast, and over 40 nominations for technology testing or site assessments have been received under MMS's interim policy (http://www.boemre.gov/offshore/RenewableEnergy/RegulatoryInformation.htm which allows companies to express interest on whether they want to investigate certain areas for wind, wave, and other renewable energy. Mr. Goll stated that there have been several workshops sponsored by MMS to help determine future needs as this program moves forward; therefore, the Committee's guidance in regards to the environmental concerns of not just the O&G Program, the Sand and Gravel Program, and Marine Minerals Program, but also the Renewable Energy Program will be valuable.

On February 10, 2009, Secretary Ken Salazar announced that he:

1) extended the comment period on the Draft Proposed 5-Year O&G Leasing Schedule by 180 days to provide additional time to states, stakeholders, and affected communities for the opportunity to provide input on the future of offshore areas,
2) tasked MMS and United States Geological Survey (USGS) to produce a report on the offshore resources and potential impacts by the end of March, and
3) would conduct 4 regional meetings, one each for the Gulf Coast, Pacific Coast, Atlantic Coast, and Alaska, following the publication of the report.

Over the past few weeks, DOI and the Federal Energy Regulatory Commission (FERC) have entered into a Memorandum of Understanding (MOU) that identifies who is to be responsible for what on the OCS. It was agreed that DOI/MMS will be

responsible for wind, wave, and ocean current energy and other activities relating to leasing activities and FERC will be responsible for wave energy and ocean current energy relating to licensing.

Status of Offshore Energy and Minerals Management

Presentation by Dr. Jim Kendall

Dr. Kendall provided background information about MMS including the recent challenges that it is facing and particularly, Offshore Energy and Minerals Management (OEMM).

Dr. Kendall began his presentation by stating that the mission of MMS is to provide the American public with ocean energy, mineral resources, and resulting economic value in a safe and environmentally sound manner. Its vision is to be a model of excellence in ocean energy and minerals management.

Core objectives, which are taken very seriously, are:

1) Safe Offshore Operations – promote incident-free operations during exploration and development on Federal offshore lands,
2) Environmental Protection – ensure that all activities on Federal offshore lands are conducted with appropriate environmental safeguards, and
3) Fair Market Value – assure receipt of fair market value for the lands leased and the rights conveyed by the Federal Government.

He further explained that MMS must also meet other environmental requirements as mandated by a series of environmental laws. Information collected through the ESP assists MMS in meeting the requirements of these laws.

Environmental Laws Affecting the OCS Program

NEPA	►Includes environmental analysis and protection in project planning
Federal Water Pollution Control Act	►Regulates discharges from O&G activities into marine waters
Clean Air Act (CAA)	►Regulates air emissions from industrial activities
Coastal Zone Management Act	►Assures compliance with State coastal area protection plans
Endangered Species Act (ESA)	►Protects threatened and endangered species
Marine Mammal Protection Act	►Protects marine mammals
Fishery Conservation and Management Act	►Protects essential fish habitat
National Historic Preservation Act (NHPA)	►Protects archaeological resources including those on the ocean floor
Oil Pollution Act	►Regulates oil spill financial responsibility

The MMS also works with, and partners with, other Federal agencies, both as a part of doing business and through joint funding of research efforts to meet mutual information needs:

- U.S. Coast Guard
  - Oil-spill response
  - Port and vessel security and inspections
- Environmental Protection Agency (EPA)
  - Air and water quality
- National Oceanic and Atmospheric Administration (NOAA)
  - Coastal programs
  - Marine mammals/endangered species
- Fish and Wildlife Service
  - Marine mammals/endangered species
- USGS
  - Cooperative research efforts

Environmental studies information is exchanged between state departments and local communities with MMS:

- Coastal Commissions,
- Departments of Fish and Wildlife,
- Air Resource Boards,
- Departments of Water Resources,
- Departments of Conservation and Natural Resources,
- Departments of Environmental Regulation,
- Departments of Culture, Recreation, and Tourism, and
- Regional Governor's Alliances.

He also explained the MMS Leasing, Exploration, and Development Process.

For the 2007 – 2012 program, there were 21 lease sales planned: one on the Atlantic Coast, 12 in the Gulf of Mexico, and eight in Alaska. When the moratoria expired, MMS released the draft proposed program (2010-2015) to provide the new Administration the greatest possible flexibility. The MMS will work under the existing 2007 – 2012 5-Year Plan until decisions are made regarding the 2010 – 2015 Plan.

Oil and Gas. The MMS regulates everything from leasing to decommissioning. There are over 8,400 leases with 44 million acres under lease in the Gulf of Mexico, 79 leases in the Pacific, and 750 in Alaska. In terms of energy production for the country, the OCS is responsible for 27 percent of the oil and 15 percent of the natural gas domestically produced.

Potential Wind Energy. Although there is potential wind energy off regional coasts, estimating what is extractable in development is difficult. For instance, the Pacific coast may have good winds, but its OCS gets deep very quickly and, unless there are major advances in having windmills sitting in very deepwater, development will be difficult. Alaska has great renewable energy in terms of wind, wave and current, but the technology can't handle the harsh environment.

Potential Current Energy. Dr. Kendall explained that the most likely area for current energy would be off of Florida in the Gulf Stream. Southeast Florida has the greatest potential for future development of current power in the U.S. due to the strong and steady flow of the Gulf Stream current. Recent estimates by Florida Atlantic University range between 4 to 8 gigawatts (35 to 70 terawatt-hours per year) annual average power which could power between 3 – 7 million average U.S. homes.

Renewable Energy Program. The final regulations of the framework for the Renewable Energy Program have been completed and are currently under review by the Office of Management and Budget. An interim policy has been published in order for companies to apply for short leases (about 5 years) and to erect meteorological towers to determine the resources and do testing.

Cape Wind Project. The MMS received a request from Cape Wind Associates, LLC, for a lease to construct and operate a wind park located in Federal waters 4.7 miles offshore Cape Cod, Massachusetts. The proposal consists of 130, 3.6-megawatt (MW) wind turbine generators covering 24 square miles in Federal waters of Nantucket Sound with the capacity to produce about 468 MW. The average expected production from the proposed wind farm could provide about 75 percent of the electricity demand for Cape Cod and the Islands of Martha's Vineyard and Nantucket. At average, it is expected that production from Cape Wind could produce enough energy to power more than 200,000 homes in Massachusetts.

The Coastal Impact Assistance Program (CIAP). The EPAct, Section 384, established the CIAP, which authorizes funds to be distributed to O&G producing states to mitigate the impacts of OCS O&G activities. Under the CIAP, the Secretary of the Interior is authorized to distribute to producing states and coastal political subdivisions (CPS) $250 million for fiscal years (FY) 2007 through 2010. This money will be shared among Alabama, Alaska, California, Louisiana, Mississippi, and Texas, and will be allocated to each producing State and eligible CPS based upon allocation formulas prescribed by the Act. The MMS developed program documents to provide guidance and direction to the eligible States and CPS interested in participating in the CIAP.

The Gulf of Mexico Energy Security Act of 2006 Revenue Sharing**.** The EPAct also required MMS to amend the regulations on distribution and disbursement of royalties, rentals, and bonuses. The amendments specify the allocation and disbursement of revenues from certain leases on the Gulf of Mexico OCS and sets forth the formula and methodology for calculating and allocating revenues to the States of Alabama, Louisiana, Mississippi, and Texas, their eligible political subdivisions, and the Land and Water Conservation Fund from the 181sale area in the Eastern Gulf of Mexico Planning Area for FY 2007 through 2016.

Major issues. Major issues MMS is working on include:

- implementing current 5-Year Program lease sales (2007 – 2012),
- beginning process for a potential new 5-Year Program (2010 – 2015),
- renewable energy rulemaking and program establishment (including Cape Wind)

Alaska OCS Regional Overview

Presentation by Mr. John Goll

Mr. Goll provided an overview of ongoing and planned activities in Alaska. The Alaska OCS is now producing oil, has had renewed industry interest in its great oil and gas resource potential, and has some exciting projects coming down the road. But numerous challenges persist, including technical, environmental, and sociological, plus litigation.

He stated that most of the Region's work is on the North Slope and the Aleutians East Borough. For size comparison, he displayed a map showing that Alaska is as big as the entire eastern seaboard. In Alaska, the total amount of roads is about 13-and-a-half thousand miles which include gravel roads. Because of this, it is difficult to reach places where research is being conducted, so other transportation such as by plane or by ship must be used which also makes it very expensive.

He explained that there are 1.7 billion acres in the OCS and that a little more than 1 billion of those acres are in Alaska. The DOI manages 52 percent of that acreage:

- 3,900 miles of Alaskan coastline,
- 75 billion acres of refuge lands (85 percent of all U.S. refuge lands),
- 54 million acres of park lands (65 percent of U.S. park lands),
- 85.6 million acres of Bureau of Land Management (BLM) land (33 percent of BLM lands), and
- 1.08 billion acres of OCS (seabed).

The TransAlaska Pipeline, at its peak, provided over 2 million barrels (MMBL) per day; now it is down to 740,000 barrels (bbl) per day. The owners of the pipeline are projecting that in less than 10 years, there will be under one-half MMBL day, and that is an important figure because this pipeline was designed for high volumes. When the figure gets down to 300,000 – 500,000 bbl per day, either it is not going to work any longer or some major changes are going to have to be made to it to downsize it, which then would strand a lot of resources on State and other lands in Alaska. This is also true with the gas pipeline.

The question, therefore, is whether or not other resources can be found prior to this decline. The Chukchi Sea is the major area with foreseen undiscovered but technically recoverable O&G along with the North Aleutian Basin (NAB).

He explained the areas in Alaska which have production:

- In the Beaufort Sea, Northstar has the only ongoing production. The main part of the infrastructure is Deadhorse which is the center of development and extends the primary of Prudhoe Bay. About 80 percent of that roughly is State and about 20 percent is Federal. Seismic surveys have been done within the Beaufort Sea, and there has been site clearance work for exploration. The Liberty Development Project, which was approved a year ago, will be drilled from an existing island within State waters 5-8 miles out into the OCS.
- In the Chukchi Sea, companies are collecting more seismic data and doing site clearance primarily in two areas: 1) the Burger Prospect and 2) the Klondike Prospect. Other site clearance information and environmental data that are more site-specific along the coastline, which is needed for exploration plans, have also been collected during the past 2 years.
- In the NAB, there is a sale proposed in 2011. The work for this sale started about a year earlier than normal in order to collect more information and to meet with more communities and fishing groups in the Seattle area. There is a Memorandum of Agreement with the Aleutians East Borough, which is the local community of the Alaska Peninsula that would like to see a sale occur if it can be done properly with regard to proper mitigation, etc.
- In Cook Inlet, although there is some activity, during the last couple of times a lease sale has been held there has been no interest. The production from Cook Inlet is all within State waters and provides oil that is used for gasoline, jet fuel, etc., for the planes and cars in that area and likewise, the natural gas which heats Alaska homes. It has been an area of decline, but there is one area, the Cosmopolitan Unit, in which MMS and the State of Alaska share management. There has also been exploratory drilling in that area from shore going out into what is hoped to be a good reservoir.

On the topic of lawsuits, he explained that basically everything that the Region does receives a Freedom of Information Act request, which takes a lot of staff time.

Pending lawsuits are:

- U.S. District Court of Alaska - Chukchi Sea Sale 193 – expected to go to hearing Summer of 2009
- U.S. Court of Appeals for the 9th Circuit:

1) Shell Beaufort Sea Exploration
   - November 2008 – 9th Circuit vacated approval/remanded to MMS
   - Split decision
   - March 6, 2009 – court vacated its November decision
2) Beaufort Sea Sale 202
   - DOI prevailed in Alaska District
   - Plaintiffs appealed to 9th Circuit
3) Seismic Surveys – Beaufort and Chukchi Seas
   - DOI prevailed in Alaska District
   - Plaintiffs appealed to 9th Circuit, but agreed to drop the case
   - March 2009 – 9th Circuit declared the case moot

Mr. Goll mentioned a list of issues facing the Region in sharing the shelf with the communities:

- subsistence,
- equity of risk, i.e., the Alaskans take all of the risks and get none of the benefits such as revenue sharing,
- overload of projects,
- stress on the culture,
- the economy can go both ways, i.e., offshore could be bringing more tax base to some of these communities and also jobs,
- environmental issues, i.e., protected species, noise in the ocean issue, climate change effects,
- if the Arctic Ocean does open up more and is freed of ice, the possibility of more shipping, and
- dispute over waters with Canada in the Beaufort Sea.

Mr. Goll pointed out the partnerships MMS has in the Region:

- Alaska Resources Library and Information Services,
- Coastal Marine Institute,
- Alaska Ocean Observing System, and
- North Slope Science Initiative.

This past October, the Alaska OCS Region held an Information Transfer Meeting (ITM) which was done in conjunction with the U.S. and Canadian Northern Oil and Gas Research Forum. Not only did the Canadians want to know what MMS is doing in the Beaufort Sea, MMS wanted to know what they were doing in Canadian waters in the Beaufort Sea. For further information regarding the results of these meetings, please go to http://www.ntis.gov/search/product.aspx?ABBR=PB2009106369 and http://www.petroleumnews.com/pntruncate/866693369.shtml.

A Comprehensive Approach Towards Future MMS Scientific Needs

Presentation by Dr. Rodney Cluck

Dr. Cluck presented MMS Headquarters ESP future goals. The presentation discussed a comprehensive approach to management of studies where oil and gas efforts, sand and gravel, and alternative energy are all included in regional studies planning. The focus was on the integration of alternative energy into the existing studies process.

Dr. Cluck stated that since these are exciting times for the studies program, DOI, and the Nation, he has created an ESP Vision Statement which, with the 2010 through 2012 Studies Development Plan, takes MMS towards new areas of the OCS for O&G development and innovative technologies for using renewable energy resources such as ocean wind and wave current. The ESP's comprehensive approach considers the potential for new energy opportunities that will help secure America's energy future and stimulate both job growth and overall economic conditions while protecting the environment.

Budget. He stated that the ESP budget has been relatively consistent, around a little less than $20 million for several years. In FY 2007 and FY 2008, 75 percent of the funding went to O&G; renewable energy received 17 percent, and hybrid received 8 percent.

Environmental Studies Program. The mission of the ESP is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production. This includes information on marine mammals, off-shore safety, deep sea monitoring, and marine environment.

Each year, the ESP determines what information is needed and consults with internal and external stakeholders, develops regional studies plans, meets with the Committee as well as its subcommittees, and develops a National Studies List.

ESP Priorities. Hot topics include new geographic areas such as the Chukchi Sea, NAB, Atlantic Ocean, Northern Pacific area, and topical issues such as noise, socioeconomics, avian issues, electromagnetic fields, and marine mammals.

In conclusion, Dr. Cluck said that MMS depends on applied science that is produced through the ESP in order to make good decisions.

Overview of Regional Environmental Programs Including Regional Components of the ESP

Presentations were given by Regional Supervisors to provide a brief orientation of the OCS Program as well as regional challenges. The presentations focused on the most pressing issues facing Alaska, the Gulf of Mexico/Atlantic, and the Pacific Regions.

Alaska OCS Region
Presentation by Dr. Cleve Cowles

Dr. Cowles displayed a map of Alaska which showed the overall planning areas for the Region over the years, and stated that there have been 25 lease sales, more than 2,300 leases have been issued over the years, and there have been 85 exploratory wells drilled. With over one billion acres of OCS, there is a total of 84 million acres in the various planning areas, four of which are in Cook Inlet, North Aleutian, Beaufort, and Chukchi Sea planning areas. He also explained that NEPA is a very major law integrated into the planning and processing of the proposals that are reviewed either from within the government or industry.

Currently, the Alaska OCS Region's Office of Leasing and Environment has two Environmental Analysis Sections, the Environmental Studies Management Section, and the Leasing Activities Section. The preponderance of the work being done is NEPA and the ESA work which generates the various Environmental Impact Statements (EIS's), Environmental Assessments (EA's), and reviews of projects that are submitted to the field office or resource evaluation.

The OCSLA has four stages that focus on studies analyses at different phases: planning, leasing, exploration, and production.

The program stage entails the planning stage which basically sets schedules, proposed sale locations, etc.

Prior to any lease sale, an EIS is prepared to analyze the terms of the proposed sale and evaluate potential mitigating measures and cumulative effects which will inform the decision-maker prior to the decision to hold the sale. The Environmental Analysis Sections are very closely integrated with environmental studies management and the studies program and are considered key players during the NEPA analysis. Although the plans are circulated to over 200 entities in Alaska, the Environmental Analysis Sections have strong weighting in the projects that are proposed and which the Committee will be reviewing.

During the exploration stage, plans are again reviewed to determine whether to approve the lessees' exploration plans at a more focused site-specific level. The DOI allows this stage to proceed only if the plan proves not to be unduly harmful to aquatic life in the area, result in pollution, create hazardous or unsafe conditions, unreasonably interfere with other use of the area, or disturb any site structure or object of historical or archeological significance.

Lastly, during the development of the production stage, an EIS is prepared under the NEPA procedures. Dr. Cowles stressed to the Committee that there is a very extensive public comment review process which the staff considers in preparing the final EIS.

The OCSLA defines environmental research monitoring as providing time series and data trend information which can be used for comparison to any previously collected data for the purposes of identifying significant changes in the productivity and quality of the marine environment. In addition to that part of the OCSLA, under MMS regulations, once industry is issued a lease, it is their responsibility to consider environmental research. He emphasized to the Committee that the Region really appreciates its contribution in helping to design the Arctic Nearshore Impact Monitoring in Development Areas project. This project is a multi-year, multidisciplinary study to monitor impacts associated with development activities and initial production of oil from the Northstar and Liberty Units in the nearshore portion of the Alaska OCS in the Beaufort Sea which also included hydrocarbons and

trace metal sampling. This project has enabled MMS to obtain a baseline that goes back for quite a long time; therefore, it is not just the time at which a study occurs that baselines can be established.

Dr. Cowles identified and described seven proposed sales in four Alaska Planning Areas for OCS O&G in the Region's Proposed Final Program for 2007 through 20012.

On-Going Studies Program
Presentation by Dr. Dee Williams

Dr. Williams began his presentation by re-iterating that there are four diverse planning areas in Alaska and that 63 percent of the studies are cooperatively funded.

He explained some of the Alaska OCS Region's planning trends which are:

- Data collection over regional/local scale, 2 – 3 years. Studies are targeted at a regional or local scale and the 5-Year Plan is focused to capture interannual variability and, since there must be 2 – 3 years of field work, by the time the preliminary work is finished, (i.e., 1 year to start up and 1 year to write the results), the 5 years have been consumed, and then it is time to evaluate how successful a particular project has been and move on with a subsequent study.
- Increasing integration of Physical Oceanography, Biology, and Social Science research at the project level. The program has always imagined integration between the disciplines in an organizational sense, but increasingly, the Region finds itself positioned to advance projects that actually incorporate these dimensions at a particular project level.
- Long-term data sampling in the Beaufort and Chukchi Seas and the NAB. If there is a place where there is production development, it would be a 20-year sampling strategy. As an example, he cited that a program to collect social indicators in the NAB has recently begun and it is imagined that collecting would occur on a 5-year frequency; however, there will be at least four rounds of that kind of data collection.
- Extension of successful projects. There is no embarrassment at all to reproduce or take another round at projects that are successful in collecting the kind of data that feeds important analysis.
- Maximize cooperative and multi-lateral efforts.
- Pragmatic opportunism. There is pragmatism to the way in which MMS can cooperate. A lot of time is spent cooperating with other agencies, and this affects not only how studies are designed but also how the procurement is designed. Adjustments in interagency agreements have been made to allow for more efficient and rapid procurement of studies.
- Coordinate data collection standards.
- Enhance distribution of study reports/data. More resources and energy are being invested to ensure that the distribution of study reports and data is occurring as broadly and as efficiently as possible.

Dr. Williams presented a short orientation of the first six studies that the Committee would not be reviewing tomorrow in the Discipline Breakout Groups. Those studies are:

- Juvenile and Maturing Salmon Use of the North Aleutian Basin Lease Area,
- Spatial and Temporal Mapping of Nearshore Juvenile Fish and Larval Crab,
- Bowhead Whale Feeding Variability in the Western Alaskan Beaufort Sea: Satellite Tracking of Bowhead Whales (Extension),
- Bowhead Whale Feeding Variability in the Western Alaskan Beaufort Sea: Oceanography and Feeding (Extension),
- Alaska Marine Science Symposium, and
- Management, Logistics, and Warehouse Storage of Oceanographic Equipment.

He explained that the Committee has already reviewed the first two studies which have received allocations, have been requisitioned, and are under legal review. The third and fourth studies are a set since they are extensions of an existing project. The last two items, although not science studies, support science so funds are dedicated to support those activities.

Gulf of Mexico OCS Region
Presentation by Mr. Joe Christopher

Mr. Christopher explained the structure of the Region's office. There are five program offices which are Field Operations, Leasing and Environment, Production and Development, Resource Evaluation, and Information Management Services. Within the Field Operations Office, there are five district offices which are where the platform inspectors are based. There are also five sections within the Leasing and Environment Office: Leasing Activities Section which handles the leasing process, Environmental Assessment Section that primarily handles pre-lease activities, Environmental Sciences Section which is the studies group, the

Environmental Compliance Section which does the postlease NEPA work, and the Coastal Programs Section which oversees the CIAP and the marine minerals issues.

He stated that the Gulf of Mexico obviously is very important to the energy picture of the country producing 25 percent of the oil, and 7.6 percent of that comes from the shallow-water Gulf and 17.8 percent from the deepwater Gulf. The percent of natural gas is 14 percent, with 8.8 percent from shallow water and 5 percent from deep water.

Mr. Christopher displayed power point presentations which indicated the sites of production.

He noted that, regarding activity levels, there have been changes due to the drop in the price of oil and the economy in general. There are Mobile Offshore Drilling Units, which include jack-up rigs, semi-submersibles and drilling barges in shallower water; in deeper water greater than about 500 feet, there are semi-submersibles and drillships. There has been a drop in the count in shallow water by 43 percent from April 2008 to April 2009. It has remained fairly stable in deep water, but it has been difficult due to lower O&G prices, higher rig and equipment costs, higher insurance costs, and reduced availability of loans to fund new drilling.

Mr. Christopher described notable development projects that are ongoing right now which include:

- Cascade-Chinook which is a floating production storage and offloading facility that will be the first of its kind in the Gulf of Mexico and will be located in Walker Ridge, about 165 miles south of Louisiana in 8,200 feet of water.
- Perdido Hub. Although this host facility is not on line until the end of this decade, it will be the deepest direct vertical access spar in the world (nearly as tall as the Eiffel Tower) moored on the Great White Field about 200 miles south of Freeport, Texas, in about 8,000 feet of water.
- Blind Faith is in the Mississippi Canyon about 160 miles southeast of New Orleans in 6,500 feet of water, with production wells in 7,000 feet of water. It started producing oil late last year and should produce about 30,000 bbl of oil and 30 million cubic feet of natural gas (MMCFG) per day at first, and then is expected to increase to 65,000 bbl of oil a day and 65 MMCFG.

Last year was a very good year for lease sales with a total of $4.2 billion in bids. In March of 2009, there was a Central Gulf Sale which had been the first Gulf of Mexico sale in 20 years to include the south of Sale 181 area and had totaled $703 billion in bids.

Remaining sales in the current program appear in the Central and Western Gulf , with a Virginia Sale in 2011.

Unfortunately, hurricanes were once again big in the Gulf last year. The number of platforms affected by Ike's winds was 1,450 and 677 by Gustav's winds. There were 60 platforms destroyed as a result of the two storms. Prior to being destroyed, these platforms produced 13,657 bbl of oil and greater than 96 MMCFG of gas daily. Thirty-one of the platforms took 3 – 6 months to repair and these included facilities with underwater structural damage or major damage to pipelines. Depending on the economy, platforms which were destroyed will not be rebuilt.

He continued with the Region's environmental accomplishments for 2004 -2008:

- 2004 –One lease sale EIS and two lease sale EA's,
- 2005 –Two lease sale EA's,
- 2006 –One supplemental multisale EIS and two lease sale EA's,
- 2007 –One multisale EIS and one lease sale EA, and
- 2008 –One supplemental multisale EIS and one lease sale EA

The MMS has been awarded two major awards from the Secretary's Partners in Conservation Program:

- The Battle of the Atlantic Expedition, which took place off the North Carolina coast, is the expedition of an exceptional collaboration among Federal, State, and academic entities to strengthen research efforts and to document historically significant shipwreck sites associated with World War II losses.
- The Flower Garden Banks Long-Term Monitoring project that is off the Texas and Louisiana coast. Through a partnership with NOAA, private sectors, and academic scientists, MMS has monitored the Flower Garden Banks in the Gulf of Mexico, the northernmost coral reefs in the western hemisphere, for many years. The reefs continue to be among the healthiest in the world, due in part to careful management and monitoring by this scientific team. This partnership highlights Interior's oceans role and is an excellent example of cross jurisdictional resource management between Interior and NOAA.

Other accomplishments include the:

- completion of the study on Sperm Whales in the Gulf of Mexico,

- release of the final report for the Mardi Gras Shipwreck Study,
- award of the Gulf of Mexico's Loop Study, and
- award of the study on Deepwater Corals in the Gulf.

Atlantic OCS Region
Presentation by Mr. Joe Christopher

Tentatively scheduled for FY 2011 is the proposed sale in Virginia. With 2.9 million acres, 50 miles offshore of Virginia, it is estimated to contain 130 MMBL of oil and 1.14 TCFG. A workshop hosted by Dr. Robert Diaz, a former member of the Committee, focused on the existing scientific knowledge base along the Virginia Coast and included presentations from local scientific experts in physical oceanography, fish and fisheries, marine mammals, socioeconomics, and other relevant science topics.

Approved 2009 OCS Atlantic studies:
- Workshop on the Status of Acoustic Monitoring,
- Inventory and Analysis of Archeological Site Occurrence on Atlantic OCS,
- O&G Infrastructure in the Mid-Atlantic Region,
- Characterization and Potential Impacts of Noise Producing Construction and Operation Activities on the OCS,
- South Atlantic Information Resources, and
- Marine Mammal and Sea Turtle Data Search and Literature Synthesis Including Stranding and Nesting Sites.

Mr. Christopher also talked about the Gulf of Mexico Region's long-term roles and responsibilities on renewable energy, the issues on the Atlantic OCS for both O&G and renewable energy, the Programmatic EIS for Geologic and Geophysical (G&G) activities on the Atlantic, the types of G&G activities requiring permits, the CIAP, and current marine minerals program projects.

Pacific OCS Region
Presentation by Dr. Fred Piltz

Dr. Piltz stated that there are active leases in southern California, primarily in the Santa Barbara Channel (SBC) and the Santa Maria Basin. Thirty-six leases have been under litigation since the year 2000. The court case has actually been settled; the companies sued the U.S. Government for breach of contract. The suit went to the District Court, and that Court found for the companies. The Department of Justice (DOJ) appealed to the Appeals Court which upheld the lower court's decision. The DOJ decided not to seek en banc judgment in the Appeals Court, and at this point DOJ has not decided whether or not to appeal to the Supreme Court. The final estimated judgment was $1.2 billion. Once paid, the leases will be relinquished or taken back.

Production in California has been pretty stable; 23 platforms, 13 fields, peak oil production was in 1995 with over 200,000 bbl per day. Currently, production has been pretty stable at 63,000 bbl in the last few years and 130 MMCFG per day. Cumulatively, there has been over 1 Bbbl of oil and 1 TCFG produced.

Dr. Piltz said that in the most recent draft proposed program, which is waiting for approval, there is a proposal for new leasing off southern and northern California. One study in the Region's proposed study plan addresses information needed to prepare the various EIS's as well as other documents if these sales go forward.

Like the other Regions, the Pacific OCS Region is also participating in the CIAP. The final program received from California is currently under review.

There are 48 personnel within the Regional office, and there are four sections:
- Environmental Evaluation Facilities,
- Safety and Enforcement,
- District Offices which, like the other Regions, are bases for inspectors, and
- Production, Development, and Resource Evaluation.

Partnerships within the Pacific OCS Region include a number of Federal agencies, such as the Channel Islands National Marine Sanctuary which is a part of NOAA, the National Parks Service, and the BLM California Coastal National Monument. The two non-Federal organizations with which MMS partners are the West Coast Governor's Agreement on Ocean Health and Coastal America.

Currently, there are 19 active research studies. The USGS's Biological Resource Discipline and the USGS Western Coastal and Marine Geology conduct a number of studies for MMS, and there is a very close partnership with them. There is also an in-house study called the MMS Intertidal Team, and this is connected to a study that has been presented to the Scientific Committee called the Multi-Agency Rocky Intertidal Network. This is part of a commitment to long-term monitoring of potential effects of any OCS O&G activities adjacent to sites that extend from the Canadian-U.S. border to the U.S.-Mexican coast, and the east coast sites are being added on as well.

Dr. Piltz explained that although the Pacific OCS Region's focus has been on monitoring, there are other O&G activities, such as O&G development or production changes and routine operations that require NEPA-type documents. All of the information received from research studies and the NEPA-type documents are used in the Region's day-to-day operations, decisionmaking, and wherever else it will benefit, such as in new field development plans, coastal consistency documents, and O&G accidents.

Another factor taken into consideration while studies are being planned is invasive species. A biotech study completed on a platform found *Watersipora*, a Bryozoan, on a platform. This is an invasive species, and researchers at Santa Barbara found some real cancer and immunosuppressant potential. It has also been reported that that this species is occurring on several of the other platforms.

Climate change is also a consideration in planning environmental studies. As an example, he explained that that the Region continues to focus on collecting time series data in coastal areas adjacent to O&G operations in order to put into regional and climate change context any observed effects of O&G operations. Although MMS is not a trustee agency in accidents that trigger National Damage Assessment procedures, information has been generated through the ESP that assists others during O&G accidents.

The MMS is continuing work with California State University Channel Islands to study shorebird use of beaches. This builds on a long-term data set started by MMS scientists as an in-house study and which has been invaluable. A National Research Council review of the ESP in the late 1990s found that although MMS and others were doing a fairly reasonable job of conducting surveys of marine birds offshore and terrestrial birds, etc., shorebirds had been pretty much ignored even though those are the animals that are going to get hit very heavily during oil spills.

Dr. Piltz displayed pictures of oil seeps on the Santa Barbara coast. The MMS became involved in the study of oil seeps because industry and MMS were being implicated in cases of oil being found on the beach. Working with USGS to develop the methodology to analyze the oil, it has been determined that most of the oil is coming from natural seeps or other sources. Another reason MMS is involved with oil seeps is due to issues regarding the contribution of the O&G platforms to air quality, especially in the SBC area. Predominant winds blow emissions from the platforms, generators, pumps, and engines from the platforms towards the beach. Again, it has been determined that a lot of the emissions are coming from oil seeps.

The Pacific OCS Region also focuses on the ecological effects of future O&G facilities removal. Data and information are required to prepare NEPA documents for removal and to develop potential mitigation measures to minimize potential environmental impacts of removing offshore O&G facilities. It was realized that a platform is just as difficult to remove as it is to put up. Informal discussions took place with the State about the possibility of these structures remaining where they are since they are, in fact, providing a refuge for a lot of fish. A series of studies were conducted from 2004 – 2009 which looked at the role of existing platforms, and it was determined that:

- key species from 1999 remain at platforms,
- 10-100 times more adults are at platforms than at all reefs combined,
- key adults species now are spawning at platforms, and
- all natural reefs are dominated by dwarf species.

As the evidence through these studies has accumulated, more people in the State and elsewhere are beginning to realize the benefit of leaving the platforms. Currently, the State is doing a study to look at these results.

Our Goal for the Next Day

MMS Headquarters and Regional Studies Development Plans outline the overall research needs and priorities of the National and Regional Studies Programs. Discussions addresse current issues, information/knowledge gaps, the most pressing research needs, how the various disciplines fit together in the overall picture, and future studies efforts, in terms of expenditures and prioritization.

Thursday, April 30, 2009

This day was spent reviewing regional draft Studies Development Plans. Following a brief charge from the Chair to the Discipline Breakout Groups, the groups went into their sessions (Ecology/Biology, Physical Oceanography, and Social Sciences) to consider proposed Regional priorities and information needs. Each Discipline Breakout Group met with staff members from each MMS OCS Region and Headquarters. In each breakout session, a Committee member was designated as a discussion leader, and an MMS staff member was assigned to take notes. The Regional MMS Studies Chiefs and staff members were asked to identify, justify, and discuss priorities for future environmental studies.

Friday, May 1, 2009

The meeting was called to order by the Chair, Dr. Michael Fry.

Renewable Energy Discussion

Led by Dr. Rodney Cluck

Dr. Cluck announced that the renewable energy rule**,** "Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf," had been recently published and that it is time to consider all of the science that is needed to help move forward the NEPA analyses and consultations that are going to be conducted for offshore renewable energy projects. Another challenge is to ensure that MMS has adequate staff and resources to handle new projects through the regulatory process, i.e., the environmental aspects, the leasing, the engineering, and the inspections.

Dr. Cluck introduced Dr. Andy Krueger of the MMS Renewable Energy Program.

Dr. Krueger explained that the Interim Policy was established as a mechanism to allow some renewable energy activities to commence while the regulations are being finalized. The environmental team has finished the NEPA analysis for the installation of a number of meteorological towers off of New Jersey and Delaware, and it appears that leases could be issued in a matter of weeks.

Dr. Michael Kosro asked whether or not studies for environmental impacts have been completed. Dr. Krueger answered that the environmental review necessary to issue leases had been completed, but there will be a need for monitoring to ensure there are no unanticipated problems during the 5-year lease term. He added that there is a host of meteorological towers that have been placed along the coastline by other agencies, such as the Air Force, the Navy, and other organizations, so there are no drastic effects anticipated. Dr. Cluck added that this is an opportunity to put additional devices on those towers to study bird migration and to collect additional data to provide information for commercial sales.

Dr. Fry asked if there will there be a public comment period before the issuance of leases. Dr. Krueger said that typically with an EA, MMS does not solicit public comments unless there is a particularly controversial project, which these are not. However, there will be an opportunity for commercial projects. Workshops have been held across the country, giving MMS an opportunity to work directly with the local governments and the State government agencies to ensure that their concerns are addressed.

Dr. Cluck reported on a few frustrations he has had with the Cape Wind leasing process. During the environmental review process, for example, he learned that the EPA, in conjunction with the U.S. Department of Transportation, established the General Conformity Rule, sometimes referred to as the Air Conformity Rule or Air Conformity, on November 30, 1993. The Rule implements the CAA conformity provision, which mandates the Federal Government to complete a conformity determination prior to commencing any action that is federally funded, licensed, permitted, or approved. Since the release of emissions from vessels traveling between the port and the project site area exceed the EPA threshold, an OCS air permit is needed, and the applicant must offset all its air emissions (mainly from construction and maintenance vessels) in Rhode Island and Massachusetts.

Another issue which is delaying a decision on the Cape Wind Project is NHPA Section 106 Consultations, which requires Federal agencies to review all actions which may affect a historic or cultural property listed or eligible for listing on the National Register of Historic Places. There are 29 properties that would be adversely impacted by the proposed project. Currently, MMS is consulting with the Massachusetts Historic Commission (MHC) and the Advisory Council on Historic Preservation, among others, about potential mitigation strategies to reduce the project's impacts on historic and cultural properties. For example, compensatory mitigation could be paid to the State of Massachusetts for each affected property, and the MHC could then spend that money on any type of historic restoration project.

There are also two tribes, the Mashpee Wampanoag and the Wampanoag Tribe of Gay Head (Aquinnah), which claim to have traditional cultural properties/sacred sites in and around the project area. Turbines have been moved to avoid any potential sites on Horseshoe Shoals, but the proposed project could pose a visual impact to the Wampanoag's traditional spiritual and cultural ceremonies while looking out over Nantucket Sound to the sunrise.

Dr. Krueger added that good studies need to be conducted to better understand visual impacts and how they can be better addressed with creative mitigation.

Dr. Mary Scranton said she knows that in a number of New England and Mid-Atlantic States, there are tribes which are recognized by the state, but not by the Federal Government, and asked whether or not these tribes have been included in these workshops and meetings. She explained that there are several tribes in New York that are constantly trying to get Federal recognition, so the MMS might want to try to at least develop some information about these tribes in case they receive Federal recognition. Dr. Cluck replied that MMS made an effort to consult with numerous tribes, even those that had not yet been federally recognized.

Dr. Fry said that a proposal had been submitted for a 100-turbine wind farm in the middle of the Hawaiian Humpback Whale Marine Sanctuary, but had been withdrawn immediately upon the signing of the MOU between the DOI and FERC due to the prohibition within MMS of leasing in marine sanctuaries. In reviewing the MOU, leasing issues would be handled by MMS, and licensing would be handled by FERC. Also in the final renewable energy rule, there is language for agreements between states and MMS dealing with cables and other issues where there may be impacts from projects in State waters, impacts on OCS lands, or OCS waters. In regard to those projects in state waters where there will be no leasing obligation on the part of MMS, and with FERC having no expertise in doing environmental studies and environmental assessments, he asked if there is an agreement with FERC for MMS to do environmental studies in state waters. During the Discipline Breakout Groups meetings, there was a proposal in the biological section to do studies offshore Northern California in support of potential leasing of wave energy projects. So, not only for wind, but also for wave and current, there is a potential for adverse effects on the environment in state waters that needs to be addressed as well. He said that he is particularly concerned with very large underwater turbines and the potential effects on turtles, marine mammals, and fish because, if done in state waters, there may not be adequate assessments. Dr. Cluck replied that that was an excellent point, but thus far, there is no discussion of an agreement for MMS to conduct studies in state waters. However, it may be important for MMS to consider. Dr. Piltz, since he is involved with the West Coast Governors Association, was asked if there has been any discussion regarding state waters in the Pacific. Dr. Piltz explained that his thought process, in proposing the Pacific studies plan with regard to renewable energy, is to look at the prospect or probability for projects that straddle the state and Federal waters or are in the Federal waters but are site-specific studies. If some things are occurring purely in state waters, MMS does not have a responsibility to address that information environmentally. Logically, that would be the burden on the state to provide the description of that environment, for example, or on FERC if FERC is involved in licensing a hydrokinetic project in State waters. However, MMS might consider doing a study in state waters if it would benefit a Federal project.

Dr. Fry brought up the SEEP studies that MMS does in the Pacific Ocean's state waters along with an otter study in state waters off Southern California. Dr. Piltz explained that the SEEP study is being done since the Federal program was implicated for oiled beaches, and if similar situations such as that occur, MMS would conduct studies. He added that the sea otters tend to stay in state waters or near shore, and they do cross into Federal waters.

Dr. Fry continued that FERC has always put the burden of environmental assessments and costs of the studies on the applicant. He asked, since MMS is going to be doing environmental studies in Federal waters, could it enter into an agreement with FERC to do the studies or supervise the studies wherever FERC is licensing so that there is consistency for environmental studies in both state and Federal waters, and receive funding from the applicants to do the studies so that it doesn't detract from the ESP budget. Dr. Piltz responded that MMS has that ability and, in the past, has received funding for studies on site-specific projects to develop O&G; however, for a single project on renewable energy, the applicant would be asked to conduct some environmental studies and/or be asked to clear the site in terms of archeological and cultural sites. In regard to the other aspect, Dr. Kendall said that in the leasing document, MMS can put in mitigations that will ask for the term of the lease. Dr. Piltz agreed and said that a stipulation could be added to the lease for the applicant to conduct cultural, archeological surveys, etc. As an example, Dr. Cluck said that for Cape Wind, the applicant has done all of the studies and has spent approximately $40 million. However, because there will be cable running from Federal waters into state waters, a stipulation in the lease states that no cable can be laid during the winter months in order to avoid winter flounder. Dr. Piltz said FERC, as stated in the MOU, can ask/request MMS to be a cooperating agency on state projects that it would be overseeing. Since the state would need to grant the lease, it could demand that FERC, or the company implementing the program or study, use the same methodologies that have been done in Federal waters.

Dr. Richard Howarth said that one of the largest barriers to getting wind projects approved is visual impact. Cape Wind demonstrates the importance of assessing visual impacts, and this raises the question of whether or not the project should be approved. He asked, from a research perspective, how can supportive decisionmaking be done at the agency level, not just in terms of compliance with the statutory process, but what information do MMS administrators need to enable statutes that explicitly say social and environmental values are to be weighed? He added that aesthetic impact explicitly has to do with people's values and their aesthetic judgment; even though it is difficult to deal with on a technical level from a social science perspective, information is really needed on how people reach aesthetic judgments and how communities form those kinds of judgments in order to know what mitigation is appropriate, and that maybe communities need to participate in the process. Dr. Cluck replied that understanding people's perceptions on aesthetics is indeed important.

Dr. Cluck mentioned that Dr. Krueger's dissertation touched on how people perceive the views of an offshore wind facility and that these types of studies could be useful to MMS when considering the visual impacts of offshore development. Dr. Howarth suggested that people being affected by these visual impacts would perhaps be more receptive if they were afforded some type of participation or say in the decisionmaking process. Dr. Cluck agreed and added that in Dr. Krueger's dissertation research, Delawareans seemed to really care where their energy came from, and when given a choice between conventional sources of energy or wind energy, they chose offshore wind energy despite knowing it could cost more and result in some visual impacts.

Reports from Discipline Breakout Group Sessions

Reports from each of the Discipline Breakout Group were presented in plenary session.

Physical Sciences
Members: Drs. Mike Kosro, Mary Scranton, and John Trefry. Dr. Joe Smith, also a member of the Group, had been consulted during a teleconference.

Dr. Kosro and the Physical Sciences Discipline Breakout Group congratulated MMS on its international collaboration with Mexico in the Gulf of Mexico projects and for seeking opportunities with the Canadians on efforts in the Beaufort Sea to promote international collaboration and wider data sharing.

The Group also recognized that MMS is already doing a lot of broad studies of ecological impacts, noting the recent increase in ecosystem management approaches, providing some examples from recent studies where ecosystem management is important, and suggesting that ecosystem management be a priority in certain cases for MMS studies.

The final item the Group was congratulation to MMS in keeping the Committee apprised of the changes in funding for MMS and changing responsibilities as sand and gravel waxes and wanes in importance compared to alternate energy. Keeping track of those trends is important, and the continuance of that information to the Committee will be helpful.

The statement was well received, and Dr. Fry suggested that it be discussed during Committee Business.

General Comments

- MMS is doing an outstanding job of maximizing the value of their modest research budget.
- MMS participants in this meeting have shown great energy and enthusiasm for the ESP.
- MMS seems to have increased responsibility for studies on land and landward of the OCS (e.g., Houma Channel Study, onshore oil spills on North Slope). Although the Group understands why these studies are being listed, there is concern that the core mission and budget of MMS may be diluted.

Ecology and Biology
Members: Drs. Kenneth Dunton, Michael Fry, Eugene Shinn, and John Trefry

Dr. Dunton presented an overview of the Ecology/Biology proposed studies:

- Over 35 proposals were presented to the Group.
- The presentations were excellent and interesting but ranged tremendously in format and length.
- A consistent format is needed (Title and Ranking, MMS Info Need, Data Required, Background, Objectives, Methods, Other Related, Summary).
- Every project should include a map and clearly show each project's relevance to O&G platforms, existing tracts, or projected development.

- Restrict presentation time to 5-8 minutes to allow for critical dialogue and questions.

General Comments

- **Alaska OCS Region:** Programs are highly interdisciplinary and leveraging of other funds notable, and there is heavy emphasis on upper trophic levels (mammals and birds). For the NAB, the Group recommended supplemental studies that focused on tagging of humpbacks, grays, smaller whales, and especially right whales (in addition to bowhead studies). Bird studies in the NAB are also needed.
- **Atlantic OCS Region:** The Group suggested that new and evolving programs focus on renewable energy and that all Atlantic studies need to be organized in one place.
- **Gulf of Mexico OCS Region:** Dr. Dunton stated that the programs in the Gulf of Mexico OCS Region need to evolve from mapping and data gathering into more interdisciplinary studies that examine questions of system-level importance in relation to O&G development. These include linking circulation to horizontal and vertical transport of materials, rigs as important mechanisms of faunal dispersal in the Gulf, a role in enhancing higher trophic level interactions compared to surrounding areas, etc. The Group also mentioned the potential for interaction between endangered and candidate bird species with wind energy operations in the Atlantic OCS, information synthesis on the potential for bat interactions with offshore wind facilities, evaluation of lighting schemes for offshore wind facilities and impacts to local environments, and the urgent need for data related to these projects.
- **Pacific OCS Region:** This Region is unique in that, although there are no active leasing activities, a lot of very important work being done.
- **Headquarters:** Dr. Fry stated that he would like MMS to consider a study on lighting for platforms modeled on the work that Phillips Electric did with the Dutch Gas Company looking at green fluorescent lights on platforms that still maintain safety for personnel, but also reduces bird collisions by about 70 percent.

  Dr. Dee Williams, based on the Group's suggestion that a bird study be added for the Bering Sea, asked Dr. Fry to be more specific about what the focus of the bird study should be. Dr. Fry replied that a study is needed to focus on sensitive species in the NAB area and that little is known about Kittlitz's murrelet, endangered short-tailed and other albatrosses, and eider ducks that use the bays to the south of the NAB. The Group also discussed the need to catalog natural oil seeps along the Aleutian Island chain.

Social Sciences

Members: Drs. Tyler Priest, Ralph Brown, Richard Howarth, and Peter Schweitzer

After Dr. Priest's presentation, Dr. Cluck asked Dr. Brown what type of social indicators he recommended for the General Social Survey for the Socioeconomic Implications of Structural Change in the OCS Petroleum Industry study. Dr. Brown replied the quality of life, which can be done regionally across the U.S. and would give a better baseline. If there were shifts taking place in particular areas of study, specific indicators could be built in that would start describing actual causes.

Dr. Priest asked Dr. Pat Roscigno if he had any thoughts about social studies that may need to be done in the future in the eastern Gulf and Florida. Dr. Roscigno answered that there are, but at this point the Region is waiting to see in which direction the 5-Year Plan is going to go, which will determine a lot of what is needed to be done.

Committee Business

Based on the Committee's discussions with MMS staff and public comments, and in its scientific advisory role, the Committee offered the following recommendations to the MMS and DOI:

- This Committee supports a significant increase in the MMS ESP budget. The Committee continues to state that the budget is not adequate for what MMS is being asked to do. The Committee feels it is critically urgent that the ESP receive more funding and personnel to be able to handle the greatly increased burden of renewable energy.
- This Committee was very impressed with the responsiveness of MMS Staff. The Committee wants to express to the Director that it gave MMS staff constructive criticism regarding the proposed studies which was received very well and taken to heart.
- This Committee urges MMS to reach out as broadly as possible in soliciting for Requests for Proposals. Broad outreach is especially important in the new areas where there are large groups of scientists working on relevant topics in the Atlantic who have not been involved with MMS.
- The Committee encourages open publication and availability of data on the MMS web site.
- Committee attendance at MMS ITMs would be very useful. This Committee encourages MMS to invite Committee members to attend ITMs and other regional meetings where MMS's material is presented. The Committee does not learn

what other groups are doing to integrate with MMS studies, and knowing results of the studies would be very valuable to the Committee in fulfilling its obligation to review and recommend needed studies.

As a result of this year's deliberations, the following recommendations emerged:

- MMS will notify Committee members of upcoming workshops and meetings via the web link at least quarterly.
- The Committee encourages the individual Regions to spend more time thinking about workshops in synthesis and integration.
- MMS may need to identify its role in ocean acidification/alkalinity shift, such as how much research should be done and when to invest in mitigation.
- Offshore wind development regulations need to be evaluated by cost/benefit analysis, i.e., make it a priority to do social science research on the various different ways of understanding and measuring the values that people attach to view sheds. Economists are divided on whether or not a monetary value can be assigned to characterize visual impacts. The Committee suggested a set of disciplines, both economic and social, to focus on how people construct values, how they construct preferences, and how to measure those preferences and values, be formulated.
- Removing rigs could have a social impact on commercial fishermen. The State of Louisiana has designated specific reef sites where rigs can remain and become reefed-in sites.

Committee and Subcommittee Membership. Terms of those members who cannot be considered for reappointment expire in 2011. Dr. Joseph Smith had nominated Dr. Ian Kopvil to participate on the Deepwater Subcommittee and will need the approval of the Official Designated Federal Employee who is the Associate Director of the Offshore Energy and Minerals Management Program.

Date and Location of next Committee Meeting. The Committee would appreciate meeting in the Woods Hole, Massachusetts, area since the Atlantic Region is be considered for development in late April or early May.

Announcements

Mr. Christopher again thanked the Committee members for attending this meeting since it benefits the staff to be directly involved.

Dr. Priest announced that the Offshore Energy Center in Houston, which is an oil-industry-funded foundation committed to educational outreach and recovering the history of the offshore industry, has a Hall of Fame induction once a year in Houston, and this year, in September, MMS is receiving recognition in its Hall of Fame for "promoting research efforts to provide the best and safest technology, cooperating with industry to develop the necessary information, communications and practices to allow the offshore enterprise to proceed with due regard for health, safety, and the environment". There will be six MMS staff recognized: Messrs. Elmer (Bud) Danenberger, Thomas Dunaway, Felix Dyhrkopp, John Gregory, Richard Craw, and Dr. Charles Smith.

The meeting was adjourned at 4:00 p.m.

I certify that the above proceedings are an accurate account of the April 29-May 1, 2009, OCS Scientific Committee proceedings. The Proceedings may be released to OCS SC members and made available for public inspection.

D. Michael Fry
Chair, OCS Scientific Committee

Minerals Management Service
Outer Continental Shelf Scientific Committee
Deepwater Subcommittee
Report to the OCS SC Committee Meeting 29 April 1 May 2009
Anchorage, Alaska

The Deepwater Subcommittee held a conference call on March 30 to consider items to be brought to the attention of the full OCS Scientific Committee during this meeting. This report summarizes the results of that discussion.

International Collaboration**.** There is a need to continue coordination of EA activities in the boundary areas between the U.S. and Mexican waters and potentially between U.S. and Cuban waters. This has been a strong point for MMS in the Gulf of Mexico (e.g., the USA-Mexico Workshop on the Deepwater Physical Oceanography of the Gulf of Mexico, held in June 2007). Opportunities may also exist for international coordination of environmental activities with those in the Canadian Beaufort Sea. The Canadian Government is expected to extend the activities undertaken with support from their Environmental Studies Research Fund from the current onshore and nearshore activities in the MacKenzie Delta and Beaufort Sea to deeper waters (up to 1200 m) for which exploration rights have been recently granted. This activity may offer natural avenues for collaboration with the MMS's Environmental Studies Program (ESP).

Ecosystem Management Approaches. The breadth of subject matter addressed in MMS-sponsored environmental and socioeconomic studies indicates that there is a strong appreciation already in place for the importance of making management decisions based on holistic evaluation of the impacts of human activities on marine ecosystems. The subcommittee would like to encourage the ESP to look for opportunities in every study to include an element of integration of the results into a broad picture of the functionality of the ecosystems where offshore activities take place. Due to the multidisciplinary nature of the studies that contribute to ecosystem management, there is a need to actively promote integration of the results from diverse fields of study. MMS programs have long provided and continue to provide the data that underlie an integrated understanding of ecosystem function. To more fully implement decisionmaking based on an ecosystem approach, the ESP could benefit from additional emphasis on defining what is meant by the functionality of ecosystems and considering appropriate metrics so that progress towards achieving the "desired end conditions" (McFadden and Barnes, 2009) of managed ecosystems can be assessed. Results from the European HERMES project have demonstrated some success in using diversity measurements as a metric for the functionality of benthic ecosystems (Danovaro et al., 2008). Although the management target for the ESP is much broader than just benthic ecosystems, this work illustrates the importance of linking measured parameters to metrics that reflect the key functions of the benthic ecosystem over appropriate spatial domains.

Trends in Funding and Emphasis. There was a discussion of the need for some additional data from MMS on current programs so that Committee members could grasp the trends in funding among the Regions and the discipline areas over the years. The Committee typically considers a menu of future projects, but putting those efforts in context with the current programs is not straightforward. For example, the sand and gravel program has disappeared over the last few years, and alternative energy has emerged as a significant interest area. Other less dramatic trends may also be going on. There seemed to be significant interest among the subcommittee members and the Committee chair in having access to this sort of information.

References

Danovaro, R., Cristina Gambi, Antonio Dell'Anno, Cinzia Corinaldesi1, Simonetta Fraschetti, Ann Vanreusel, Magda Vincx, and Andrew J. Gooday (2008) Exponential Decline of Deep-Sea Ecosystem Functioning Linked to Benthic Biodiversity Loss Current Biology, Volume 18, Issue 1, 1-8, 8 January 2008.

McFadden, K.W. and Barnes, C. , (2009), " The implementation of an ecosystem approach to management within a federal government agency", Marine Policy 33. pp 156-163.

Minerals Management Service (MMS)
Outer Continental Shelf (OCS)
Scientific Committee (SC)
Meeting Agenda

MEETING DATES: April 29, 30, and May 1, 2009
LOCATION: Sheraton Anchorage
401 E. 6th Avenue
Anchorage, AK 99501

Wednesday, April 29, 2009

8:30 a.m.	Welcome and Introductions *(please turn cell phones off or set to silent)*	Dr. D. Michael Fry, Chair, OCS SC and Dr. James Kendall, Executive Secretary of the OCS SC, MMS
8:45 a.m.	MMS Director's Welcome	Mr. John Goll, Director, MMS Alaska OCS Region
9:15 a.m.	Status of Offshore Energy and Minerals Management	Dr. James Kendall, Executive Secretary of the OCS SC, MMS
	9:45 a.m. – 10:15 a.m.	BREAK
10:15 a.m.	Alaska OCS Regional Overview	Mr. John Goll, Director, MMS Alaska OCS Region
11:00	A Comprehensive Approach Towards Future MMS Scientific Needs	Dr. Rodney Cluck, Chief, Environmental Sciences Branch
	11:30 a.m. – 1:30 p.m.	LUNCH

1:30 p.m.	Overview of Regional Environmental Programs including Regional components of the ESP (45 minutes each)	Presented by the Regional Supervisors, Office of Leasing and Environment
	• Alaska OCS Region	Dr. Cleve Cowles
	• Gulf of Mexico	Mr. Joe Christopher
	• Atlantic OCS Regions	Mr. Joe Christopher
	3:00 p.m. – 3:30 p.m. BREAK	
	• Pacific OCS Region	Dr. Fred Piltz
4:15 p.m.	Our Goal for the Next Day	Dr. Rodney Cluck, Chief, Environmental Sciences Branch
4:45 p.m.	Recess	

Minerals Management Service (MMS)
Outer Continental Shelf (OCS)
Scientific Committee (SC)
Meeting Agenda

Thursday, April 30, 2009

7:50 a.m. – 8:00 a.m. Charge to the Discipline Breakout Groups — Dr. D. Michael Fry, Chair

This day was spent reviewing regional draft Studies Development Plans. Following a brief charge from the Chair to the Discipline Breakout Groups, the groups went into their sessions (Ecology/Biology, Physical Oceanography, and Social Sciences) to consider proposed regional priorities and information needs. Each Discipline Breakout Group met with staff members from each MMS OCS Region and Headquarters. In each breakout session, a Committee member was designated as a discussion leader and an MMS staff member was assigned to take notes. The Regional MMS Studies Chiefs and staff members were asked to identify, justify, and discuss priorities for future environmental studies. Sessions include sand and gravel and renewable energy study profiles.

Physical Sciences, Biology, and Socioeconomic Disciplines meet separately to discuss national and regional studies plans.

<table>
<tr><th>Ecology/Biology
or
Interdisciplinary</th><th>Physical Sciences</th><th>Social Sciences</th></tr>
<tr><td rowspan="2">8:00 a.m. – 10:00 a.m. Alaska</td><td>8:00 a.m. – 9:00 a.m. Atlantic</td><td>8:00 a.m. – 9:30 a.m. Gulf of Mexico</td></tr>
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<tr><td colspan="3">11:30 – 1:00 LUNCH</td></tr>
<tr><td>1:00 p.m. – 1:30 p.m. Pacific continued</td><td rowspan="2">1:00 p.m. – 2:30 p.m. Pacific</td><td rowspan="2">1:00 p.m. – 2:30 p.m. Alaska</td></tr>
<tr><td rowspan="2">1:30 p.m. – 3:30 p.m. Gulf of Mexico</td></tr>
<tr><td></td><td>2:30 p.m. – 3:30 p.m. Alaska</td><td>2:30 p.m. – 3:30 p.m. Pacific</td></tr>
<tr><td>3:30 p.m. – 4:30 p.m. Atlantic</td><td colspan="2"></td></tr>
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Minerals Management Service (MMS)
Outer Continental Shelf (OCS)
Scientific Committee (SC)
Meeting Agenda

Friday, May 1, 2009

8:00 a.m. Preparation of Discipline Breakout Groups Reports

10:00 a.m. – 10:30 a.m. BREAK

10:30 a.m. Renewable Energy Discussion
(please turn cell phones off or set to silent)

11:30 a.m. – 1:00 p.m. LUNCH

1:00 p.m. Reports From Discipline Breakout Group Sessions
(20 minutes each)

- Ecology/Biology
- Physical Oceanography
- Social Sciences

2:00 p.m. Open Discussion of Breakout Group Sessions Reports

3:00 p.m. Public Comment

3:30 p.m. – 3:45 p.m. BREAK

3:45 p.m. Committee Business

- Items for Letter to the Director
- Emerging Issues/Topics of Interest
- Other Business
- Dates and locations for the next meeting

4:00 p.m. Final Comments

4:30 p.m. Adjourn

OCS SCIENTIFIC COMMITTEE DISCIPLINE BREAKOUT GROUPS

ECOLOGY/ BIOLOGY	PHYSICAL OCEANOGRAPHY	SOCIOECONOMICS
Kenneth Dunton	Jim Coleman	Ralph Brown
D. Michael Fry	Mark A. Johnson	Richard Hildreth
Lorrie Rea	Mike Kosro	Richard B. Howarth
Gene Shinn	Mary Scranton	Tyler Priest
John Trefry	Joe Smith	Peter Schweitzer

SUBCOMMITTEES

DEEPWATER	ALASKA	MARINE MINERALS	DECOMMIS-SIONING	RENEWABLE ENERGY
*Joe Smith	*Peter Schweitzer	*John Trefry	*Mary Scranton	*Mike Fry
Jim Coleman	Ken Dunton	Jim Coleman	Richard Hildreth	Ralph Brown
Mike Kosro	Mike Fry	Robert Diaz	Eugene Shinn	Richard Hildreth
Tyler Priest	Duane Gill	Richard Hildreth	Joseph Smith	Richard Howarth
Mike Rex	Richard Howarth	Denise Stephenson-Hawk		Mike Kosro
William Schroeder	Lorrie Rea			Mary Scranton
**Ian Voprial	William Schroeder			Lynda Shapiro
	Lynda Shapiro			Eugene Shinn

* Chair ** Membership Pending

ACRONYMS

bbl	barrels
Bbbl	billion barrels
BLM	Bureau of Land Management
CAA	Clean air Act
CIAP	**Coastal Impact Assistance Program**
CPS	coastal political subdivisions
DOI	Department of the Interior
DOJ	Department of Justice
EA	Environmental Assessments
EIS	Environmental Impact Statements
EPA	Environmental Protection Agency
EPAct	**Energy Policy Act**
ESA	Endangered Species Act
ESP	Environmental Studies Program
FERC	Federal Energy Regulatory Commission
FY	Fiscal Years
G&G	Geological and Geophysical
MHC	Massachusetts Historic Commission
MMBL	million barrels
MMCFG	million cubic feet of gas
MMS	Minerals Management Service
MOU	**Memorandum of Understanding**
MW	megawatts
NAB	North Aleutian Basin
NEPA	**National Environmental Policy Act**
NHPA	National Historic Preservation Act
NOAA	**National Oceanic and Atmospheric Administration**
O&G	oil and gas
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OEMM	Offshore Energy Minerals Management

SBC	Santa Barbara Channel
TCFG	trillion cubic feet of gas
USGS	United States Geological Survey

DEPARTMENT OF THE INTERIOR Minerals Management Service

Outer Continental Shelf (OCS) Scientific Committee (SC); Announcement of Plenary Session

AGENCY: Minerals Management Service (MMS), Interior.

ACTION: Notice of Meeting.

SUMMARY: The OCS Scientific
Committee will meet at the Sheraton Anchorage Hotel in Anchorage, AK.

DATES: Wednesday, April 29, 2009, from 8:30 a.m. to 5 p.m.; Thursday, April 30, 2009, from 8 a.m. to 4:30 p.m.; and Friday, May 1, 2009, 8 a.m. to 4:30 p.m.

ADDRESSES: Sheraton Anchorage Hotel, 401 E. 6th Avenue, Anchorage, Alaska 99501, telephone (907) 276–8700.

FOR FURTHER INFORMATION CONTACT: A copy of the agenda may be requested from MMS by calling Ms. Carolyn Beamer at (703) 787–1211. Other inquiries concerning the OCS SC meeting should be addressed to Dr. James Kendall, Executive Secretary to the OCS SC, Minerals Management Service, 381 Elden Street, Mail Stop 4043, Herndon, Virginia 20170–4817 or by calling (703) 787–1656.

SUPPLEMENTARY INFORMATION: The OCS SC will provide advice on the feasibility, appropriateness, and scientific value of the OCS Environmental Studies Program to the Secretary of the Interior through the Director of the MMS. The SC will review the relevance of the research and data being produced to meet MMS scientific information needs for decision making and may recommend changes in scope, direction, and emphasis.

The Committee will meet in plenary session on Wednesday, April 29. The Deputy Associate Director will address the Committee on the general status of the MMS and its activities. There will be an update on OCS activities in the Alaska OCS Region and Regional Supervisors for Environment and Leasing from each region will present an overview of the Environmental Studies Program and current issues.

On Thursday, April 30, the
Committee will meet in discipline breakout groups (i.e., biology/ecology, physical sciences, and social sciences) to review the specific research plans of the MMS regional offices for Fiscal Years 2010 and 2011.

On Friday, May 1, the Committee will meet in plenary session for reports of the individual discipline breakout sessions of the previous day and to continue with Committee business.

The meetings are open to the public. Approximately 30 visitors can be accommodated on a first-come-first- served basis at the plenary session.

Authority: Federal Advisory Committee Act, Public Law 92–463, 5 U.S.C., Appendix I, and the Office of Management and Budget's Circular A–63, Revised.

Date: March 24, 2009.

Chris C. Oynes,

Associate Director for Offshore Energy and Minerals Management.

[FR Doc. E9–7060 Filed 3–27–09; 8:45 am]

OCS SCIENTIFIC COMMITTEE

MEMBERSHIP INFORMATION

Dr. Ralph Browning Brown

Dr. Brown is a Professor with the Department of Sociology and Director of the International Development Minor at Brigham Young University and his interests include: community satisfaction and attachment, including community-level impacts due to boom-growth most often associated with large-scale economic development; natural resource-human interface; persistent rural poverty and subsistence lifestyles, and effects of mass consumer economy on rural communities and their residents. He specializes in Social Impact Assessment and is versed in both quantitative and qualitative data collection and analysis techniques.

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e-mail: ralph_brown@BYU.edu

Discipline: Socioeconomics (Development and Social Change; Social Impact Assessment)

Appointed:	April 28, 2006
Reappointed Under New Charter:	June 24, 2008

Dr. James M. Coleman

Dr. Coleman is a Boyd Professor for the Coastal Studies Institute and recently served as Interim Vice-Chancellor for Research and Graduate Studies at Louisiana State University. He started his professional career as a graduate student at Coastal Studies Institute, LSU, and eventually serving as director of CSI, chairman of Geology and Geophysics, head of the School of Geoscience, and interim dean of Basic Sciences before being named Executive Vice-Chancellor in 1989. He has conducted worldwide research on deltaic sedimentation, riverine processes, marine geology, shallow structure of shelf sediments, and muddy coasts. He serves on numerous local, state, and national committees and is presently a member of the Ocean Studies Board, National Research Council, and has recently been appointed to the U.S. Commission on Ocean Policy.

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e-mail: chanjc@lsu.edu

Discipline: Oceanography/Geology (Use of Science in Oil and Gas Decision-Making)

Appointed:	March 30, 2004
Reappointed Under New Charter:	April 28, 2006
Reappointed Under New Charter:	June 24, 2008

Dr. Kenneth H. Dunton

Dr. Dunton is a biological oceanographer whose research is focused on estuarine and coastal processes. Although his work spans from the Arctic to the Antarctic, his continuous studies of the arctic coastal ecosystem has spanned three decades and over 3000 research dives. Funded by NSF's Arctic System Science's Shelf-Basins Interactions study from 1999 to 2008, he examined the distribution and biomass of benthic biota and changes in trophic structure based on the application of stable isotopic signatures. He has also performed intensive studies of nearshore shelf arctic benthic communities and kelp beds since 1977. He has examined the linkages between arctic watersheds and coastal lagoons along the eastern Alaskan Beaufort Sea coast, with particular emphasis on the lagoon systems of the Arctic National Wildlife Refuge. His work in the Gulf of Mexico has addressed the productivity of seagrass and marsh systems, and the trophic structure of the Flower Gardens coral reef community. He obtained a B.S. from the University of Maine (1975), M.S. from Western Washington (1977), and Ph.D. from the University of Alaska-Fairbanks (1986) and is currently a professor in Marine Science at The University of Texas at Austin.

Professor, Department of Marine Science
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Discipline: Biology (Oil and Gas Effects on Benthic Communities; Arctic and Gulf of Mexico Research)

Originally Appointed:	June 24, 2008
Eligible for Reappointment:	June 24, 2011

Dr. Michael D. Fry
Chair

Dr. Fry is the Director of Conservation Advocacy at American Bird Conservancy, and is an avian toxicologist with research interests in the effects of pollutants, pesticides, and oil spills on ecosystems and wild birds. He received his doctorate at the University of California-Davis, followed by Postdoctoral fellowships in Australia and UC San Francisco before returning to UC Davis where he was a research physiologist in the Department of Avian/Animal Sciences for 23 years before joining Stratus Consulting in 2003 and American Bird Conservancy in 2005. Dr. Fry has been a panel member for the National Academy of Sciences on hormone active chemicals in the environment and has participated in toxicology reviews and international symposia for the Organization for Economic Cooperation and Development (OECD) and for the United Nations University in Japan. He has specialized in ecotoxicology of raptors and marine birds and served as Chairman of the Pacific Seabird Group. He has been a committee member for EPA and OECD in revising avian toxicity test methods and was a member of the EPA Ecological Committee for Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Risk Assessment Methods (ECOFRAM). He currently serves on the EPA Federal Advisory Committee for pesticide programs.

Director, Conservation Advocacy
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office: (202) 234-7181
fax: (202) 234-7182
e-mail: mfry@abcbirds.org

Discipline: Ecology (Avian Biology & Alternative Use)

Appointed:	March 30,2004
Reappointed:	April 28, 2006
Reappointed Under New Charter	June 24, 2008

Dr. Richard B. Howarth

Dr. Howarth is an economist who studies the theory of environmental policy analysis with applications to topics such as energy use, climate change, and ecological conservation. His research and teaching emphasize themes that include the role of discounting and sustainability in evaluating long-term environmental policies; mathematical models of economy-environment interactions; and the interplay between economics and ethics in valuing and managing environmental resources. Dr. Howarth has held appointments at the Lawrence Berkeley National Laboratory and the University of California at Santa Cruz. He is currently the Pat and John Rosenwald Professor in the Environmental Studies Program at Dartmouth College and the Editor-in-Chief of *Ecological Economics*.

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fax: (603) 646-1682
email: RBHowarth@Dartmouth.edu

Discipline: Socioeconomics (Environmental Economics and Policy Analysis)

Originally Appointed:	June 24, 2008
Eligible for Reappointment:	June 24, 2011

Dr. Mark A. Johnson

Dr. Johnson's research interests include physical oceanography of the Arctic Ocean with a focus on its general circulation and variability. His approach is analysis of historical and model data sets and use of observational methods such as moored instruments. His present focus is assessment of the ice volume of the Arctic Ocean, especially thickness along the margins, and how this may be affected by climate change.

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Discipline: Physical Oceanography (Arctic Region and Sea Ice)

Originally Appointed:	June 24, 2008
Eligible for Reappointment:	June 24, 2011

Dr. P. Michael Kosro

Dr. Kosro is a coastal physical oceanographer, and a Professor of Oceanography at Oregon State University. His group has installed and operates a large array of HF current mapping systems to continuously measure the time-varying surface circulation over the entire Oregon coast, while also using conventional moored and shipborne tools. Recent studies include interannual variability of the circulation, mesoscale features of the upwelling circulation, California Current and undercurrent, and spatial structure of tidal flows.

Professor, College of Oceanic & Atmospheric Sciences
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Discipline: Physical Oceanography (Shelf-deep Sea Exchange/Pacific Coast)

Appointed:	March 30, 2004
Reappointed:	April 28, 2006
Reappointed Under New Charter	June 24, 2008

Dr. Lorrie Rea
Vice-Chair

Dr. Rea's general research interest encompasses the metabolism and nutritional physiology of terrestrial and marine mammals and is particularly interested in questions dealing with lipid metabolism in large mammals and how physiological processes are adapted to periods of food limitation and fasting in the wild. Most of her recent research addresses health, diet, and body condition assessment of Steller sea lions in Alaska. Dr. Rea earned her Ph.D. in Marine Biology from the University of Alaska Fairbanks (1995) after obtaining a B.S. from the University of Guelph (1987) and an M.S. from the University of California Santa Cruz (1990). She is currently a Wildlife Physiologist with the Alaska Department of Fish and Game, Division of Wildlife Conservation.

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Discipline: Biology (Endangered Species; Arctic Marine Mammal Health)

Appointed:	June 24, 2008
Eligible for Reappointment:	June 24, 2011

Dr. Peter Paul Schweitzer

Dr. Schweitzer was born and raised in Austria where he became interested in the Soviet Union, which started to show small signs of change during the mid-1980s. A graduate student exchange program enabled him to study in Leningrad for one academic year in 1986/87 and to begin ethnohistoric research about the Chukchi Peninsula in the Russian Far East, which led to Ph.D. degree awarded by the University of Vienna in 1990. Since 1990, he has had several opportunities for longer and shorter field trips to Chukotka and, more recently, to the Republic of Sakha (Yakutia). Since 1992, he has been conducting fieldwork in various communities on the Seward Peninsula in Alaska. He joined the faculty of the Department of Anthropology at UAF in 1991. His topical interests, in addition to the above-mentioned historical inquiries, encompass social organization (kinship, gender, politics), hunter-gatherer studies, the history of anthropology, transnationalism and other forms of interethnic contact, as well as practices and ideologies of colonialism and their local impacts. Since 2007, he has been serving as Director of Alaska EPSCoR (Experimental Program to Stimulate Competitive Research).

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Anthropology, Northern Studies
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Discipline: Socioeconomics (Anthropology and Subsistence)

Appointed:	April 28, 2006
Reappointed Under New Charter:	June 24, 2008

Dr. Mary I. Scranton

Dr. Scranton received a BA in Chemistry from Mount Holyoke College and a PhD. in Oceanography from the Woods Hole Oceanographic Institution/MIT Joint Program in Oceanography. Her dissertation was on the marine geochemistry of methane. Following her dissertation work, she spent 2 years as a National Academy of Sciences/National Research Council Postdoctoral Fellow at the Naval Research Lab in Washington, D.C., working on analytical and geochemical aspects of hydrogen gas distributions in the ocean and atmosphere. Since 1979, she has been at the Marine Sciences Research Center of Stony Brook University. In recent years she has been interested in the factors controlling the cycling of organic compounds in sediments and in the water column, primarily as a part of the CARIACO (Carbon Retention in a Colored Ocean) program, a study of carbon cycling in the Cariaco Basin, Venezuela. She also maintained her long-standing interest in methane geochemistry and is investigating the role of seeps and vents, and possibly of destabilizing gas hydrates, in controlling water-column methane concentrations near the US North-East continental shelf.

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Discipline: Chemical Oceanography (Geochemistry/Hydrates)

Appointed:	March 30, 2004
Reappointed:	April 28, 2006
Reappointed Under New Charter	June 24, 2008

Dr. Eugene A. Shinn

Dr. Shinn began his career as a biologist but in 1958 switched to carbonate sedimentology after joining Shell Development Co, the research arm of Shell Oil. During 15-years with Shell, he conducted extensive studies in modern carbonate sedimentation and diagenesis in the Florida Keys, the Bahamas, and the Persian Gulf. With Shell he completed assignments with Royal Dutch Shell and lived in Doha, Qatar. His last major assignment was the Environmental Affairs Department at Shell's Head Office in Houston. He advised the company on environmental issues and served on several API research panels. In 1974, Dr. Shinn left Shell to establish a research field station (Fisher Island, Florida) for the USGS.

He ran the station and conducted research there for 15-years. The main focus was on modern carbonates, especially tidal flats, and coral reefs, but also conducted studies on the environmental effects of offshore drilling. Fisher Island Station also supported a Texas A&M doctoral dissertation on the effects of drill mud on corals. Another study focused on the effects of offshore drilling in the Philippines and off Key West. Later, with funding from MMS, he used a two-man submersible and evaluated the effects of 6 drill sites in the Eastern Gulf of Mexico. In 1989, he transferred to the USGS Coastal Program in St. Petersburg, Florida, where he began studies of sewage contamination and groundwater movement in the Florida Keys. His next research project was the environmental effects of transoceanic African dust. In 1998 The University of South Florida awarded him a Ph.D. in Earth Science. After 31years of service, Dr. Shinn retired and joined the University of South Florida College of Marine Science in St. Petersburg, FL. He currently serves on numerous committees relating to coral reef health as well as the AAPG Global Climate Change Committee. In June 2009, he received the Twenhofel Medal, the highest award annually presented by SEPM, (Society for Sedimentary Geology).

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Discipline: Zoology/Geology (Fate/Effects;Government/Industry Science)

Appointed:	April 28, 2006
Reappointed:	June 24, 2008

Dr. Joseph Patrick Smith

Dr. Smith is group leader for environmental technology research at ExxonMobil Upstream Research Company. He holds a Ph.D. in physical chemistry from the University of California at Berkeley (1978) and a B.S. in chemistry from the University of Rochester (1972). He joined Exxon Production Research Company in 1981 and has been active in research on the environmental aspects of offshore oil and gas operations since 1990. His research interests include numerical modeling of offshore discharges, the environmental fate and effects of drilling and production discharges, and the environmental effects of seawater usage for thermal management by offshore facilities. He is the chairman of the Offshore Operators Committee (OOC) Environmental Sciences Subcommittee and has also served on the steering groups for many joint industry environmental studies sponsored by organizations such as OOC, the American Petroleum Institute, and the International Association of Oil and Gas Producers.

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Discipline: Physical Oceanography (Oil and Gas Industry Technology Contaminant Fate and Effects, Environmental Management)

Appointed:	March 30, 2004
Reappointed:	April 28, 2006
Reappointed Under New Charter	June 24, 2008

Dr. John H. Trefry

Dr. Trefry is a Professor of Marine & Environmental Sciences at Florida Institute of Technology. He holds a Ph.D. in Chemical Oceanography from Texas A&M University. His research activities focus on the concentrations and cycling of trace metals in rivers, estuaries, oceans and deep-sea hydrothermal vents. Trace metals are studied for their natural value and for their potential as pollutants. Dr. Trefry's research activities are carried out in a wide variety of geographical settings including the Pacific and Atlantic Oceans, the Alaskan Arctic, the Gulf of Mexico and the Indian River Lagoon, Florida. He also has been active in studies of environmental issues related to offshore oil exploration and production in the Gulf of Mexico, the Beaufort Sea, the Sea of Okhotsk and other locations. He presently serves as an Associate Editor of the journal *Marine Chemistry*.

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Discipline: Chemical Oceanographer/Biology (Chemical Contaminants)

Appointed:	March 30, 2004
Reappointed:	April 28, 2006
Reappointed Under New Charter	June 24, 2008

Federal Ex Officio Member

Minerals Management Service
Director
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Executive Director & Designated Federal Officer

Mr. Chris Oynes
Associate Director, OEMM
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Executive Secretary

Dr. James Kendall
Executive Secretary
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OUTLINE OF TRANSCRIPTS

April 29, 2009

OUTLINE OF TRANSCRIPTS

May 1, 2009

MINERALS MANAGEMENT SERVICE
Speakers

Anchorage, Alaska

April 29 - May 1, 2009

JOSEPH CHRISTOPHER

Regional Supervisor for the Office of Leasing and Environment
Gulf of Mexico Outer Continental Shelf (OCS) Region

Mr. Christopher has been involved in various aspects of the OCS Program for over 30 years, and is currently responsible for the Region's leasing and adjudication activities, environmental studies program, pre- and post-lease environmental assessment processes, and Coastal Impact Assistance Program. He holds a B.A. in Geography from the University of New Orleans and an M.A. in Management from Central Michigan University.

RODNEY E. CLUCK

Chief, Environmental Sciences Branch

Dr. Cluck holds a Ph.D. in sociology from Mississippi State University and a Masters Degree in Rural Sociology from the University of Arkansas, Fayetteville. For 6 years Dr. Cluck served as the Headquarters' social scientist for the Environmental Division. In 2005, Dr. Cluck joined the Office of Offshore Alternative Energy Programs and was the project manager for the United States' first offshore wind facility. Recently, Dr. Cluck was selected as the Chief of the Environmental Sciences Branch.

CLEVE COWLES

Regional Supervisor for the Office of Leasing and Environment
Alaska Continental Shelf (OCS) Region

Dr. Cowles oversees the region's environmental assessment, leasing, and environmental studies activities. He has been with the Alaska OCS Region since 1979, serving as Wildlife Biologist (Endangered. Species), Chief of the Environmental Studies Unit (1983-1994), Acting Chief of the Social and Economic Studies Unit (1992-1994), and Chief, Environmental Studies Section (1995-2007). He received his B.S. in Wildlife Science from the University of Maine (1969) and an M.S. (1974) and Ph.D. (1979) in Wildlife/Fisheries Sciences at Virginia Polytechnic Institute and State University.

JOHN GOLL

Regional Director
Alaska Outer Continental Shelf (OCS) Region

Appointed in May 1997, Mr. Goll is responsible for oil and gas and other mineral leasing and oversight of industry activities on the OCS off Alaska. This ranges from assessments of the oil and gas resources, preparation of environmental analyses and research, coordinating with local, state, tribal, and federal governments, and others interested in the OCS program, and assuring that exploration and development on the federal OCS is done safely and in the best interest of the United States. Prior to becoming Regional Director, Mr. Goll headed the Minerals Management Service's (MMS) national environmental office and was responsible for the agency's nationwide environmental program, including the National Environmental Policy Act and research. He was closely involved with the National Research Council and Government Accountability Office committees which reviewed MMS's environmental studies program, and represented MMS on the Council's Ocean Studies Board project on improving the use of science in decisionmaking for coastal issues. He has participated in training missions with Russian environmental regulators in northwest Siberia and on Sakhalin Island. He has also worked as a meteorologist with the U.S. Geological Survey and the U.S. Nuclear Regulatory Commission, working on air quality modeling and assessments. Mr. Goll holds a Bachelors Degree in Meteorology and Oceanography and a Masters Degree in air pollution meteorology, both from the University of Michigan.

JAMES J. KENDALL

Chief, Environmental Division and
Outer Continental Shelf (OCS) Scientific Committee Executive Secretary

Dr. Kendall was appointed Chief of the Environmental Division for Offshore Energy and Minerals Management in June 2008. Previously, he served as the Chief of the Environmental Sciences Branch which is responsible for coordinating the Minerals Management Service's (MMS) Environmental Studies Program (ESP). The MMS ESP is tasked with providing the environmental and socioeconomic information necessary for MMS to make informed decisions concerning offshore energy and marine minerals activities. Prior to joining the MMS Headquarters Office, Dr. Kendall served as the ESP Studies Chief for the MMS Gulf of Mexico OCS Regional Office in New Orleans, Louisiana. He

received his bachelor's degree in biology from Old Dominion University, his Ph.D. in oceanography from Texas A&M University, and is a graduate of the Senior Executive Fellows program of the John F. Kennedy School of Government, Harvard University. Dr. Kendall has conducted marine research in the Gulf of Mexico, Caribbean, and Red Sea.

ROBERT P. LABELLE

Deputy Associate Director for Offshore Energy and Minerals Management

Mr. LaBelle, as the Deputy Associate Director for Offshore Energy and Minerals Management, serves as Chief Operating Officer for the management of all facets of the U.S. Offshore Energy Program, including policy development and program planning. As mandated in the Energy Policy Act of 2005, this now includes authority for development and regulation of offshore wind, wave, and marine current energy in all U.S. Federal waters.

He has received both the Citation for Distinguished Service (2008) and the Citation for Meritorious Service (1996) from the Department of the Interior (DOI) in recognition of his scientific and management accomplishments. Previously, as Chief of the Minerals Management Service's (MMS) Environmental Division, Mr. LaBelle was responsible for offshore oil and gas industry compliance with all environmental requirements, including water and air quality, seafloor impacts, endangered species, oil spill risk analysis, and cultural resources. He has managed large environmental and technology research programs and has overseen the preparation of numerous Environmental Impact Statements and other decision documents used for U.S. offshore energy activities.

In prior positions, Mr. LaBelle was Chief of the MMS Technology Assessment and Research Program, where he led research on safety, engineering, and technical aspects of offshore production and development. Prior to joining DOI, Mr. LaBelle worked for Martin Marietta Corp on the siting of electrical power plants and on assessing their effects on aquatic species. Mr. LaBelle is a graduate of the University of Massachusetts Dartmouth (BS), the University of Maryland (MS), and Loyola College, MD (MBA).

CHRIS OYNES

Associate Director , Offshore Energy and Minerals Management

On February 5, 2007, Minerals Management Service's (MMS) Director Johnnie Burton named Mr. Oynes as the new Associate Director of the Offshore Energy

and Minerals Management program. Until that time, Mr. Oynes had served as the Regional Director of the Gulf of Mexico Outer Continental Shelf (OCS) Region for the past 13 years.

"Chris Oynes brings to the position of Associate Director a wealth of knowledge and experience about the practices and processes of the Offshore Program as well as impressive leadership skills," said Burton. "His work has helped to make the OCS a major contributor to the Nation's energy and economic security" she continued, "and his solid leadership was crucial to MMS Gulf of Mexico Region employees as well as Gulf OCS energy operators before, during and after the devastating hurricane seasons of 2004 and 2005."

In the Gulf of Mexico OCS Region, Mr. Oynes managed the leasing of OCS lands off five Gulf Coast states for oil, gas, and other mineral development, and supervised the regulation of operations and protection of the environment on those leases, which involve more than 4,000 platforms. He managed a staff of 550, comprised of geologists, geophysicists, petroleum engineers, biologists, and environmental scientists.

Mr. Oynes has more than 30 years of Federal Government experience with energy matters, including 11 years in Washington, D.C. with MMS in various capacities, most notably as Chief of the Lease Sale Planning Branch and the Leasing Division. He served for 7 years as the Deputy Regional Director in the Gulf of Mexico OCS Region before being named the Regional Director in 1995.

He has received the two highest honor awards that the U. S. Department of the Interior bestows--the Distinguished Service Award and the Meritorious Service Award.

FRED M. PILTZ
Regional Civil Penalty Review Officer and Senior Environmental Scientist Pacific Outer Continental Shelf (OCS) Region

Dr. Piltz serves as the Department of the Interior's (DOI) representative to the West Coast Governor's Agreement on Ocean Health (one of three Federal co-leads under the Subcommittee for Integrated Management of Ocean Resources, the Regional Civil Penalty Review Officer, and is the Senior Environmental Scientist, Pacific OCS Region. He is responsible for the planning, implementation, and management of the environmental studies for the Pacific OCS Region and representing DOI bureaus in their support of the West Coast

Governors Agreement. He joined the agency in 1979 and has overseen ocean research in topics as diverse as physical oceanography, marine invertebrate taxonomy, long-term ecological monitoring, and sociology of coastal communities. Dr. Piltz has served as the agency regional representative to a variety of National Research Council study reports including Oil in the Sea and Managing Troubled Waters. He serves as the Region's representative to the Channel Islands National Marine Sanctuary Advisory Committee and the Northwest Regional Implementation Team of Coastal America. Prior to his current position, he worked in applied environmental impact assessment research as both a taxonomic consultant and field scientist in Southern California and in the Straits of Magellan, Chile. His research experience includes laboratory work on the effects of heavy metals on marine organisms, effects of oil spills on intertidal invertebrates, and effects of municipal sewage outfalls on benthic invertebrate communities. He has published on polychaete biology, marine ecology, and marine pollution.

PASQUALE F. ROSCIGNO

Chief, Environmental Sciences Section
Gulf of Mexico and Atlantic Outer Continental Shelf (OCS) Regions

Dr. Roscigno is the Chief of the Environmental Sciences Section for the Gulf of Mexico and Atlantic OCS Regions. He is responsible for managing the Regions' Environmental Studies Program and has over 20 years of experience in managing multi-disciplinary environmental projects. Previously, he held several different research and program management positions with the Minerals Management Service and with the Department of Interior's U.S. Fish and Wildlife Service. He attended Fordham University in New York City.

LYNNETTE L. VESCO

Chief, Office of Environmental Evaluation
Pacific Outer Continental Shelf (OCS) Region

Ms. Vesco manages the leasing and environmental aspects of Pacific OCS Region programs, including the oil and gas, alternative energy, and marine minerals programs. Her office is responsible for planning and carrying out the Regional Environmental Studies Program, conducting environmental reviews and analyses, ensuring compliance with environmental conditions of project approvals, and implementing the Coastal Impact Assistance Program which provides grants to state and local governments affected by oil and gas activities. She is also

responsible for lease management functions such as lease adjudication and company financial responsibility. Ms. Vesco has an M.A. in marine biology.

DEE WILLIAMS

Chief, Environmental Sciences Section
Alaska Outer Continental Shelf (OCS) Regions

Dr. Williams is Chief of Environmental Studies for the MMS Alaska OCS Region. He is responsible for managing and directing the activities of a multi-disciplinary staff in the planning, design, procurement, and conduct of environmental research and study products to serve MMS environmental information needs. He earned a Ph.D. in anthropology from Columbia University and previously worked in academics and resource management consulting. He has a broad international and intercultural background in development impact studies, with many publications in various academic journals and book presses. He sits on Technical Review committees for multiple federal/state agencies in Alaska.

ATTENDEES

OCS Scientific Committee Members

Dr. Ralph Browning Brown, Brigham Young University
Dr. Kenneth H. Dunton, The University of Texas at Austin
Dr. D. Michael Fry, American Bird Conservatory
Dr. Richard B. Howarth, Dartmouth College
Dr. Michael P. Kosro, Oregon State University
Dr. Tyler Priest, University of Houston
Dr. Peter Paul Schweitzer, University of Alaska Fairbanks
Dr. Mary I. Scranton, University of Stony Brook
Dr. Eugene A. Shinn, University of South Florida
Dr. John Trefry, Florida Institute of Technology

Minerals Management Service

Ms. Carolyn Beamer, Offshore Energy and Minerals Management
Dr. Greg Boland, Environmental Sciences Branch
Ms. Chris Campbell, Environmental Studies Management Section, Alaska OCS Region
Mr. Joe Christopher, Regional Supervisor, Leasing and Environment, Gulf of Mexico OCS Region
Mr. James Cimato, Environmental Sciences Branch
Ms. Phyllis Clark, Environmental Sciences Branch
Dr. Rodney Cluck, Chief, Environmental Sciences Branch
Ms. Cathy Coon, Environmental Studies Management Section, Alaska OCS Region
Dr. Cleve Cowles, Regional Supervisor, Leasing and Environment, Alaska OCS Region
Ms. Debbie Cranswick, Chief, Environmental Analysis Section I, Alaska OCS Region
Dr. Heather Crowley, Environmental Studies Management Section, Alaska OCS Region
Dr. Deborah Epperson, Environmental Sciences Section, Gulf of Mexico OCS Region
Mr. John Goll, Regional Director, Alaska OCS Region
Mr. Warren Horowitz, Environmental Studies Management Section, Alaska OCS Region
Dr. Jack Irion, Supervisor, Social Sciences Unit, Leasing and environment, Gulf of Mexico OCS Region
Dr. James Kendall, Chief, Environmental Division
Mr. Fred King, Chief, Leasing Activities Section, Alaska OCS Region
Dr. Andrew Krueger, Offshore Renewable Energy Program
Mr. Jamie Kuhn, Leasing Division
Dr. Ron Lai, Environmental Sciences Branch
Mr. Herb Leedy, Environmental Sciences Section, Gulf of Mexico OCS Region
Dr. Margret Metcalf, Environmental Sciences Section, Gulf of Mexico OCS Region
Dr. Chuck Monnett, Environmental Studies Management Section, Alaska OCS Region
Dr. Fred Piltz, Office of Environmental Evaluation, Pacific OCS Region
Dr. Dick Prentki, Environmental Studies Management Section, Alaska OCS Region
Dr. James Price, Environmental Sciences Branch

Dr. Mike Rasser, Environmental Sciences Branch
Dr. Pat Roscigno, Environmental Sciences Section, Gulf of Mexico OCS Region
Ms. Celeste Rueffert, Procurement Operations Branch
Dr. Donna Schroeder, Environmental Assessment Section, Pacific OCS Region
Ms. Barbara Wallace, Environmental Sciences Branch
Ms. Ruthie Way, Environmental Studies Management Section, Alaska OCS Region
Ms. Kate Wedemeyer, Environmental Studies Management Section, Alaska OCS Region
Mr. Geoffrey Wikel, Environmental Assessment Branch
Dr. Dee Williams, Chief, Environmental Studies Management Section, Alaska OCS Region
Mr. James Woehr, Environmental Assessment Branch

Others

Dr. Don Perrin, Large Project Coordinator, Alaska Department of Natural Resources, Office of Project Management and Permitting
Mr. Paul Stang, Stang Consulting, Anchorage, Alaska
Dr. Ian Voparil, Consultant for companies within the Shell Group, Shell Global Solutions
Dr. Erling Westlien, Environmental Engineer, Shell Exploration & Production Company

Outer Continental Shelf Scientific Committee
Charter

1. Official Designation: Outer Continental Shelf (OCS) Scientific Committee.

2. Scope and Objectives: The Committee will provide advice to the Secretary of the Interior (Secretary) through the Director of the Minerals Management Service (MMS) on the feasibility, appropriateness, and scientific value of the OCS Environmental Studies Program. The Committee will review the relevance of the research and data being produced to meet MMS scientific information needs for decisionmaking and may recommend changes in scope, direction, and emphasis.

3. Description of Duties: The duties of the Committee are solely advisory and are stated in Scope and Objectives above.

4. Duration: The Committee's charter may be renewed in 2-year increments by the Secretary as long as the Offshore Minerals Management Program of the MMS requires the expertise and advice of the Committee.

5. Agency or Official to Whom the Committee Reports: The Committee will report to the Secretary through the Director of the MMS.

6. Bureau Responsible for Providing Necessary Support: The Minerals Management Service.

7. Estimated Annual Operating Costs: The estimated annual operating costs associated with supporting the Committee's functions, including all direct and indirect expenses, are estimated to be $75,000 plus the support of one full-time employee.

8. Allowances for Committee Members (compensation, travel, per diem, etc): Members of the Committee serve without compensation. However, while away from their homes or regular places of business, Committee, subcommittee, or workgroup members engaged in Committee, subcommittee, or workgroup business approved by the Designated Federal Officer (DFO) may be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in Federal Government service under Section 5703 of Title 5 of the United States Code (U.S.C.).

9. Estimated Number and Frequency of Meetings: The Committee will meet at the request of the Director of the MMS, but not less than once annually.

10. Termination Date: The Committee is subject to biennial review and will terminate 2 years from the date the charter is filed, unless renewed prior to that date. The charter is renewed in compliance with section 14(a) (2) of the Federal Advisory Committee Act (FACA). The Committee is subject to the provisions of the FACA, 5 U.S.C. Appendix 2, and shall take no action unless in compliance with the charter filing requirements of section 9 of FACA.

11. Committee Membership: The Secretary will appoint non-Federal members to the Committee to serve a 3-year term. There will be no alternates. Non-Federal members may

not serve more than two consecutive terms. However, after a 2-year break in service, any such non-Federal member will again be eligible for appointment. The Secretary may revoke the appointment of the member if the appointed member fails to attend two consecutive meetings. All members serve at the discretion of the Secretary.

Non-Federal Members: To ensure fair and balanced representation in terms of technical skills and geographic location with consideration for the efficiency and fiscal economy of the Committee, the Secretary may appoint members based on the following criteria:

- Scientific competence,
- Reputation within their field of expertise, and
- Ability to represent important elements of the MMS's research and science information efforts.

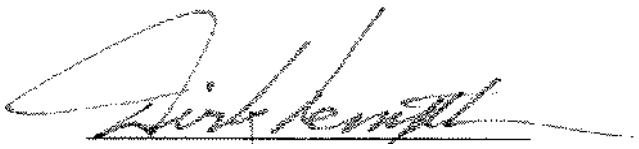
Federal Members: The Director of the MMS, or the Director's designee, is a nonvoting, ex officio member of the Committee.

12. Ethics Responsibility: The Committee's non-Federal members are designated special government employees and will comply with applicable ethics rules and regulations. The Department of the Interior (DOI) will provide materials to members who are appointed as special government employees, which will explain their ethical obligations. Consistent with the ethics requirements, members will endeavor to avoid any actions that would cause the public to question the integrity of the Committee's operations, activities, or advice. The provisions of this paragraph do not affect any other statutory or regulatory ethical obligations to which a member may be subject.

13. Designated Federal Officer: Associate Director for Offshore Minerals Management (ADOMM), or the ADOMM's designee.

14. Subgroups: The Committee may establish such subcommittees or workgroups as it deems necessary, subject to the approval of the DFO, for the purposes of compiling information or conducting research. The Committee Chair, with the approval of the DFO, will appoint subcommittee or workgroup members. However, the role of such subcommittees or workgroups is merely to provide information or recommendations for consideration b' the full Committee. Such subcommittees or workgroups shall not conduct business independent of the Committee and must report their recommendations to the full. Committee for consideration. Subcommittees or workgroups will meet as necessary to accomplish their assignments, subject to the approval of the DFO and the availability of resources.

15. Authority: This Committee is in the public interest in connection with the responsibilities of the Department of the Interior under the OCS Lands Act, as amended (43 U.S.C. 1331 *et. seq.),* and as provided in Section 9 (a)(2) of the FACA.



Secretary of the Interior

Date Signed FEB 19 2008

Date Filed MAR 10 2008

Memorandum

To: Outer Continental Shelf (OCS) Scientific Committee Members

From: Chief, Environmental Sciences Branch /S/ Rodney E. Cluck

Subject: The Minerals Management Service's (MMS) Environmental Studies Program (ESP)– Studies Development Plan (SDP) Fiscal Year (FY) 2010-2012

Attached is the FY 2010-2012 SDP. In past years, we provided you with a notebook containing the SDP along with other briefing materials. This year, we are only providing the "cliff notes" in print with all other documents in files on a thumb drive (Attachment 2). This format coincides with the new administration's focus on a green environment. As before, we ask you to review the materials in preparation for discussion we will be having in both the plenary session and Discipline Breakout Groups.

The SDP contains study plans from headquarters and the regional offices and are composed of "proposed" studies to address information needs of both the oil and gas and renewable energy programs. Each plan is divided into a programmatic overview and study profiles. The programmatic overview will provide you with background information on regional and headquarters ESP activities, where activities may be directed over the next 2 years, and expected "topical areas" of concern from 3 years out and on. The proposed study profiles are divided into two sections: FY 2010 and FY 2011. Proposed studies are efforts we are considering for funding in the next 2 years. These are the potential studies where we will most require your expertise and input in the near future.

As per the request from the last meeting, each program plan includes a table of the currently funded studies and those studies planned for this FY (2009); the latter are either already awarded and ongoing, or currently in the procurement process.

If you have any questions or comments regarding this memorandum, please contact me at (703) 787-1087 or at Rodney.E.Cluck@mms.gov.

Attachments

ALASKA OCS REGION
ACRONYMS

ANS	Alaska North Slope
AOOS	Alaska Ocean Observing System
BLM	Bureau of Land Management
cANIMIDA	Continuation of Arctic Nearshore Impact Monitoring in Development Area
DEM	Digital Elevation Model
DPP	Development and Production Plan
EA	Environnemental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EP	Exploration Plan
ESA	Endangered Species Act
GIS	Geographic Information Systems
NAB	North Aleutian Basin
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPRB	North Pacific Research Board
NSF	National Science Foundation
OCS	Outer Continental Shelf
OSRA	Oil-Spill-Risk Analysis
UAA	University of Alaska Anchorage
UAF	University of Alaska-Fairbanks
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Cliff Notes Alaska OCS Region
Proposed Studies and Rankings

Fiscal Year 2010

Page No.	Discipline	Title	Ranking
31	MM	Bowhead Whale Feeding Variability in the Western Alaskan Beaufort Sea: Satellite Tracking of Bowhead Whales (Extension)	1
33	MM	Bowhead Whale Feeding Variability in the Western Alaskan Beaufort Sea: Oceanography and Feeding (Extension)	2
35	IM	Alaska Marine Science Symposium	3
37	IM	Management, Logistics, and Warehouse Storage of Oceanographic Equipment	4
39	HE	Beaufort Sea Marine Fish Monitoring Survey in the Central Beaufort Sea	5
41	PO	Evaluation of the Use of Hindcast Model Data for OSRA in a Period of Rapidly Changing Conditions (Workshop)	6
43	HE	North Aleutian Basin Monitoring in Drilling Area (NABMIDA): Nearshore Benthic Biota Habitat Baseline & Community Based Long-Term Monitoring	7
45	HE	Joint Funding Opportunities in Existing Marine Fish Studies	8
47	HE	Seabird Distribution and Abundance in the Offshore Environment	9
49	SS	***North Aleutian Basin Socio-economic Indicators	10
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AQ = Air Quality IM = Information Management PO = Physical Oceanography	FE = Fates & Effects SS = Social Systems HE = Habitat & Ecology MM = Marine Mammals and Protected Species

Bowhead Whale Feeding Variability in the Western Alaskan Beaufort Sea: Satellite Tracking of Bowhead Whales (Extension)
This study addresses a conservation recommendation in NMFS's 2001 Arctic Region Biological Opinion that MMS study "the use of the Beaufort Sea by feeding bowheads and assess the importance of this feeding to the health and well being of these animals". The objective of this study is to better understand the relationship between environmental and behavioral variables and the timing and spatial extent of bowhead feeding in the Western Alaska Beaufort Sea. Information from this study will be used for permit approvals for all Beaufort Sea Lease Sales and the NEPA analysis and documentation for Beaufort Sea Lease Sales and DPP's. By understanding how such factors are related to bowhead feeding in western Beaufort Sea locations, MMS would be in a better position to mitigate potential effects of such actions on bowheads and their populations. Collaborations will be developed among whaling captains, Alaska Eskimo Whaling Commission, North Slope Borough, Alaska Department of Fish and Game, NMFS, MMS, and other interested parties to clarify roles in research permitting, co-sponsorship, and implementation.

Bowhead Whale Feeding Variability in the Western Alaskan Beaufort Sea: Oceanography and Feeding (Extension)
A previous MMS study estimated the extent to which the bowhead whale population utilizes OCS areas in the eastern Alaskan Beaufort Sea for feeding, as well as that area's importance to individual whales. Additional research on this subject has been requested, particularly at locations not included in the previous study. The objectives of this study are to better understand the relationship between feeding and environmental and behavioral variables on the timing and spatial extent of bowhead feeding in the western Alaska Beaufort Sea. By understanding this relationship MMS would be in a better position to mitigate potential impacts on bowheads and their populations.

Alaska Marine Science Symposium
The objectives of this symposium are to provide a forum for marine scientists and local communities to present information on the changing marine environment in Alaska, provide a venue for MMS's Alaska OCS Region's environmental studies research for the Arctic and Bering Sea, and to provide a forum for the Alaska OCS Region's scientists and Principal Investigators to communicate with other researchers who are conducting similar scientific studies within the Alaska OCS or adjoining areas of the Alaska marine ecosystem. This symposium is the largest and most comprehensive annual marine science conference within the State of Alaska and is unique since it brings together government and non-government-sponsored marine scientists from within and outside the State of Alaska. Daily sessions are focused on the main components of the marine ecosystem including climate and oceanography, lower trophic level productivity, fish and fish habitat, seabirds, marine mammals, and human dimensions.

Management, Logistics, and Warehouse Storage of Oceanographic Equipment
The purpose of this program support element is to efficiently manage and store oceanographic equipment and provide other support to the Environmental Studies Program's needs. Without funding of this program support element, it would not be possible to maintain or deploy the 36-foot MMS Launch 1273 that provides a mobile, cost-effective, and specialized research vessel for a variety of biological and oceanographic studies throughout the coastal waters of Alaska. Costs for certain studies would increase significantly if more expensive marine-support renewables were chartered. Additionally, it would not be possible to maintain an equipment warehouse that allows us to re-use and share equipment effectively among projects and agencies. This is a fundamental program support element related to studies that support all current leases.

Beaufort Sea Marine Fish Monitoring: Pilot Survey in the Central Beaufort Sea
Fish resources are important to upper trophic levels in the Beaufort Sea ecosystem and to the coastal communities. A recent surge in industry interest and activity was evidenced by a record lease sale and high levels of exploration activity. NEPA analysts need additional species presence and abundance information for assessing potential impacts of offshore development activities. The objectives of this study are to: 1) collect information in the central OCS Beaufort Sea lease areas subject to the most intense development activity, 2) establish methodology adapted to MMS information needs in the Beaufort Sea, 3) implement the pilot under-ice survey developed at the 2007 MMS Under-Ice Sampling Workshop, and 4) correlate observation of seabirds and marine mammals to fish and zooplankton and test the hypothesis. Study information will be used in NEPA analyses, documentation for Beaufort Sea Lease Sales, EP's, and DPP's in 2011 and beyond.

Evaluation of the Use of Hindcast Model Data for Oil-Spill-Risk Analysis in a Period of Rapidly Changing Conditions (Workshop)
Oceanic current patterns in the Arctic, especially in nearshore regions, are strongly influenced by climatological factors such as winds, river runoff, and sea ice coverage. Rapid changes in each of these factors are now occurring that could lead to alteration of surface current fields. Most datasets of modeled surface currents now used in OSRA are more than 10 years old, pre-dating the period of most rapid change. This workshop will include experts in the fields of ocean circulation, meteorological, and climate modeling. The objectives of this workshop are to: 1) describe the impacts that climate change is having on surface circulation in the Arctic Ocean, 2) evaluate whether the hindcast data that is currently used for OSRA adequately represents the surface currents in the region, and 3) evaluate averaging methods used for ensemble forecasting. Possible topics of discussion include trends evident in available long-term ocean datasets that can be linked to the effects of climate change, comparisons of hindcast/forecast results from various ocean models including those used in ongoing studies co-funded by MMS, the Regional Ocean Modeling System, and challenges associated with ensemble forecasting.

North Aleutian Basin Monitoring in Drilling Area: Nearshore Benthic Biota Habitat Baseline & Community Based Long-Term Monitoring (Phase I)
This study will address key environmental assessments of the North Aleutian Basin (NAB) needed for Lease Sale 214 in response to local stakeholder input and public comment during scoping meetings. The primary objective of this study is to provide information on nearshore benthic biota of concern to assess potential impacts of oil and gas exploration and development. Results will provide abundance and distribution of key species and a hydrocarbon baseline that will help identify the PAH (polynuclear aromatic hydrocarbon) loads and sources prior to the layering of new spill events in areas where subsistence use is significant. This study may also contribute data needed for oil spill trajectory analysis for MMS impact assessment in the NAB Planning Area. The results will contribute information useful for developing ongoing monitoring of hydrocarbons, as well as honing mitigation measures to reduce potential impacts from proposed oil and gas exploration and development on nearshore benthic environments.

Joint Funding Opportunities in Existing Marine Fish Studies
Although they fill an essential role in the Arctic ecosystem, little is known of fishes in the Chukchi and Beaufort Seas. Information on the ecology of fish in these waters would be valuable for assessing oil-spill risks and conducting Essential Fish Habitat (EFH) and NEPA analyses. Information resulting from fish surveys will also be useful for developing mitigation measures to reduce potential impacts

to upper trophic level birds, fish, and marine mammals from proposed oil and gas exploration and development activities. The objectives of these studies are to: 1) estimate the spatial distribution, species composition, and feeding ecology for fish species in designated and potential planning areas, 2) incorporate the data (GIS based maps and attribute tables) into the MMS fish database for future accessibility, 3) facilitate new information for OSRA and EFH designations, 4) catalog specimens for further study and for Alaska Museum voucher specimens, and 5) identify high priority locations for mitigation or deferral areas under consideration in EA's. This information is also valuable for assessing oil spill risks.

Seabird Distribution and Abundance in the Offshore Environment
Data on the distribution of marine birds and mammals will be potentially useful for ESA, Section 7, consultations and NEPA analyses, DPPs, and other documentation. The objectives of this study are to: 1) estimate the spatial distribution, species composition, and seasonal changes in species and abundance for marine birds and mammals in designated and potential planning areas and 2) process the data for entry into the North Pacific Pelagic Seabird Database for future accessibility, and 3) facilitate management decisions for marine bird use of planning areas. The information obtained from these surveys will potentially contribute to development of mitigation measures and strategies to reduce potential impacts. The results of this study will complement recent and on-going surveys of marine birds and mammals which are partially funded by the North Pacific Research Board (NPRB) and the USFWS.

North Aleutian Basin Socio-economic Indicators There is high priority for baseline information from the communities of Nelson Lagoon, Sand Point, Cold Bay, False Pass, King Cove, and related Community Development Quota groups. This study is intended to initiate new socio-economic data collection in coastal communities along the Alaska Peninsula most proximate to the proposed North Aleutian Basin lease sale area. The objectives of this study are to: 1) synthesize a broad range of existing socio-economic data for identified communities, 2) collect new data on key socio-economic indicator variables, 3) identify existing community infrastructure and public services and local capacity to incorporate change that would likely accompany oil and gas exploration, and 4) develop and identify regional socio-economic aspirations and values. Later phases of the study are anticipated that will increase the range of surveyed communities to establish a broader regional baseline, as potential exploration or development in the NAB achieves greater definition.

Seasonal Habitat Use by Endangered Steller Sea Lions of the North Aleutian Basin Sale Area
The Steller sea lion is listed as endangered under the ESA and as a species of concern in the North Aleutian Basin. Information on use of terrestrial and marine habitats by Steller sea lions in the southeastern Bering Sea, including the NAB Sale Area, is beneficial for ensuring that oil and gas lease and development activities do not delay the species' recovery. The objectives of this study are to determine seasonal distribution, migration to haul outs, foraging areas, and home ranges for the Steller Sea Lion within the Sale Area. Individuals will be permanently marked so that they may be included in future population dynamics research. Study findings will be incorporated into NEPA analyses, ESA Section 7 consultations, and other reviews of pre- and post-sale and pre- and post-exploration decision making and mitigation.

Occurrence and Distribution of Endangered Humpback and Fin Whales in the North Aleutian Basin Area
At least nine species of cetaceans are known to occur in the North Aleutian Basin lease-sale area. In addition to the North Pacific right whale (*Eubalaena japonica*) (already the subject of a NMFS-MMS inter-agency agreement), other species listed as threatened and/or endangered are known to, or

potentially could, occur in areas that may be affected by oil and gas activities within the NAB. Little is known about the temporal and spatial patterns of their use in the NAB, their use of specific areas for feeding or other biologically significant behaviors, or the types of whales that use specific areas. Virtually nothing is known about the extent to which the region is important for fin whales. Under NEPA and the Endangered Species Act, MMS will be required to evaluate if and how federal actions associated with oil and gas development may affect these whales. The occurrence, distribution and habitat use of these species in the area may play an important role in determining where and when exploration or access to petroleum reserves may be conducted. The objective of this study is to characterize and understand the spatial and temporal use of habitats by humpback and fin whales within and adjacent to those areas in the NAB in which oil and gas exploration, development, and production, and associated activities may occur in the near future. Because some basic humpback and fin whale information will be collected during the course of the study of the North Pacific right whale, the objectives of this particular study are designed to complement data that will be collected during aerial surveys and passive acoustic monitoring that will occur during that ongoing study.

Alaska State-Wide Oceans Research and Studies Project Browser Covering the Alaska Offshore and Coastal Areas

Although the MMS places digital copies of final study reports online, it's difficult to quickly access the study boundary, data collection efforts, or conclusions from multiple study efforts without expending significant personal time and effort. In addition, it is a challenge for internal MMS staff to remain current with all research in the OCS due to the quantity of government and industry activities conducted within these areas. The MMS, as well as other agencies such as NPRB, AOOS, UAF, NOAA, and BLM have identified a statewide need for a centralized database of ocean research and studies in Alaska. Representatives from these agencies held a Data Integration Meeting in August of 2008 to plan how to integrate studies projects from these agencies into one unified project browser. A technical steering committee was formed among the participants that succeeded in establishing the fields necessary to integrate the agency project information. The objective of this study is to provide support to the Alaska Ocean Observing System (AOOS) to coordinate and integrate ocean research project information from MMS, other agencies, and industry in the development a web-based visual GIS that will meet MMS needs for the Alaska OCS. A web-based database will assist MMS in the writing of new study descriptions and statements of work, preparing and planning of new meetings, promoting collaboration with other agencies on similar projects, provide significant savings of funds, expand our research potential, and improve MMS decision making in the writing of environmental impact statements, EA's, and commenting on exploration and development plans for the OCS.

Oil Spill Occurrence Estimators for Onshore Alaska and Canada North Slope Crude and Refined Oil Spills

The objectives of this study are to update and collate crude and refined oil spills occurrences on the ANS from industry, U.S. Coast Guard (USCG), EPA, U.S. Department of the Interior, BLM, MMS, and the Alaska Department of Environmental Conservation data sets through 2010, and develop relative spill occurrence estimator(s) suitable for use for onshore small oil spills on the ANS using an appropriate exposure variable. The MMS has not updated or reanalyzed ANS small spill data since 2000. By the time this study is completed, it will be more than a decade since a comprehensive analysis of ANS crude and refined small spills has been completed by MMS. Recent criticisms have stated that MMS must do a better analysis and reporting of sources of variance and magnitude of confidence intervals for spillage estimates. A full study of sources of variance and confidence intervals in small oil spill occurrence estimators for the ANS has not been attempted by MMS in the past because of limited data availability. With a Joint Industry Project between industry and MMS, this study will test the assumptions of Poisson distribution for small spills, reconsider the suitability

of pipeline length or blended spill estimators, and develop confidence intervals for spill occurrence estimators used by MMS and industry.

Fiscal Year 2011

Page No.	Discipline	Title
65	HE	cANIMIDA Monitoring of Boulder Patch Kelp During Liberty Development
67	SS	Baseline Nutritional Survey: Inventory and Content Analysis of Subsistence and Market Foods as Consumed by North Slope Communities
69	HE	Current Distribution of Pelagic Fish, Demersal Fish, and Invertebrate Communities in the Chukchi Sea Lease Area
71	MM	Use of the Chukchi, Beaufort and Bering Seas by Endangered Humpback and Fin Whales
73	HE	Field Experiments of Seismic Effects on Arctic Fish and Field Measurements of Seismic Acoustic Characteristics
75	PO	A Comparison of Modern and Historical Ice Gouge Characteristics and Recurrence Rates in the Alaskan Chukchi Sea
77	PO	High-Resolution Digital Elevation Model for the Greater Alaskan Waters
79	SS	Report of Multivariate Statistical Analysis from Beaufort Sea Community Data

AQ = Air Quality IM = Information Management PO = Physical Oceanography FE = Fates & Effects	SS = Social Systems HE = Habitat & Ecology MM = Marine Mammals and Protected Species

cANIMIDA Monitoring of Boulder Patch Kelp During Liberty Development

The Boulder Patch, located between the Satellite Drilling Island and Liberty Unit leases, is the northern-most kelp community in the western Arctic and has been identified by MMS and the scientific community as an area of special biological concern. The combination of water depth, relic cobble and boulder bottom, and barrier-island protection from ice gouging has allowed development and persistence of a unique and distinct kelp community. Over 30 years of monitoring has demonstrated both strong limitation of low in situ light levels on kelp production and of high interannual variability of light as function of storminess and resultant resuspended sediment levels. The kelp is extremely vulnerable to any increase in background suspended sediment levels. Because of the significance of Boulder Patch, the MMS Scientific Committee recommended addition of Boulder Patch monitoring task be added to the MMS Arctic Nearshore Monitoring in Development Area (ANIMIDA) and continuation of ANIMIDA (cANIMIDA) projects in 2000-2007. Those projects have completed their monitoring just as development of Liberty is anticipated. The objective of this study is to monitor the potential effects of Liberty development on the Boulder Patch Community.

Baseline Nutritional Survey: Inventory and Content Analysis of Subsistence and Market Foods as Consumed by North Slope Communities

A significant body of research has emerged to indicate that different categories of North Slope residents increasingly manifest serious health problems that are related to changes in diet and consumption patterns, including diabetes, botulism, iron deficiency anemia, caries, heart disease, obesity, and substance abuse. The objectives of this study are to improve understanding of contemporary patterns of food consumption within each sampled community, analyze representative food consumption patterns and portions for nutritional value and potential contaminants, estimate the percentage and dosage of food energy derived from subsistence and market sources for sampled subgroups in each community, and link nutritional data to existing subsistence surveys and sharing network studies to enhance analysis of potential health impacts from oil and gas development , preferably in the Wainwright, Point Lay, and Kaktovik communities. This study will use a nutritional survey and analysis of subsistence and market foods as actually consumed using standard methods of nutritional epidemiology to characterize the mixed and changing nutritional system. Key sampling variables for each community would likely include ethnicity, gender, age group, and lifestyle attributes, especially level of subsistence effort. This study would contribute to a better understanding of the social complexities of emergent pathologies and investigate if any are attributable to incremental subsistence sector disruptions that may be reasonably associated with oil and gas activities. This study will strengthen MMS compliance with Executive Order 12898 on Environmental Justice and will facilitate MMS research coordination with multi-agency initiatives. The study is envisioned as a collaborative, inter-agency effort, with the State of Alaska Department of Health and Human Services assuming the lead role with assistance from MMS. Other cooperative funding institutions may include the North Slope Science Initiative, BLM, USFWS, the U.S. Department of Agriculture, State of Alaska, and private industry.

Current Distribution of Pelagic Fish, Demersal Fish, and Invertebrate Communities in the Chukchi Sea Lease Area

The Alaska OCS Region identified a need for continued fish and invertebrate baseline monitoring during the 2007 MMS-sponsored "Chukchi Sea Information Status and Research Planning Meeting" to provide useful information to upcoming NEPA reviews and post sale needs. The recent surge in interest in Arctic oil leases combined with climatic changes has elevated this information need. The objectives of this study are to document, characterize, and understand the distribution of pelagic and demersal fish and invertebrate communities in Chukchi Sea lease 193. The study will provide a basis for post-sale monitoring through a comprehensive assessment of pelagic fishes combined with a series of bottom trawls to document demersal fish and invertebrates in the Chukchi Sea lease area. It will also provide GIS-based maps and attribute tables of forage fish for OSRA and impact monitoring.

Use of the Chukchi, Beaufort and Bering Seas by Endangered Humpback and Fin Whales

In recent years, humpback whales have been observed in the Chukchi and Beaufort Seas, and fin whales have been sighted in the former area. Given the retreat of sea ice and the known high-latitude range of these species in other oceans, it is likely that the recent sightings represent a climate-related range expansion that will continue in future years. The extent to which this is occurring and the potential impact of resource extraction activities on these species in the Chukchi and Beaufort, is currently unknown. Nothing is known about the population identity of the animals observed there. In the case of the humpback whales, it is possible that they are part of the small western North Pacific stock. The objectives of this study are to estimate spatial and temporal patterns of use of the Chukchi and Bering Seas by endangered fin and humpback whales and assess population structure and origin of animals in both regions.

Field Experiments of Seismic Effects on Arctic Fish and Field Measurements of Seismic

Acoustic Characteristics

Concerns about seismic exploration effects on fish are increasing. The effects of seismic exploration on fish is becoming a high-priority issue for arctic residents and this study will provide new and region-specific information for NEPA analysts who need to assess potential effects of seismic activity on fisheries and the ecosystem functions of the affected fish resources. The information needed to address this issue does not exist for the region's fish species. The objectives of this study are to coordinate between MMS and industry operators to prepare appropriate field tests to define and measure acoustic propagation levels and transmission loss level in specific marine environments and evaluate effects of seismic sound waves on important Arctic fish and shellfish species through field experiments during industry seismic operations.

A Comparison of Modern and Historical Ice Gouge Characteristics and Recurrence Rates in the Alaskan Chukchi Sea

A recently completed Technology Assessment and Research Program study "Design Options for Offshore Pipelines in the U.S. Beaufort and Chukchi Sea" stated a strong need for "increased regional coverage of repetitive mapping of the U.S. Beaufort and Chukchi seas." This study was unable to ascertain the impact of ice gouges on pipelines for the Chukchi Sea since there was insufficient data to predict the age, occurrence, extent, and magnitude of ice gouging since only single year surveys were done in sighting the exploration wells during the late 1980's and early 1990's. Therefore, the age and recurrence rates of the gouges found within the survey area could not be ascertained. Some gouges identified during these site surveys were as deep as two meters. Ice gouges of this magnitude can cause severe damage to any pipeline and possibly cause a major oil-spill. Data sets clarifying the magnitude and recurrence rates of ice gouging are very important for establishing guidelines for burial of oil production pipelines that cross the shelf. The most common mitigation strategy for reducing ice gouge impacts on sub-sea, pipeline burial beneath the zone of sea floor disturbance, requires knowledge of ice gouge recurrence rates and depth of seabed disturbance. The objectives of this study are to conduct a regional repetitive ice gouge survey on the Chukchi OCS to assess characteristics and severity of contemporary ice gouges along historic site survey lines and within those areas of high potential for oil and gas development. Comparison with existing data sets will show whether ice gouge characteristics are changing with sea ice conditions, and assess the burial depth for any proposed potential future development plans for the Chukchi Sea.

High-Resolution Digital Elevation Model (DEM) for the Greater Alaskan Waters

Over the course of 2008-2009, researchers at the UAF have assembled what they believe to be one of the most complete sets of publicly-available bathymetric soundings for the greater Alaskan region and MMS has attained access to some proprietary soundings. They have created a high resolution (1-km) DEM grid from these soundings that exclude the use of digitized contours in order to avoid the terracing effect. In Russian waters, where shipboard sounding data is sparse, they have undertaken the digitization of point soundings from Russian nautical charts. To date, nearly 150 charts have been digitized. Through partnership with Canadian colleagues they have received many soundings from the Canadian Hydrographic Service. Soundings in U. S. waters come from the National Ocean Service hydrographic trackline database, NOAA Electronic Navigational Chart point soundings, other various U. S. trackline and multibeam data archives, and miscellaneous research cruises conducted by UAF and other oceanographic institutions. The objective of this study is to further improve the AOOS bathymetric DEM's through acquiring additional soundings, processing soundings that have already been obtained but not yet incorporated into the DEM, and continued development of error-checking and gridding schemes. This study will complete the digitization of

Russian nautical chart point soundings, greatly improving the resolution in the Chukchi Sea and parts of the western Bering Sea. Additional in-hand sounding data that lie within the NAB planning region and over the greater Bering Sea shelf will be processed as well. Also, the study will locate and obtain additional soundings, particularly soundings located within foreign oceanographic/hydrographic databases or private industry archives, improve the data quality control error-checking algorithm, and re-grid the entire dataset with the new soundings incorporated and with improved error-checking. Construction of a new high resolution dataset will enable more accurate numerical model simulations.

Report of Multivariate Statistical Analysis from Beaufort Sea Community Data
Through multivariate analysis of existing social data sets, this study will foster improved information about Beaufort Sea communities to better address OCS Lands Act requirements, assist in NEPA-document preparation, and prepare effective mitigation and monitoring measures. The study will strengthen MMS compliance with Executive Order 12898 on Environmental Justice and will facilitate MMS research coordination with other agencies. The objectives of this study are to 1) assess variability to survey response within the study population by residence, age, gender, ethnicity, and other demographic variables; 2) analyze differences between Beaufort Sea communities and explore correlations to test hypotheses; 3) conduct univariate and bivariate analysis to generate valid and reliable descriptive information for inclusion in summary tables and graphs; 4) provide quantitative-oriented but readily understandable explanatory discussion in the draft and final report; and 5) conduct multivariate analysis of relationships among key variables to predict relationships regarding oil and gas development. The proposed new study will supplement analytical findings from previous data collection efforts. It will contribute to a better understanding of the social complexities in North Slope communities to help explore the strength of hypothetical correlations and to predict changes that may be reasonably associated with oil and gas activities.

GULF OF MEXICO REGION
ACRONYMS

EPA	Environmental Protection Agency
GOM	Gulf of Mexico
HNC	Houma navigational Canal
MAFLA	Mississippi/Alabama/Florida
NCAR	National Center for Atmospheric Research
NDBC	National Data Buoy Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
O&G	oil and gas
SBF	synthetic-based drilling fluids
SIA	social impact assessments
SIP	State Implementation Plans
WRF	Weather Research and Forecasting

Cliff Notes MMS Gulf of Mexico Region's Proposed Studies and Rankings for Fiscal Years 2010

FY 2010

Page #	Discipline	Title	Rank
19	FE	Forcing Functions Governing Salt Transport Processes in OCS Navigation Canals and the Surrounding Wetland Landscape Utilizing Houma Navigation Canal (HNC) as a Surrogate Canal	1
23	AQ	Year 2011 Gulf-wide Emissions Inventory Study	2
25	PO	A Lagrangian Approach to Study the Gulf of Mexico's Deep Circulation	3
27	AQ	A Coupled Atmosphere and Ocean Model for Air Quality and Other MMS Applications in the Gulf of Mexico	4
29	FE	Synthetic-Based Fluid Spill of Opportunity: Environmental Impact and Recovery	5
31	SS	Battle of the Atlantic Expedition 2009	6

AQ = Air Quality IM = Information Management PO = Physical Oceanography	FE = Fates & Effects HE = Habitat & Ecology MM = Marine Mammals & Protected Species SS = Social Sciences

Forcing Functions Governing Salt Transport Processes in OCS Navigation Canals and the Surrounding Wetland Landscape Utilizing Houma Navigation Canal (HNC) as a Surrogate Canal

The Louisiana State Department of Natural Resources has questioned the ability of MMS to accurately determine the affect of OCS activities on canal widening and its contribution to wetland loss in the coastal zone. The objective of this study is to determine the relationship of OCS activity to salt wedge behavior as it may relate to channel widening and wetland loss along OCS navigation canals. The focus will be on documenting and mapping the temporal and spatial extent of the salinities associated with the salt wedge both in the canal and adjacent wetland communities. In addition, maps will be produced and an accompanying narrative will explain any evidence of a connection between canal salinity and adjacent wetlands. Comparisons will be conducted with adjacent marsh complexes that either lack connectivity with salinity or have avenues of saline input not associated with the canal. The resulting product should explain the behavior of the salt wedge in the HNC and its relationship to the connectivity to adjacent marshes.

Year 2011 Gulf-wide Emissions Inventory Study

The EPA significantly strengthened its National Ambient Air Quality Standards (NAAQS) for ground-level ozone. Due to these more stringent NAAQS, it is likely that many of the regions adjacent to the Gulf of Mexico will face great challenges in attaining air quality standards in their respective states and may require state agencies to perform air quality photochemical modeling for ozone and regional haze for use in their SIPs. In order to conduct this modeling, emission inventories must be generated as inputs to the models. The objective of this study is to develop a year 2011 air emissions inventory of OCS sources (platform and non-platform), including estimates of carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter, hydrocarbons, carbon dioxide, methane, and nitrous oxides. This inventory data will be made available to assist states in conducting modeling for additional SIP demonstrations to meet the new requirements. An air emissions inventory will be conducted to assure coordination of air pollution control regulations between OCS

offshore sources and state's sources onshore. This emissions inventory will likely be useful for compliance with EPA's Greenhouse Gas Reporting Rule. Finally, MMS will use the 2011 emissions inventory to support the National Environmental Policy Act process when preparing environmental impact statements and assessments and for emissions trends and impacts analysis.

A Lagrangian Approach to Study the Gulf of Mexico's Deep Circulation

This 3-year study will increase the geographical coverage of drifter releases and analyze the resulting data to produce maps of currents and Lagrangian statistics of the current field such as length scales and dispersion of particles. This study will use acoustically tracked deep drifters in the Gulf of Mexico, including possible releases in Mexican waters, which will be submerged for a period of 12 months. The results of this study will provide maps of deep currents that will help with the assessment of accidental pollutant releases and shed light on dispersal of larvae. These improved maps of currents will be used by MMS and Industry to prepare for and avoid high currents, design better biological assessments for regulatory documents, and increase understanding of deep circulation. In addition, the findings may benefit archeologist's investigating of shipwrecks in the deep Gulf of Mexico.

A Coupled Atmosphere and Ocean Model for Air Quality and Other MMS Applications in the Gulf of Mexico

The MMS requires meteorological model results to feed air quality models that assess air quality impacts both on and offshore. Through this study, MMS would contribute funding to support the development of a combined atmosphere and ocean model system suitable for the GOM's needs. The objective of this study is to integrate one atmospheric model and one oceanic model into an atmosphere-ocean model system in order to obtain a better understanding of the feedback mechanism of the upper ocean and the impact of sea surface temperature on the atmospheric circulation. It will also improve the accuracy and parameterization of various physical processes of the model and will produce a better-working, integrated atmosphere and ocean model. The MMS has funded a number of relevant studies including meteorological and oceanographic modeling studies, observational studies, and a study of the atmospheric boundary layer in the GOM. The results obtained from these studies will be used to develop the atmosphere-ocean model.

Synthetic-Based Fluid (SBF) Spill of Opportunity: Environmental Impact and Recovery

MMS needs more information about biodegradation and removal of SBF from the seafloor. Spills that are large in volume and not well dispersed prior to settling on the seafloor occur every few years and have not been studied outside of the laboratory environment. In 2005, the MMS awarded a contract, "Re-examination of Variance, Assumptions, and Statistical Approach to Volume-Based Occurrence Rates for Accidental Oil Spills on the U.S. OCS. The study objectives are to: 1) design and successfully complete a more robust study than contract M07PC13002 (GM-05-04); 2) determine the spatial distribution of SBF on the seafloor after an accidental release; 3) evaluate the initial environmental impact; 4) compare the data generated from the spill location to relevant SBF cutting discharge studies; and 5) if possible, evaluate the temporal changes of the accidental release. The spill will be modeled so as to select coring locations and estimate SBF thickness. This study shall be performed through an Indefinite Deliverable/Indefinite Quantity contract with task orders and, within 6 months of the occurrence of an appropriate spill incident, a research team will collect samples.

Battle of the Atlantic Expedition

Currently, there are over 125 known losses from the Battle of the Atlantic located in Federal waters off the North Carolina coast. These sites are recognized as non- cultural, historical, and archaeological resources. With recent interest in renewable energy sources and new leasing activity

planned for the Atlantic Region, development in this area will increase. Therefore, a current assessment of World War II vessel losses will be crucial for mitigating adverse affects to these resources as required under Section 106 of the National Historic Preservation Act (NHPA) and Executive Order 11593, which require that Federal agencies must apply the National Register Criteria to properties that may be affected by an undertaking. The objective of this project is to collect detailed documentation of shipwrecks. This is Phase II of the project and will investigate Allied losses in the Graveyard of the Atlantic including U. S. and British naval vessels, as well as U. S. Merchant Marine ships. Also included in this number are at least four, and possibly five, German U-boats. Results from this project will include a cumulative report on fieldwork and historical significance; a joint Battle of the Atlantic nomination with MMS on the U-166 and Gulf of Mexico WW II merchant vessel losses to the National Register of Historic Places; and outreach products, including a Battle of the Atlantic web site, posters, and educational materials.

Fiscal Year 2011

Page #	Discipline	Title
35	HE	Characterization of Seagrass in Waters of the U.S. Outer Continental Shelf: Florida Big Bend Area
37	HE	Environmental Monitoring of Oil and Gas Development Sites on the Florida Outer Continental Shelf
39	HE	Gulf of Mexico Monitoring Program (2011): South Texas Banks
41	HE	High Resolution Bathymetry of Seafloor Biological and Archaeological Features of the Mid-Atlantic Outer Continental Shelf
43	HE	Long-term Effects of Oil and Gas Activities on the Mississippi-Alabama-Florida Shelf
47	MM	Association of Sea Turtles with Petroleum Platforms in the Gulf of Mexico
49	PO	Current-Topography Interaction and its Influence on Water Quality and Contaminant Transport Over Shelf-Edge Banks
51	SS	Socioeconomic Implications of Structural Change in the OCS Petroleum Industry

AQ = Air Quality IM = Information Management PO = Physical Oceanography	FE = Fates & Effects HE = Habitat & Ecology MM = Marine Mammals & Protected Species SS = Social Sciences

Characterization of Seagrass in Waters of the U.S. Outer Continental Shelf: Florida Big Bend Area
The objective of this study is to survey the distribution of seagrass in Federal waters of the Florida Big Bend region. Seagrasses are rapidly declining worldwide, therefore recent mandates to offer offshore leases within 125 miles of the west coast of Florida prompt the need for MMS to update seagrass information for the Big Bend region. The Big Bend region of Florida is one of the most favorable seagrass habitats in the U. S, with seagrass extending well into Federal waters. It has relatively low pollution, a gently sloping shelf, and a low-energy wave regime. There is currently little information on the characteristics of seagrass in federal waters of the Big Bend Region. The MMS needs information about the status of seagrass in this region to support ecosystem-based management of this sensitive resource.

Environmental Monitoring of Oil and Gas Development Sites on the Florida Outer Continental Shelf
The state of benthic communities near O&G activities is a robust indicator that the MMS can use to define the effectiveness of their regulations and to apply adaptive management. Periodic monitoring of the effects of O&G activities provides feedback to the MMS to insure protection of the marine, coastal, and human environment. The objective of this study is to evaluate the condition of benthic communities surrounding oil and gas (O&G) activities to detect impacts. The study will accomplish this objective through the following goals: 1) assess the condition of benthic communities near a variety of ongoing O&G activities; 2) assess the condition of benthic communities near a variety of past O&G activities; 3) assess the condition of similar benthic communities far from O&G activities; and 4) evaluate the effects of O&G activities. Measures of community health and success will serve as clear indicators of the effectiveness of MMS regulations and support adaptive management practices.

Gulf of Mexico Monitoring Program (2010): South Texas Banks
Much of the MMS's baseline data for benthic habitats on the continental shelf dates back to the 1970's and

80's. It is important for the MMS to be able to detect anthropogenic impacts from oil and gas activities. This can only be done by comparison with current reliable information on the status and health of the sensitive habitats concerned. Many natural and anthropogenic influences could have produced changes in the past 20-30 years. The objective of this study is to renew MMS's knowledge of the Gulf of Mexico's (GOM) habitats to insure that protective measures are adequate or if the habitats are able to adapt to changing conditions. Using new knowledge, equipment, and techniques, this study will create baseline data that will be updated periodically to maintain a current understanding of the conditions of sensitive shelf habitats. This is a large task and the process would start in the western GOM by using modern methodology to investigate the South Texas Banks. Future phases would shift eastward and focus on varying habitats across the GOM.

High Resolution Bathymetry of Seafloor Biological and Archaeological Features of the Mid-Atlantic Outer Continental Shelf

The MMS has an immediate need for comprehensive information on seafloor characteristics of the Mid-Atlantic OCS to support a scheduled lease sale planned for 2011. There have been no lease sales in this area for over 20 years. The resolution and accuracy of the old geographic data does not compare with the capabilities of new techniques. The objective of this study is to support collection of high resolution bathymetry of seafloor features in the mid-Atlantic planning area which will provide information on seafloor features and archaeological sites to support sound environmental management by the MMS. This cooperative project will be designed with one or more Federal agencies and other appropriate partners to gather high resolution bathymetry data for pertinent areas of the mid-Atlantic OCS. High resolution multi-beam equipment with acoustic backscatter capability will be used to provide accurate and precise bathymetry data. This data will particularly target offshore areas of topographic highs and potential archaeological features.

Long-term Effects of Oil and Gas Activities on the Mississippi-Alabama-Florida Shelf

Determination of the long-term effects of oil and gas activities on the outer continental shelf is necessary to assess the effectiveness of MMS regulations and promote adaptive management practices. The objective of this study is to produce a current assessment of the cumulative long-term impacts of O&G activity in the Mississippi/Alabama/Florida (MAFLA) shelf area, compare them to relatively undeveloped areas off the west Florida shelf, and relate that to the wider region of the GOM continental shelf. This will be accomplished through the following goals: 1) compare data from areas where O&G activities have occurred for decades with areas of no activity; 2) compare the results to historical studies; 3) determine whether there are long-term measurable changes in potential indicators of contamination including biological indicators and if these changes can be attributed to oil and gas activities; 4) and extrapolate the impacts of O&G activities from the MAFLA shelf to the remainder of the GOM continental shelf with consideration for regional conditions. This information is needed to ensure that MMS regulations continue to effectively protect the coastal, marine, and human environments.

Association of Sea Turtles with Petroleum Platforms in the Gulf of Mexico

There are currently over 4,000 petroleum platforms in the north-central Gulf of Mexico (GOM). When a platform is no longer viable, federal regulations require its removal, which commonly requires explosives. On average 30-40 platforms are removed using explosives, with an estimated 40-50 sea turtles exposed to these disturbances each year. Using explosives has the potential to injure or kill marine species, including sea turtles, within the vicinity of the platform. This project will study the relationship between sea turtles and petroleum platforms in the GOM, while looking at changes in distribution and abundance over time (~20 years). Data from this study will be compared to a previously-funded MMS project conducted from 1988-1990. The combined data will provide a better understanding of how sea turtles utilize platforms as habitats and food sources at multiple temporal and spatial scales. This study will provide an understanding

of the general relationship between sea turtles and platforms which may assist in designing and implementing mitigations put forth for the decommissioning of these structures.

Current-Topography Interaction and its Influence on Water Quality and Contaminant Transport Over Shelf-Edge Banks

The purpose of this study is to elucidate the role of water circulation and its interaction with topography in the maintenance of reef communities. This study will shed light on circulation and environmental conditions affecting reef organisms on sensitive habitats of the GOM OCS and support management decisions regarding O&G activities near mid-shelf or shelf-edge banks. This study will evaluate the degree of entrainment of near bottom waters and sediments (with potential detrimental factors) onto the mixed layer where sensitive biological features are located. Results of this study will confirm the basic assumptions for shunting, shunting zones, and No Activity Zones in use for the past 30+ years. It will also determine natural water quality conditions over time and throughout the water column for the first time at a selected bank.

Socioeconomic Implications of Structural Change in the OCS Petroleum Industry

The 1980's oil price collapse marked the beginning of what are now a decades-long reorganization of the petroleum industry world wide and a period of dynamic change and adjustment to generally lower and more variable oil prices. The objective of this study is to better understand the effects of the world energy market on key sectors of the GOM region petroleum industry and the localized socioeconomic consequences of these sector-level effects. Information derived from this study will support assessment of regional-level socioeconomic impacts that are changing due to the changing of the offshore petroleum industry. This study will analyze industry responses to the world petroleum market focusing on key drivers and outcomes of these responses at the sector level (e.g. changes in level of competition, capital markets, factors driving entry, exit and consolidation) and at localized levels (e.g. centralization, labor recruitment, and corporate participation).

PACIFIC OCS REGION
ACRONYMS

EIS	Environmental Impact Statement
MARINe	Multiagency Rocky Intertidal Network
NEPA	National Environmental Policy Act
MMS	Minerals Management Service
NPS	National Park Service
OCS	Outer Continental Shelf
OSRA	Oil Spill Risk Analyses
SBC	Santa Barbara Channel
USGS	U. S. Geological Survey

Cliff Notes Pacific OCS Region
Proposed Studies and Rankings

Fiscal Year 2010

Page #	Discipline	Title	Rank
13	HE	Regional Importance of Manmade Structures as Rockfish Nurseries	1
15	HE	MMS MARINe – Multiagency Rocky Intertidal Network	2
17	PO	Habitat Mapping in the Santa Barbara Channel	3
19	HE	Completion of Fish Assemblage Surveys around Manmade Structures and Natural Reefs off California	4
21	MM	Southern Sea Otter Range Expansion and Habitat Use and Interaction with Manmade Structures	5
23	HE	Completion of the Invertebrate Surveys around Manmade Structures off California	6

AQ = Air Quality FE = Fates and Effects
HE = Habitat and Ecology MM = Marine Mammals and Protected Species
IM = Information Management PO = Physical Oceanography

Regional Importance of Outer Continental Shelf (OCS) Oil and Gas Platforms as Rockfish Nurseries

The Minerals Management Service (MMS) will need to make decisions in future years about the environmental impacts of platform decommissioning options. Currently, shallow habitats of OCS oil/gas platforms host large numbers of economically important juvenile species, especially rockfishes. The objectives of this study are to initiate an integrated region-wide oceanographic, geologic, and biologic database on the Pacific OCS that enables an ecosystem-level synthesis of the marine environment on which to base management decisions and to perform environmental analyses. The initial efforts in applying this synthesis will focus on understanding the regional importance of platform habitat of rockfish nurseries in order to predict consequences of future leasing, production, or decommissioning activities to essential fish habitat and managed fish species. This integration allows prediction of regional consequences from events occurring within a limited spatial scale. Such predictive capability is important in all aspects of OCS permitting, mitigation, and decommissioning decisions. The knowledge gained from this study will allow MMS to address critical concerns raised in the University of California Blue Ribbon Science Panel on Decommissioning about the contribution of oil and gas platforms to regional fish stocks.

MMS MARINe (Multi-Agency Rocky Intertidal Network)

This study will provide funding to monitor the 24 MMS long-term monitoring intertidal sites on the mainland shore immediately adjacent to OCS facilities. With these data, MMS can directly assess impacts to shoreline resources from OCS activities by differentiating between naturally caused impacts and other anthropogenic impacts including impacts from OCS oil and gas production and accidental oil spills. This study fulfills MMS's OCS Lands Act mandate to monitor the marine and coastal environment adjacent to OCS operations. It is proposed to update the analysis with data from 2003 to present in the first year of the funding. Rather than a report, however, a web-based product is planned to analyze trends at MMS sites, in combination with data at other MARINe sites in the shared database. This is an important Cooperative Agreement with the State as currently funding has

been severely cut and MMS-MARINe data are the key source of rocky intertidal information being used in Southern California to determine Marine Life Protected Areas designations/monitoring, and determining impacts to biology in Areas of Special Biological Significance.

Habitat Mapping in the Santa Barbara Channel (SBC)
The SBC is an active area for potential projects and for modifications to older oil and gas facilities and so the need for information is high. The objective of the study is to map benthic habitats in the Eastern SBA that have not been previously mapped or are outdated. MMS is especially interested in locating long-lived, high-relief, rocky reef habitats characterized by large sponges and corals, white abalone habitat, and rock fish habitats. The MMS uses this information to evaluate modifications to platforms and pipelines, proposed anchoring activities and discharges, and projects which are proposed in the vicinity of OCS facilities. The MMS and the U. S. Geological Survey (USGS) have conducted habitat mapping for deep OCS platform areas and near-shallow platforms. This study will fill in the area not mapped by two previous studies and, in addition, cover pipeline and power cable routes. This study supports the West Coast Governor's Agreement on Ocean Health State/Federal initiative to map the area off California for use in making decisions about offshore renewable energy projects and Marine Protected Areas.

Completion of Fish Assemblage Surveys around Platforms and Natural Reefs off California
Since 1995, the USGS, the MMS, and most recently the California Artificial Reef Enhancement Program, have provided funding to conduct research on the fish assemblages that live around the platforms and on natural rock outcrops of Central and southern California. The goals of this research include describing the spatial and temporal patterns of fish diversity, density, and size distribution among habitat types. Except for a single platform, all other platforms have been surveyed at least once, with a few platforms surveyed annually during the past 13 years of research. This 2-year effort will complete the overall research effort and conclude 15 years of surveys and analyses. When complete, this long-term data set will provide important information on regional populations so that MMS can specify requirements and/or additional surveys for proposed decommissioning projects.

Southern Sea Otter Range Expansion and Habitat Use and Interaction with Oil and Gas Facilities
The southern sea otter was listed as threatened species primarily because of its small population size and the risk of oil spills. Since listing, the southern sea otter population has gradually increased its size and range. Approximately 2,800 sea otters now inhabit the coastline from Half Moon Bay to Santa Barbara. Within the past 5 years, about 100 sea otters have been routinely observed in the Point Conception area, adjacent to active oil and gas facilities, and natural oil and gas seeps. Very little is known about their daily activity patterns and habitat use in this area. Research objectives include identification of important sea otter resting and foraging areas adjacent to oil and gas facilities, delineation of movement patterns along the southern California coast, and assessment of sea otter distribution and behavior in the vicinity of natural oil and gas seep areas (e.g., Coal Oil Point, Santa Barbara County). Such information, coupled with ongoing research being done by USGS and funded by MMS, fingerprinting seep oils would inform MMS of the possible source of oil on any otters that potentially become oiled.

Completion of the Oil and Gas Platform Invertebrate Surveys
The objective of this study is to complete invertebrate sampling on gas platforms offshore Southern California including those in the most southerly Beta Unit, and examine geographic diversity of

invertebrates and algae on the oil and gas platforms throughout the region. The information obtained will be used in NEPA documents relating to potential future platform decommissioning and is also applicable to any potential future renewable energy projects that include structures that would provide surfaces for similar fouling communities to develop. This study will complete a survey of oil and gas platforms offshore southern California and provide MMS with needed information about the geographic distribution of rare and potentially beneficial marine invertebrates inhabiting the offshore structures. In addition, previous research indicates that several invertebrates living on these structures have significant biopharmaceutical potential and MMS needs to be prepared to respond to requests to harvest such organisms for future human health benefits.

HEADQUARTERS
ACRONYMS

CAA	Clean Air Act
CRRC	Coastal Response Research Center
IMEMS	International Marine Environmental Modeling Seminar
IOOS	Integrated Ocean Observing System
IWGOO	Interagency Working Group on Ocean Observations
MMC	Marine Mammal Commission
MMP	Marine Minerals Program
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
OSRA	Oil Spill Risk Analysis
UNH	University of New Hampshire

Cliff Notes Headquarters
Proposed Studies and Rankings

Fiscal Year 2010

Page #	Discipline	Title	Rank
15	HE	Exploration and Research of North- and Mid-Atlantic Deepwater Hard Bottom Habitats with Emphasis on Canyons and Coral Communities	1
17	PO	North Atlantic Ocean Model Skill Assessment	2
19	PO	South Atlantic Ocean Model Skill Assessment	3
21	PO	California Ocean Model Calculations	4
23	IM	Support for Second International Conference on the Effects of Noise on Aquatic Life	5
25	FE	Conducting the 10th International Marine Environmental Modeling Seminar (IMEMS 2010)	6
27	MM	Support for the Development of a Marine Mammal Data Archive	7
31	MM	Development of a Web Site to Announce Upcoming Marine Mammals Research	8
33	FE	Improving Emission Estimates and Understanding of Pollutant Dispersal for Impact Analysis of Beach Nourishment and Coastal Restoration Projects	9
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AQ = Air Quality FE = Fates & Effects HE = Habitat & Ecology	IM = Information Management MM = Marine Mammals and Protected Species PO = Physical Oceanography SS = Social Sciences

Exploration and Research of North- and Mid-Atlantic Deepwater Hard Bottom Habitats with Emphasis on Canyons and Coral Communities

It is well known that there are many locations with significant areas of hard bottom in the north and mid-Atlantic deepwater, particularly associated with canyon features. These habitats can include significant populations of corals. Knowledge and distribution of these unique biological habitats is necessary for management decisions regarding potential oil and gas development in the Atlantic Region. The focus of this project is on exploration and study of selected habitats that will refine our understanding of the distribution and complexity of hard bottom communities in the north and mid-Atlantic slope area. Similar to studies in the Gulf of Mexico, this project will use sophisticated submergence facilities capable of producing high resolution imagery and collecting extensive samples. The results of this study will help to define mitigations and need for avoidance of hard bottom areas and associated sensitive coral communities in deepwater.

North Atlantic Ocean Model Skill Assessment

The objective of this study is to perform analyses of the hindcast simulations of the circulation of the North Atlantic Ocean model in order to determine the skill in simulating the near-surface currents compared to drifting buoy data and other data sets. Simulations of the ocean current using the wind forcing in the time period 1995-2008 will provide comparison of the model to data and would represent the time period of the model application to provide environmental variability in the Oil Spill Risk Analysis (OSRA) calculations. The results of this study will be used by the Minerals Management Service (MMS to create the OSRA estimates of oil spill trajectories. The ocean models have been shown to have skill in estimating the near surface currents. This study will result in an analysis of the time series of simulated currents developed by a previous study. These simulated currents will be compared to field projects that have been conducted in the North Atlantic as well as the use in the OSRA calculations.

South Atlantic Ocean Model Skill Assessment

The objective of this study is to perform analyses of the hindcast simulations of the circulation of the South Atlantic Ocean to determine the skill in simulating the near-surface currents compared to drifting buoy data and other data sets. Simulations of the ocean current using the wind forcing in the time period 1995-2008 will provide comparison of the model to data and would represent the time period of the model application to provide environmental variability in the OSRA calculations. The results of the study will be used by MMS to create the OSRA estimates of oil spill trajectories. The ocean models have been shown to have skill in estimating the near surface currents. This study will result in an analysis of the time series of simulated currents developed by a previous study. These simulated currents will be compared to field projects that have been conducted in the South Atlantic as well as the use in the OSRA calculations.

California Ocean Model Calculations

The objective of this study is to acquire hindcast simulations of the circulation of the Northern and Southern California Planning Areas including the entire California coast using an ocean model which has significant skill in simulating the near-surface currents compared to drifting buoy data and other data sets. Simulations of the ocean current using the wind forcing in the time period 1993-2008 will provide comparison of the model to data and would represent the time period of the model application to provide environmental variability in the OSRA calculations. The results of the study will be used by MMS to create the OSRA estimates of oil spill trajectories. The OSRA results are used in the Lease Sale environmental impact statements (EIS's) as a measure of the probability of oil spill occurrence and contact to environmental resources. The ocean models have been shown to have skill in estimating the near-surface currents. This study will result in a time series of simulated currents. These simulated currents will be compared to other field projects that have been conducted in the Northern and Southern California Planning Areas as well as the use in the OSRA calculations.

Support for Second International Conference on the Effects of Noise on Aquatic Life

There has been an increasing interest and concern about the effects of noise on marine life. The objective of this conference is to provide a venue for the collection and sharing of research related to the effects of noise on aquatic life. While in the past the emphasis has been on the effects on marine mammals, there is a growing concern about impacts to fish and invertebrates. The results of this conference may identify possible mitigations relevant to upcoming renewable energy projects as well as future research needs.

Conducting the 10th International Marine Environmental Modeling Seminar (IMEMS 2010)

The primary objective of this study is to co-present the IMEMS in 2010. Co-founded by the MMS

and SINTEF of Norway, the annual IMEMS brings together researchers and managers from governmental agencies, universities, and marine-related industries to present and discuss recent developments in the modeling of environmental impacts to the marine environment. The transport, fates, and effects of oil spills and related mitigation efforts in the ocean are among the dominant topics presented and discussed. Subject to administrative approval, the task of presenting the seminar will be given to IMEMS co-founder SINTEF, which has conducted all previous seminars and is well recognized and respected in the modeling and offshore industrial communities. The secondary objective of this study is the production of a seminar proceedings and the publication of some, if not all, of the papers presented at the seminar in one or more peer-reviewed publication(s). SINTEF has arranged for the Coastal Response Research Center (CRRC) at the University of New Hampshire (UNH) to host the IMEMS in 2010. The CRRC was established as a partnership between the NOAA and UNH and will co-fund the seminar with MMS. The study will add to MMS's knowledge of the most recent developments in oil-spill modeling which includes oil-spill transport, oil weathering, dispersion, and sediment interaction.

Support for the Development of a Marine Mammal Data Archive

Although many scientific projects and monitoring efforts have been conducted to observe the ecology of marine mammals, there is no single repository for these data. The idea of forming such a data archive has been evolving in the Interagency Coordinating Group on the Impact of Noise on Marine Mammals and is now being seriously pursued. The office of the Assistant Secretary of the Navy (Installations and Environment) has taken the lead and has had serious conversations with NOAA about the development of such an archive. The objective of this study is to provide a data archive to receive, store, and make publicly available observations of marine mammals. This study would provide MMS with easy access to a comprehensive collection of observations of marine mammals including research and monitoring projects conducted nationwide, and perhaps, internationally as well. This study will: 1) develop a common data format for observations of marine mammals through extensive discussion with marine mammal researchers and monitors nationwide, 2) acquire the hardware, software, and maintenance personnel needed to receive, quality check, and store the observations, 3) publicize the existence of the data archive and encourage researchers and monitors to contribute their past and future marine mammal observations, 4) evaluate the successfulness of the archive after a couple of years, and if successful, 5) determine the means of indefinitely sustaining the archive. This collection would provide a basis for biological assessments that are unified and comprehensive.

Development of a Web Site to Announce Upcoming Marine Mammals Research

Many federal agencies have interest in, and responsibilities for, marine resource protection and management. The interests and responsibilities of the agencies typically overlap, which could result in wasteful duplication of efforts. The objective of this study is to inform the marine mammal research community about upcoming research projects in order to facilitate joint funding of projects of mutual interest. The Marine Mammal Commission (MMC) has funded the development of a web site to document all ongoing and completed research on marine mammals. Initially, this site is devoted to federally funded research, but it may expand to other research, including that done in other countries. The study proposed herein will add a component to the MMC's web site that will announce upcoming research, planned or adopted, for funding for the purpose of attracting joint funding by other interested parties.

Improving Emission Estimates and Understanding of Pollutant Dispersal for Impact Analysis of Beach Nourishment and Coastal Restoration Projects

The Clean Air Act (CAA) requires the MMS to ensure that any action authorizing the use of Outer

Continental Shelf (OCS) sand resources in coastal restoration and beach nourishment projects does not cause or contribute to air quality violations in areas not meeting National Ambient Air Quality Standards (NAAQS) or does not cause a violation of these standards in areas that meet the NAAQS. The MMS evaluates the potential impacts to air quality under its National Environmental Policy Act (NEPA) mandate, whether or not the project area is considered in attainment, maintenance, or non-attainment under the CAA. Estimating a proposed activity's emissions and evaluating the degree of atmospheric dispersion of pollutants over the shallow inner shelf and coastal region are key elements of evaluating the potential effects on local air quality and determining appropriate mitigation. The MMS needs best estimates of horsepower, activity profiles, loading factors, and emission factors for dredge equipment, support vessels, and construction equipment and vehicles. The objectives of the proposed study are four-fold: 1) develop generic (i) operational characteristics of marine and tiered construction equipment, (ii) activity profiles for each equipment type, (iii) loading factors for each activity per equipment type, and (iv) emission factors for each equipment type; 2) develop a streamlined and standardized approach to project emissions; 3) develop emission inventory templates that can be used in NEPA analyses addressing proposed projects in attainment areas, and 4) provide generic information about plume transport and dispersion for use in future environmental analyses. Best estimates of potential emissions coupled to a pollutant dispersion model will provide the basis for effective mitigation and monitoring requirements if so needed.

Best Practices for Physical Process and Impact Assessment in Support of Beach Nourishment and Coastal Restoration Activities

Environmental analyses prompted by our NEPA mandate would benefit from an improved understanding of the nature, extent, and duration of potential impacts related to offshore dredging. Some of the key physical processes controlling impacts at the borrow area and in the nearshore zone are poorly understood. The majority of past exercises focusing on wave impacts have shown minor impacts related to dredging. As such, it is not clear if the current practice of site-specific physical process modeling is necessary for all projects that propose to use OCS sand resources. State-of-the-art hydrostatic primitive equation models that can couple spectral wave transformation, hydrodynamic, and sediment transport/morphologic evolution modules are widely available and can produce more realistic 3-dimensional hindcast and prediction. The MMS needs to develop criteria and guidelines to support or redefine modeling efforts. The objectives of this study are to: 1) improve the current understanding of near-field and far-field physical processes and potential impacts to those processes caused by modification of offshore bathymetry, 2) identify and rank the key factors for differentiating potential impacts and, 3) preparation of generic guidelines that provide criteria for determining site-specific modeling. The application of these advanced tools may provide more accurate information about wave transformation, as well as much needed information about potential changes in nearshore and offshore circulation and morphologic evolution following dredging. From this improved understanding of processes, analysis criteria and general guidelines can be developed that would describe when and why site-specific modeling and higher-cost shoreline impact assessments would be required or could be precluded.

Fiscal Year 2011

Page #	Discipline	Title
27	MM	Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions
29	HE	Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from DOI Monitoring Programs
31	HE	Description of Benthic Communities for the Point Arena Basin, Northern CA

Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions

The objective of this study is to evaluate data from previous MMS/USGS marine mammal and seabird surveys in relation to habitat data extracted from satellite remote sensing and bathymetry data. The objective will be to examine habitat relationships that can be used to predict species' distributions and refine population estimates, understand the relationship between specific oceanographic processes and features such as upwelling, fronts, eddies, bathymetry, and the distribution, abundance, and species composition of the primary marine mammal and seabird prey. Specifically, the study will examine how fixed abiotic features (e.g., colony location, bathymetric features) and dynamic oceanographic parameters (e.g., SST, ocean color, fronts) affect seabird distribution and detection probabilities. This work builds on techniques and methods that have been developed for analyzing single species' habitat associations using aerial VHF telemetry, and at-sea habitats measured using satellite remote sensing. Probabilities in turn will be mapped and presented as continuous surfaces in a geographic information system. The study will allow MMS to refine marine mammal and seabird population estimates based on current oceanographic conditions which would aid in oil spill response, renewable energy project NEPA analyses, and evaluating decommissioning and other OCS projects.

Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from Department of the Interior Monitoring Programs

The ultimate goals of this study are to understand the natural range and sources of variability in the kelp forest ecosystem well enough to generate predictions on how it will respond to environmental change. This will enable scientists and managers to evaluate possible impacts from offshore oil/gas and renewable energy production, and to develop options to mitigate these impacts. Long-term data on the kelp forest communities of San Nicolas Island and the Channel Islands National Park will be combined and analyzed to determine: 1) the influence of short and long-term climate oscillations on the abundance, species composition, and trophic structure of kelp forest communities, 2) resilience of the community to varying levels of disturbance, and 3) the periodicity, and perhaps causes, in shifts of community state. Funds will support the analysis of existing data collected by the USGS and National Park Service (NPS). The USGS has been collecting data on the abundance of macroalgae, benthic invertebrates, and fishes at six kelp forest sites around San Nicolas Island since 1980. The NPS has been collecting similar data at 16 sites within the Channel Islands National Park since 1982. These two databases are very compatible in terms of their content, time period, and methods of data collection. The general approach will be to conduct detailed comparative time series analyses. Importantly, both data sets encompass two of the largest El Niño events ever recorded (1982-83 and 1997-98).

Description of Benthic Communities for the Point Arena Basin, Northern California

To responsibly manage the ocean energy resources on the OCS, MMS requires knowledge of the seafloor environment that may be affected by offshore oil and gas activities. The Point Arena area was singled out as an area with hard substrate relief above three meters and correspondingly unique animal communities. Additional surveys are needed for future leasing, exploration, and development because over the past 20 years, regional oceanic patterns may have changed due to global climate change in that area causing more frequent low oxygen conditions. The tools for visualizing seafloor habitats has also advanced and high resolution seafloor mapping is extensive for the Mendocino Ridge area at the northern border of the basin and mapping is currently ongoing in state waters. The overall objective of this study is to provide MMS with a basic description of the common benthic organisms and major seafloor habitats that exist in the Point Arena Basin and whether these communities are unique, rare, or more widely distributed. These efforts will further help to successfully target areas for sampling in Federal waters. A broad reconnaissance benthic survey will provide MMS analysts with essential information on benthic communities for use in NEPA documents for leasing, exploration, and development activities. The information will also provide data to analyze future renewable energy projects.

Fiscal Year 2011

Page #	Discipline	Title
39	PO	Updating the MMS Oil Spill Risk Assessment (OSRA) Model
41	HE	Assessment of Long-Term Biological Recovery of MMP Sediment Borrow Sites
43	FE	Evaluation Underwater Noise Produced During Sand and Gravel Related Dredging
45	IM	A Synthesis of the Results and Currency of Research Projects Completed for the Environmental Protection, Leasing, and Extraction of Offshore Sand

AQ = Air Quality FE = Fates & Effects HE = Habitat & Ecology	IM = Information Management MM = Marine Mammals and Protected Species PO = Physical Oceanography SS = Social Sciences

Updating the MMS Oil Spill Risk Assessment (OSRA) Model

The objective of this study is to improve the OSRA model in order to make better estimates of the probabilities of oil-spill contact to areas of sensitivity. One of the primary issues addressed in the MMS environmental documents is the probability of oil-spill contact to environmentally sensitive areas or areas of commercial or recreational value. For many years, MMS has used an OSRA model to estimate the likelihood that hypothetical spills from prospective oil and gas development will contact areas of known vulnerability to spilled oil. Over those years, the OSRA model has undergone improvements to enhance the probability estimates, including adopting recommendations from a National Research Council review of the model done in 1990. The regular enhancements are in keeping with the MMS policy of using the best available information for safe operations and environmental protection.

Assessment of Long-Term Biological Recovery of Marine Minerals Program (MMP) Sediment Borrow Sites

The objectives of this study are to: 1) assess the rate and nature of recovery of benthic habitats in previously dredged borrow sites on the OCS, 2) assess and compare recovery of borrow sites with differing primary substrate types, 3) fill in information gaps about the long-term ecological recovery of biological communities utilizing previously dredged borrow sites on the OCS, and 4) allow for a more accurate determination of acceptable frequency of borrow events from specific areas and sediment types. The OCS Lands Act mandates the MMS to act as a steward for sand, gravel and other non-energy mineral resources from the OCS. The MMS conducts studies at potential sand and gravel borrow sites to address three main requirements: 1) to comply with environmental regulations, 2) to support its responsibility to manage these public sand resources in an environmentally sound manner, and 3) to identify long-term, cumulative impacts that are then used in making current and future management decisions. This study will collect date related to the long term recovery of borrow sites, data which is essential to correctly identifying the potential impacts of sediment removal activities.

Evaluation Underwater Noise Produced During Sand and Gravel Related Dredging

Offshore marine mineral dredging generates noise during operation. The MMS needs to understand the magnitude and zone of influence of the sound generated by the equipment in order to determine

potential mitigation of impacts to marine mammals, sea turtles, and fish. The objectives of this study are to evaluate the potential levels of noise generation and sound propagation from sand and gravel dredge operations. This study would support the Environmental Compliance, NEPA, the Marine Mammal Protection Act, the Endangered Species Act, and the Magnuson-Stevens Fishery Conservation and Management Act of 1976 MSFCMA needs for sand and gravel related projects.

A Synthesis of the Results and Currency of Research Projects Completed for the Environmental Protection, Leasing, and Extraction of Offshore Sand

Since 1993, 51 environmental studies have been completed for the MMP. The objectives of this study are to review and summarize all environmental studies done for the MMP and identify significant knowledge gaps that need to be addressed, particularly studies done overseas. Examples of subject areas in need of study include attenuation of noise from dredges and the entrainment of fish by both suction and cutterhead dredges. Additionally, a significant volume of research on sand dredging impacts has been done overseas in places such as the North Sea, Persian Gulf, and the far Pacific where large dredging projects have taken place. Environmental data from these projects need to be summarized and incorporated into the MMS database. The information collected by these studies is used to prepare environmental analyses for environmental assessments or EIS's which are required before a lease can be issued.

RENEWABLE ENERGY
ACRONYMS

MMS	Minerals Management Service
NHPA	National Historic Preservation Act
OCS	Outer Continental Shelf

Cliff Notes Alternative Energy
Proposed Studies and Rankings for Fiscal Year 2010

Page #	Discipline	Title	Rank
13	HE	Instrumentation of Meteorological Towers for Avian Monitoring	1
15	SS	Evaluation of Socio-Economic and Cultural Impacts on Coastal Tribes from Offshore Renewable Energy Development	2
17	FE	Establishment of Standardized Monitoring Protocols	3
19	SS	Inventory and Analysis of Archaeological Site Occurrence on the Pacific OCS	4
21	SS	Renewable Energy Visual Impacts	5
23	MM	Marine Mammal and Seabird Surveys of Potential Renewable Energy Sites Offshore Northern California, Oregon, and Washington	6
25	SS	Alternative Energy Capacity Inventory in Coastal Alaska	7

AQ = Air Quality FE=Fates & Effects HE = Habitat & Ecology	IM = Information Management MM= Marine Mammals and Protected Species PO= Physical Oceanography SS = Social Sciences

Instrumentation of Meteorological Towers for Avian Monitoring

The potential for impacts to avian species is a critical concern for development of offshore wind. Most developers are first proposing the installation of meteorological towers to assess the wind fields at proposed locations. These towers often extend 50 to 90 meters above the sea surface with instruments attached at several heights, offering an excellent platform to install instruments to monitor for avian species. Potential instrument types include radar, camera, and acoustic devices. The use of instruments allows for the collection of data under conditions when direct observations are not possible. The purpose of this study is to acquire offshore avian data about the occurrence of bird species at potential offshore wind development sites. Currently, several meteorological towers are proposed to be built along the mid-Atlantic coast. This study would fund the installation of the instrument as well as collection and processing of the data. The selected instrument type would be based on the recommendations of avian experts in the mid-Atlantic region.

Evaluation of Socio-Economic and Cultural Impacts on Coastal Tribes from Offshore Alternative Energy Development

The Minerals Management Service (MMS) is concerned about potential impacts to Native American tribes from the development of offshore alternative energy projects on the Outer Continental Shelf (OCS). Impacts can be diverse and span social, economic, and cultural concerns including visual impacts, access restrictions to waters, and direct impacts to tribal lands, sacred sites, or other culturally significant areas. The MMS is responsible for identifying these impacts and determining appropriate mitigation measures through the National Environmental Policy Act process and the National Historic Preservation Act (NHPA) Section 106 consultations. The objectives of this study are to identify those coastal Native American tribes that are likely to be impacted due to offshore

alternative energy development along areas of the Atlantic and Pacific coastline and summarize the impacts that tribes could incur due to the alteration of the ocean view or construction and operation activities of offshore alternative energy projects. Recommendations will be developed to improve communication strategies between the MMS and coastal tribes, especially for the NEPA and NHPA Section 106 processes, and develop a set of mitigations that the MMS could employ to help avoid, mitigate, or minimize such impacts.

Establishment of Standardized Monitoring Protocols

Offshore alternative energy is a new activity on the OCS. As such, the environmental effects from these activities will not be fully understood until after development has occurred. The MMS plans to require that industry monitor these effects, at least initially, to determine their magnitude and extent. While it is expected that the environmental consequences will be minimal, these expectations need to be verified. The objective of this study is to create scientifically valid monitoring protocols to collect information about the effects of offshore alternative energy facilities. The development of clear monitoring guidelines requires several steps. First, what will be monitored must be clearly identified. The monitoring data, once collected, must provide useful information to guide future decision making. Second, the monitoring protocols should follow good scientific principles to ensure that valid data is collected, including consistency, background information, and any other applicable data to ensure the quality of the measurements. Third, the monitoring methods must be executable and reproducible. Fourth, the data recording must be consistent and predetermined to allow for comparable data across several projects.

Inventory and Analysis of Archaeological Site Occurrence on the Pacific OCS

A current inventory and analysis of potential locations of submerged cultural resources is crucial for mitigating potential adverse affects to these resources from alternative energy projects. Also, as required under Section 106 of the NHPA and Executive Order 11593, Federal agencies must apply the National Register Criteria to properties that may be affected by an undertaking. The proposed study will develop an inventory of historic shipwrecks emphasizing the use of primary sources, assess areas of the Pacific OCS for prehistoric site potential, develop a model for where prehistoric sites might be expected, and recommend appropriate survey methodology in order to detect and avoid impacts to such resources.

Renewable Energy Visual Impacts

There are a number of different renewable energy projects and offshore technologies that can capture energy from wind, wave, tidal flow, and/or ocean current. Each of these approaches presents a number of designs that present different views from the coastline. Many people living on the coasts of California, Oregon, and Washington place a high value on the views from their homes and places of recreation and become concerned about any permanent structures that are proposed which might be visible from shore. Studies and analyses that have been done to date have examined the impacts on the viewshed from oil and gas platforms on the Pacific Coast. There has also been analysis of viewshed impact from the proposed Cape Wind Project on the east coast. To our knowledge, no such analyses are available for wind, wave, or ocean current energy projects. The objective of the study is to assess the potential visual impacts associated with offshore renewable energy technologies including wave, wind, and ocean current projects. Stakeholders along the Pacific Coast value the viewshed and are concerned with the impacts from offshore renewable energy development.

Marine Mammal and Seabird Surveys of Potential Renewable Energy Sites offshore Northern California, Oregon and Washington

The proposed study will provide MMS with up-to-date information on species composition, distribution, abundance, and seasonal variation of marine mammals and seabirds along this section of

coast. Objectives of this study would include reviews of previous MMS study methodology, monthly aerial field surveys offshore northern California over an 18-month period, assessment and analysis of data for this area collected over the past 20 years, characterization of the current marine mammal and seabird diversity, distribution, and abundance within the study area, and publication of report(s) on the findings of the surveys and data analysis. Survey methodologies used in previous MMS studies would be reviewed and modified, as necessary, to account for new technologies and equipment availability. The proposed study would limit the field effort to monthly aerial surveys along prescribed transect lines supplemented by other sources of aerial/shipboard data collected over the past 20 years, as available. Data generated will be used for environmental review of projects proposed in the area, including oil spill risk analyses for NEPA documents and alternative energy projects.

Alternative Energy Capacity Inventory in Coastal Alaska

Renewable energy resources, such as solar, wind, tidal and geothermal power, are gaining credence as a viable means to offset the Nation's dependence upon fossil fuels and reduce pollution emissions as well as a means to reduce large international trade deficits, to improve national security, and to stimulate new prospects for economic expansion. The Energy Act of 2005 delegated regulatory authority to MMS over renewable energy resources on the OCS. The new mandate requires fresh research about the range of opportunities, environmental implications, and potential social effects of renewable energy projects on a national, regional, and local scale. The objectives of this study are to: 1) establish firm intellectual understanding over the range of options, processes, economic feasibility, and potential management strategies that are relevant to development prospects for renewable energy sources on the OCS of Alaska and 2) systematically collect a variety of technical and socio-economic data to produce a resource inventory database about the realistic prospects and related social impacts of specific alternative energy development scenarios for the Alaska region. This study is designed to provide an initial inventory of plausible development opportunities and potential socio-economic consequences for residents of Alaska and select coastal communities. The information is needed for timely agency planning of the new regulatory authority.

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Page #	Discipline	Title
29	SS	Recreation and Tourism in the Atlantic Region
31	SS	The Economic Impact of OCS Wind Development on Commercial Fishing
33	MM	Potential for Interactions between Endangered and Candidate Bird Species with Wind Facility Operations on the Atlantic OCS
35	HE	Survey of Benthic Communities near Potential Renewable Energy Sites Offshore Oregon and Washington
37	IM	Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities
39	FE	Potential Artificial Reef Effects of Offshore Wind Facilities
41	FE	Field Measurements and Evaluation of Sound Generated from the Construction of OCS Wind Facilities and the Potential Impact of this Noise to Marine Mammals, Sea Turtles and Fish
43	FE	Survey and Evaluation of Potential Environmental Effects from Anti-fouling Paints, Lubricants, Hydraulic Fluids and other Chemical Products Potentially used at Offshore Facilities
45	FE	Fate and Effects of Spilled Transformer Oil (Dielectric Fluids) on the Marine Environment
47	FE	Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments
49	PO	Wave Attenuation Calculations for Various Designs of Wave Devices
51	PO	Energy Extraction from the Florida Current, How Many Turbines is Too Many?

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Recreation and Tourism in the Atlantic Region

Many coastal areas receive a large percentage of their revenues from the tourism industry. The focus of most tourism is the high quality recreational activities such as fishing, boating, golfing, hiking, picnicking, and sightseeing. Guided tours and charters are also popular activities which may include whale watching, wildlife, kayaking, canoeing tours, and bike tours. It has been suggested that offshore wind development could have a negative impact on recreation and tourism by impacting the viewshed. This could occur if individuals avoided recreational areas where development has occurred. In contrast, it has also been suggested that recreation and tourism may benefit from offshore wind structures by drawing onlookers. Information on how these effects manifest themselves should be better understood in order for better decisions to be made with respect to specific locations and the economic impacts that may occur. The objective of this study is to synthesize literature and collect and analyze data on recreation and tourism employment, beach use, recreational boating, recreational fishing, and income generated from these activities.

The Economic Impact of OCS Wind Development on Commercial Fishing

Concerns have surfaced on the potential impacts that OCS wind development may have on

commercial fishing. The Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended, provides the U. S. with exclusive management authority over fisheries, except for highly migratory species of tuna, within a fishery conservation zone of 3 to 200 miles offshore. The law was enacted to insure sound fishery conservation and management measures for both domestic and foreign fisheries. Eight regional fishery management councils were established to serve as planning units to carry out provisions of the Act. Each Council is directed to prepare fishery management plans for implementation by the Secretary of Commerce. Information on how these effects manifest themselves should be better understood. The objective of this study is to determine geographic areas (using geospatial data) of the Mid-Atlantic where commercial fishing occurs and estimate the economic loss if those areas were restricted during construction, operations, and decommissioning of an offshore wind park. MMS will work with National Oceanic and Atmospheric Administration's Fisheries Management Council in order to collect and synthesize the necessary data for better decisions to be made with respect to specific locations and the economic impact that may occur if these areas were temporarily restricted from fishing.

Potential for Interactions between Endangered and Candidate Bird Species with Wind Facility Operations on the Atlantic OCS II

Development of offshore alternative energy facilities, particularly wind turbines, has the potential to impact bird species. Several bird species have been identified as potentially being impacted by offshore wind facilities, specifically piping plovers, roseate terns, and red knots. Whether these birds actually fly or migrate into Federal jurisdiction greater than three nautical miles offshore is not known, with the exception of observations of roseate terns in Nantucket Sound. The objective of the study is to determine whether endangered, threatened, or candidate species of birds are at risk from offshore wind facilities. The MMS contracted for a pilot study to evaluate and test monitoring methods that would collect data to address the critical questions about the potential risks to these bird species. This study would extend the methodology testing to include installation of instruments at critical offshore or onshore sites and to further evaluate the potential risk.

Survey of Benthic Communities near Potential Alternative Energy Sites Offshore Oregon and Washington

Oregon and Washington states have limited historic surveys and data regarding offshore benthic habitats and benthic communities. State agencies from Washington, Oregon, and California, are moving forward as part of the West Coast Governors Agreement to characterize the type of sediment on the seafloor in state waters but no surveys have been planned for offshore Oregon or Washington. The continental shelf off of Oregon and Washington is known to be a very productive region with active commercial fishing and abundant marine life. MMS requires knowledge of the seafloor environment and any sensitive biological communities that may be affected by alternative energy activities. MMS analysts must be able to characterize the seafloor habitats and biological communities within areas of potential alternative energy projects. The overall objective of this study is to provide MMS with a basic description of the benthic habitats and benthic communities that exist in the Oregon and Washington seafloor. The goals are to collect multibeam sonar data at selected potential alternative energy sites off Oregon and Washington into Federal waters and to collect and identify both hard bottom and soft substrate organisms, and identify them to the lowest possible taxon, thereby building community profiles and identifying rare or unique species assemblages. Findings from this initial survey will be essential for future siting in this area and for determining the nature and extent of further seafloor explorations.

Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities

A recent workshop on alternative energy environmental information needs identified the use of the

OCS by migratory bats as an area of concern. The MMS needs to identify which bat species, if any, could be impacted by offshore wind facilities, and whether there are mitigation measures, such as not leasing a particular area, that may apply. Bats are ranked among our most endangered wildlife according to the Fish and Wildlife Service. Of the 45 kind of bats living in the U. S., seven are in danger of becoming extinct. Many of these bats exist within the central U. S. However, some bats do occur in coastal areas and may migrate between barrier islands and the coast. The objectives of this study are to synthesize existing information about bat species that occur along coastal areas, summarize bat sightings, and identify those bats that are migratory and may be at risk from offshore wind energy facilities. Currently, no comprehensive summary exists for the description of coastal migratory bats.

Potential Artificial Reef Effects of Offshore Wind Facilities

The objective of this study is to evaluate the potential artificial reef effects from the development of offshore wind facilities along the Atlantic Coast. This study will also summarize and evaluate various scour protection materials and their potential to affect the benthic environment. Wind facilities will involve the installation of tens to hundreds of structures in a relatively small area leading to the creation of artificial reefs. Each monopile may require the use of scour pads or some other material to reduce sediment transport around the base. These materials will also increase available hard substrate and further the creation of an artificial reef system. Stakeholders have raised concerns about the potential impacts of this altered ecosystem to local marine species and commercial fishing. The first wind facilities are expected to be placed along the Atlantic coast in relatively shallow water (~20 meters). This study will build on information gathered from the compilation of information about benthic habitats and examine the potential impacts from placing these structures in the existing mix of hard and soft substrate. Artificial reef effects of concern include alteration of the benthic environment, attraction of fish species, attraction of prey for marine mammals and sea turtles, creation of a protective environment that attracts sea turtles, and potential range expansion of both native and invasive species. The study will also summarize the different types of scour protection currently available and the potential impacts to the environment.

Field Measurements and Evaluation of Sound Generated from the Construction of OCS Wind Facilities and the Potential Impact of the Noise to Marine Mammals, Sea Turtles, and Fish

The objective of this study is to evaluate the potential levels of noise generated from pre-construction through decommissioning of a wind facility. The construction of offshore wind facilities will involve geological and geophysical work and construction operations as well as decommissioning ultimately generating a significant amount of noise for some period of time. Wind facilities will also be equipped with foghorns to prevent collisions during foggy weather. Anthropogenic noise in the environment can alter the behavior of some marine species and force them to leave an area that may be critical habitat. During pile driving, marine species such as sea turtles can be injured if they are too close to the sound source. The intensity and duration of these sound sources can determine the extent of the impact. Ideally, data about noise should be collected during the actual construction and operation of a facility. This may occur within the next few years and this study would include field work to evaluate the sound generated during these activities. The MMS needs to understand the zone of influence of the sound generated by these facilities in order to determine potential mitigation of impacts to marine mammals, sea turtles, and fish. One key issue is whether the operation of these facilities will affect the soundscape.

Survey and Evaluation of Potential Environmental Effects from Anti-fouling Paints, Lubricants, Hydraulic Fluids, and other Chemical Products Potentially used at Offshore Facilities

Some paints and fluids have the potential to cause greater or lesser impact to the environment depending on the composition. Stakeholders have expressed their concern about the types of chemicals that may be used. In the past, antifouling paints have included chemicals such as tributyltin and copper, which can have detrimental impacts to the environment. Other types of chemicals or products that may be used include blasting agents for surface preparation and coatings used above the waterline. The potential impacts to the environment will depend on the frequency with which the chemicals are replaced or reapplied and a description of the application. The MMS will need to evaluate the potential environmental impacts from the use of these chemicals and must ensure that appropriate chemical handling procedures and spill response are used. MMS needs information about these chemicals to develop appropriate mitigation measures. The installation of commercial facilities for the generation of electricity through renewable energy will require the use of tens to hundreds of devices. Each of these devices will be painted with anti-fouling paints and will use lubricants and hydraulic fluids. The objectives of this study are to compile information about the various types of anti-fouling paint, lubricants, hydraulic fluids, and other chemicals or products available and identify, where possible, the potential environmental impacts from the use of these chemicals. The study will also evaluate spill response capabilities for the potential types of spills.

Fate and Effects of Spilled Transformer Oil (Dielectric Fluids) on the Marine Environment
Alternative energy projects will nearly always include an electrical service platform containing one or more large transformers which contain thousands of gallons of dielectric fluids. The MMS will need to know, in the event of a spill, what effects this dielectric fluid would have on the marine environment including sea birds, marine mammals, fish eggs and larvae, and shorelines. While information on crude oil and its effects on marine life are well-known, much less is known about mineral oil or other oil-like fluids commonly used in transformers. Note that the actual on-water behavior of spilled dielectric fluid (e.g., spreading, evaporation, emulsification tendencies, etc.), the ability to clean it up (e.g., best types of booms, dispersibility and burnability, etc.), and the frequency and volume of spills would best be studied by the Technology and Research Branch and probably include tests at OHMSETT. The research objectives of this study include: 1) an exhaustive literature search, including European sources, which would provide a foundation of knowledge for this topic; 2) an assessment of the effects of dielectric fluids on marine mammals, sea birds, fish, fish eggs and larvae, and other sensitive biological resources; 3) an assessment of the impacts to shoreline communities (e.g., sandy, rocky, etc.) using existing shoreline community sensitivity information; and 4) a summary of knowledge gaps based on the results of the objectives above.

Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments
The selection of lighting for offshore wind facilities will require the balancing of several requirements. These requirements include meeting Federal Aviation Administration and Coast Guard requirements while minimizing impacts to wildlife and onshore development. The impacts include the intensity of the light, the color, how the light is directed, and the rate of blinking. Due to their height, these lights may be visible from shore and impact coastal communities and historic properties. The configuration of the facility, the location of shipping lanes, and the type of vessels allowed within the facility will be important for determining the type of lighting. Lights may attract turtles, fish, and possibly marine mammals. The objectives of this study are to evaluate the potential lighting schemes for offshore wind facilities, describe air traffic and vessel traffic usage along the East Coast and how that will affect lighting options, and the impacts of these lighting options on marine and coastal species and the human environment.

Wave Attenuation Calculations for Various Designs of Wave Devices

Numerous wave facilities are currently proposed along the Pacific Coast. Several designs for devices have been proposed including both point absorbers and attenuators. Commercial development using these devices will require installation of tens to hundreds of the devices in a relatively small area (a few square miles). Since these devices are designed to remove kinetic energy from waves to generate electricity, there is concern that they could alter the wave energy resulting in changes in sediment transport, beach nourishment, and possibly surfing. Both direct measurements and models are needed to understand and minimize the impacts from the designs. The objective of this study is to evaluate the effects of wave facilities on the local wave environment. Evaluation of the potential dampening will require the use or creation of a model to examine the wave field on the scale of a few hundred feet and to allow for the addition of multiple devices as potential dampeners. Field measurements made during the testing of devices would be used to acquire data to verify the model. The implications of altering the wave or current regime would also need to be addressed.

Energy Extraction from the Florida Current, How Many Turbines is Too Many?

The use of ocean currents for the production of electricity is not a new concept. In the early 1970's, a conference was held to discuss the potential for extraction of energy from the Florida Current and Gulf Stream. An upper limit of 4% was calculated for the extraction of energy and reported at this conference. Our understanding of the Gulf Stream has evolved since that time. The extraction of energy from currents may involve a large number of structures that not only will extract energy to turn their turbines, but also be a source of friction that may reduce the current speed. Before development is proposed, the question of cumulative impacts from multiple devices and facilities needs to be addressed. The objective of this study is to evaluate the upper limit of the amount of energy that can be extracted or lost from the Florida Current/Gulf Stream before the current is altered. The information from this study could affect the design characteristics of marine current devices and determine whether commercial ventures are even possible.

Minerals Management Service
Outer Continental Shelf Scientific Committee
Deepwater Subcommittee
Report to the OCS SC Committee Meeting 29 April 1 May 2009
Anchorage, Alaska

The Deepwater Subcommittee held a conference call on March 30 to consider items to be brought to the attention of the full OCS Scientific Committee during this meeting. This report summarizes the results of that discussion.

International Collaboration**.** There is a need to continue coordination of EA activities in the boundary areas between the U.S. and Mexican waters and potentially between U.S. and Cuban waters. This has been a strong point for MMS in the Gulf of Mexico (e.g., the USA-Mexico Workshop on the Deepwater Physical Oceanography of the Gulf of Mexico, held in June 2007). Opportunities may also exist for international coordination of environmental activities with those in the Canadian Beaufort Sea. The Canadian Government is expected to extend the activities undertaken with support from their Environmental Studies Research Fund from the current onshore and nearshore activities in the MacKenzie Delta and Beaufort Sea to deeper waters (up to 1200 m) for which exploration rights have been recently granted. This activity may offer natural avenues for collaboration with the MMS's Environmental Studies Program (ESP).

Ecosystem Management Approaches. The breadth of subject matter addressed in MMS-sponsored environmental and socioeconomic studies indicates that there is a strong appreciation already in place for the importance of making management decisions based on holistic evaluation of the impacts of human activities on marine ecosystems. The subcommittee would like to encourage the ESP to look for opportunities in every study to include an element of integration of the results into a broad picture of the functionality of the ecosystems where offshore activities take place. Due to the multidisciplinary nature of the studies that contribute to ecosystem management, there is a need to actively promote integration of the results from diverse fields of study. MMS programs have long provided and continue to provide the data that underlie an integrated understanding of ecosystem function. To more fully implement decisionmaking based on an ecosystem approach, the ESP could benefit from additional emphasis on defining what is meant by the functionality of ecosystems and considering appropriate metrics so that progress towards achieving the "desired end conditions" (McFadden and Barnes, 2009) of managed ecosystems can be assessed. Results from the European HERMES project have demonstrated some success in using diversity measurements as a metric for the functionality of benthic ecosystems (Danovaro et al., 2008). Although the management target for the ESP is much broader than just benthic ecosystems, this work illustrates the importance of linking measured parameters to metrics that reflect the key functions of the benthic ecosystem over appropriate spatial domains.

Trends in Funding and Emphasis. There was a discussion of the need for some additional data from MMS on current programs so that Committee members could grasp the trends in funding among the Regions and the discipline areas over the years. The Committee typically considers a menu of future projects, but putting those efforts in context with the current programs is not straightforward. For example, the sand and gravel program has disappeared over the last few years, and alternative energy has emerged as a significant interest area. Other less dramatic trends may also be going on. There seemed to be significant interest among the subcommittee members and the Committee chair in having access to this sort of information.

References

Danovaro, R., Cristina Gambi, Antonio Dell'Anno, Cinzia Corinaldesi1, Simonetta Fraschetti, Ann Vanreusel, Magda Vincx, and Andrew J. Gooday (2008) Exponential Decline of Deep-Sea Ecosystem Functioning Linked to Benthic Biodiversity Loss Current Biology, Volume 18, Issue 1, 1-8, 8 January 2008.
McFadden, K.W. and Barnes, C. , (2009), " The implementation of an ecosystem approach to management within a federal government agency", Marine Policy 33. pp 156-163.

List of Current Interagency Agreements with Federal Partners

	Recipient	Total Allocation
Gulf of Mexico		
None		
Alaska		
Monitoring the Distribution of Arctic Whales (AIRCRAFT Support for Bowhead Whale Aerial Survey Project - BWASP)	NOAA Aircraft Operation Center, 7917 Hangar Loop Drive 5, Tampa, FL 33621-5407	$1,974,995.00
Monitoring the Distribution of Arctic Whales (OBSERVERS for Bowhead Whale Aerial Survey Project - BWASP)	National Marine Mammals Laboratory, NOAA, 7600 Sand Point Way, NE, F/AKC3, Seattle, WA 98115-6349	$1,395,000.00
Monitoring Marine Birds of Concern in the Eastern Chukchi Nearshore Area (Loons)	USGS Western Region, 4230 University Dr., Anchorage, AK 99508	$311,545.90
North Pacific Right Whales in the Southeastern Bering Sea: Distribution, Abundance, and Habitat Use	National Marine Mammal Laboratory, 7600 Sand Point Way, NE, F/AKC3, Seattle, WA 98115-6349	$3,950,000.00
COMIDA: Distribution & Relative Abundance of Marine Mammals: Aerial Surveys - Air Support	Resource Management Division, NOAA Aircraft Operations Center, 7917 Hanger Loop Drive, Hanger #5, MacDill AFB, FL 33621	$700,000.00
COMIDA: Distribution & Relative Abundance of Marine Mammals: Aerial Surveys - Personnel	National Marine Mammal Laboratory, Alaska Fisheries Science Center, NOAA Fisheries, 7600 Sand Point Way, NE, Seattle, WA 98115	$800,000.00
Arctic Fish Ecology Catalogue	USGS-Western Fisheries Research Center, 6505 N.E. 65th Street, Seattle, WA 98115	$275,000.00
Beaufort Sea Marine Fish Monitoring: Pilot Survey and Test of Hypotheses	Alaska Fisheries Science Center, NOAA, P.O. Box 15700, Seattle, WA 98115	$997,283.00
Pacific		
Fate, Volume and Chemistry of Natural Seeps in the Santa Barbara Channel/Southern Santa Maria Basin	(USGS) Tom Lorenson, Western Coastal and Marine Geology Team, USGS, 345 Middlefield Rd., Menlo Park, CA 94025	$327,843.00
Headquarters		
MMS Support for OCEAN.US (NOPP)	NOAA Integrated Observing Program, 1100 Wayne Avenue, Suite 1225, Silver Spring, MD	$100,000.00
Surveying for Marine Birds in the Northwest Atlantic	U.S. Fish and Wildlife Service, Atlantic Coast Joint Venture, 11410 American Holly Drive, Laurel, MD 20708	$289,400.00
AE: Compendium of Avian Information and Comprehensive GIS Geodatabase	U.S. Geological Survey, Patuxent Wildlife Research Center-Beltsville Lab, BARC East, Bldg. 308, 10300 Baltimore Ave., Beltsville, MD 20705	$588,847.00

OCS Report
MMS 2009-015

Report to the Secretary,
U.S Department of the Interior

Survey of Available Data on OCS Resources and Identification of Resource Gaps

Executive Summary

Survey of Available Data on OCS Resources and Identification of Resource Gaps

Executive Summary

Introduction

In response to President Obama's vision for energy independence for our Nation, Secretary of the Interior Ken Salazar announced on February 10, 2009, a four-part strategy for developing a new, comprehensive approach to energy resources of the Outer Continental Shelf (OCS):

(1) Extending the public comment period 180 days until September 21, 2009, on the Draft Proposed 5-Year Oil and Gas Leasing Program announced by the previous Administration.

(2) Development of a report by the Department's Minerals Management Service (MMS) and United States Geological Survey (USGS) on conventional and renewable offshore energy resources.

(0) Hosting four coastal regional meetings in April (Atlantic Coast, Gulf of Mexico, Pacific Coast, and Alaska) to review the findings of the USGS/MMS report and to gather input from all interested parties on whether, where, and how the Nation develops its conventional and renewable energy resources of the OCS.

(1) Expediting the Department of the Interior's (DOI's) renewable energy rulemaking for the OCS that was required under the Energy Policy Act of 2005 (EPAct), but which was never accomplished by the previous Administration.

The OCS refers to 1.7 billion acres of Federal jurisdiction lands submerged under the ocean seaward of State boundaries, generally beginning 3 geographical miles off the coastline (for most States) and extending for at least 200 nautical miles to the edge of the Exclusive Economic Zone and further as the continental shelf is extended. As the Secretary explained in his announcement, the DOI should establish an orderly process that allows us to make wise decisions based on sound information, in a way that provides States, stakeholders, and affected communities the opportunity to provide input on the future of our offshore areas.

This report is the result of the Secretary's directive to MMS and USGS, and has been prepared by the MMS in collaboration with the USGS. The report surveys information that is currently available regarding the nature and scope of offshore oil and gas and renewable energy resources on the OCS and identifies information regarding sensitive environmental areas and resources in the OCS. The report also identifies information gaps regarding available data on conventional and renewable resources on the OCS and environmental issues connected with OCS development.

The report's three main sections are: (1) renewable energy resources, (2) oil and gas resources, and (3) sensitive environmental areas and resources. They draw on information from technical reports and publications produced by the DOI bureaus, other Federal Agencies, academia, and the private sector. This document serves as a first step in summarizing information and identifying data gaps that may need to be addressed to make future informed decisions.

The information collated in this report regarding oil and gas resources has been drawn primarily from the 2006 report prepared by MMS, as directed by the EPAct. Information on OCS renewable resources has been drawn from a variety of sources including data collected from the U.S. Department of Energy, the National Renewable Energy Laboratory (NREL) , and other sources. Information on environmental issues was synthesized by MMS and USGS scientists based on the decades of research that has been conducted by MMS and USGS, as well as other Federal Agencies, universities, private industry, and research institutions.

As this report indicates, there are a number of important gaps in available data relating to all of these issues. The report, compiled in 45 days, does not purport to present new information or fill in existing data gaps. The primary purpose of the report is to present a survey of available data on the OCS so that the public and interested stakeholders can participate more effectively, and with greater access to potentially relevant information, in the public meetings on OCS development.

Energy Resources on the U.S. Outer Continental Shelf

The Outer Continental Shelf Lands Act (OCSLA) of 1953, as amended (Public Law, 43 U.S.C. 1331 *et seq.*), provides authority for mineral leasing on the OCS and guidance for balancing orderly oil and gas resource development with protection of the human, marine, and coastal environments. The OCSLA Amendments of 1978 established the requirement for developing an OCS oil and natural gas leasing program based on a 5-year cycle.

Section 388 of EPAct amended the OCSLA, giving the DOI discretionary authority to issue leases, easements, or rights-of-way for activities on the OCS that produce or support production, transportation, or transmission of energy from sources other than oil and gas, except where activities are already otherwise authorized in other applicable law. This authority was delegated to the MMS, which was charged with developing regulations intended to encourage orderly, safe, and environmentally responsible development of renewable energy resources and alternate use of facilities on the OCS.

The MMS has the lead role for developing wind energy on the OCS—leasing, exploration, development, production, and decommissioning. For hydrokinetic resources, the Federal Energy Regulatory Commission (FERC) is the lead for issuing licenses authorizing construction and operation of generating facilities. The MMS's role for hydrokinetic resources is to provide appropriate input to FERC's licensing process and to issue necessary leases, easements, and rights-of-way.

Renewable Energy

Estimating the potential of a given resource is a fairly straightforward process. However, it is often difficult to estimate the amount of renewable energy that is extractable or developable given the many uncertainties in societal preferences, technological developments, environmental sensitivities, transmission capacity, grid connection availability, and potential space-use conflicts in the ocean environment. Additionally, while certain geographic locations may possess economically developable resources and adequate transmission and grid capacity, the ultimate development of that potential is dependent on citizen interest and local, State, and Federal governmental policies.

Wind power is a renewable, low-carbon dioxide energy source located on the OCS that has the potential to become a significant source of electricity in the United States. Over the past two decades, land-based wind energy has seen a significant reduction in cost, making it a viable source for electric power generation in some areas of the United States. Offshore winds are typically stronger and more consistent than on land, and are frequently located near high-energy demand centers. Of the 48 contiguous States, 28 have a coastal boundary (including Great Lakes), and electric-use data show that these coastal States use 78 percent of the Nation's electricity.

Offshore wind resources have substantial potential to supply a large portion of the Nation's electricity demand (Figure 1). According to estimates by the NREL, developing shallow water (typically 0-30 meters) wind resources, which are the most likely to be technically and commercially feasible at this time, could provide at least 20 percent of the electricity needs of almost all coastal States.

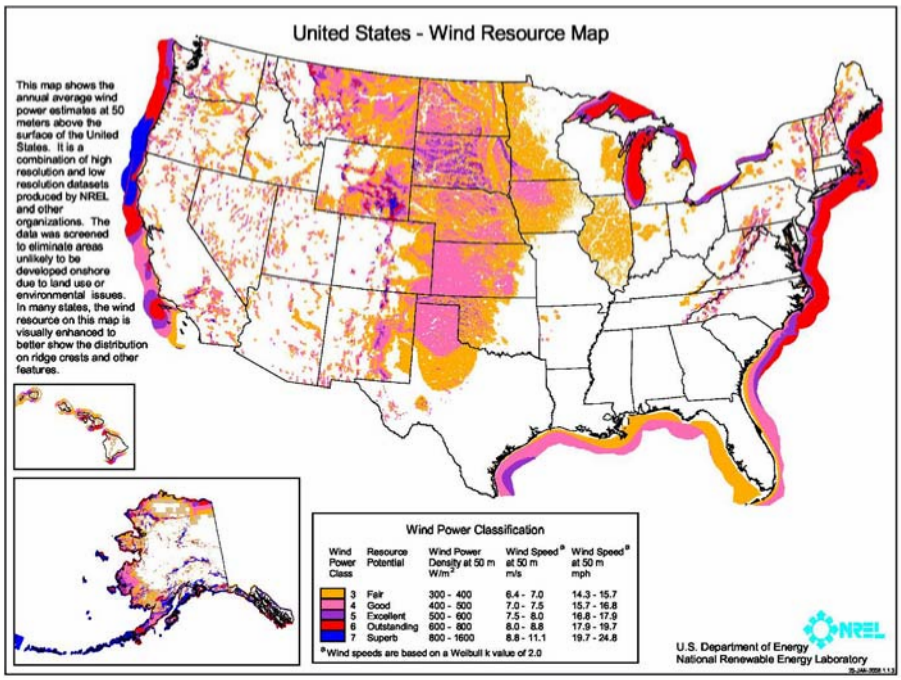

Figure I. United States Wind Resource Map (Source: NREL)

Wave energy also is a potentially significant OCS renewable energy resource, but wave energy is in the developmental stage. Given the current state of technology, the proximity to dense population and high energy load centers, and initial interest by select States, it does not appear that wave power is likely to become a major contributor to the national energy picture in the near future. Development is most likely to be focused in areas along the Pacific Northwest or off the coast of Hawaii.

Tidal energy technology development appears to be moving more quickly than wave energy technology development because its characteristics, such as predictable currents and location in shallow nearshore waters, make it more accessible to development. However, tidal projects typically occur close to the coast, within State boundaries.

Relative to wind, wave, and tidal energy, the resource potential for **ocean current power** is the least understood, and its technology is the least mature. The most viable potential opportunities for ocean current energy development in the United States are located off the southeast coast of Florida, in the Gulf Stream. However, analyses are incomplete at this time, so there may be other areas that have potentially viable current energy resources as well. To date, there is no comprehensive nationwide estimate on the current energy resource potential.

The Atlantic OCS has the greatest **renewable energy potential** relative to other OCS Regions in the Gulf of Mexico, Pacific, and Alaska. In the short-term (the next 5-7 years), this is most likely to be from offshore wind power. Substantial wind resources exist offshore the Atlantic Coast, near high-energy demand centers. Strong wind resources also exist offshore California, Oregon, Washington, and Hawaii, but it appears that the majority of this resource lies in deep waters where technology constraints are potentially significant. Alaska has outstanding ocean renewable energy resource potential. However, because of harsh weather conditions and significant distance from high-energy demand centers, it is not anticipated that these resources will be developed on the Alaska OCS in the short term.

Oil and Gas Resources

Oil and gas development in the OCS is, and will continue to be, an important component of our Nation's energy portfolio. In 2007, the OCS accounted for 14 percent (2,860 billion cubic feet) of the Nation's natural gas production and 27 percent (492,329 barrels) of its oil production. This production was from 3,795 production facilities on 8,124 MMS-administered leases, covering more than 43 million acres.

This report summarizes the results of a regional assessment of the entire U.S. OCS that was completed by MMS in 2006, as well as assessments of new areas identified for inclusion in the 2010-2015 Draft Proposed Oil and Gas Leasing Program.

It is important to recognize that estimates of undiscovered oil and natural gas resources are just that: *estimates*. Resource assessments are an attempt to quantify something that cannot be

accurately known until the resource has been developed and essentially depleted. The estimates presented in this report should be considered general indicators and not predictors of the absolute volumes of petroleum potential of the areas.

The MMS assessment of the hydrocarbon potential of the OCS is based on the analysis of published information and proprietary geologic, geophysical, and engineering data obtained by industry from operations performed under permits or mineral leases and furnished to the MMS. These estimates of undiscovered *technically* recoverable resources (UTRR) are subjected to a separate analysis incorporating economic and engineering parameters to estimate the undiscovered *economically* recoverable resources.

Regional-level UTRR results from the 2006 National Assessment are shown in Table 1. The estimates are presented as a range of estimates, and include the mean estimate and the 95th and 5th percentile levels. This range of estimates corresponds to a 95-percent probability (a 19 in 20 chance) and a 5-percent probability (a 1 in 20 chance) of there being more than those amounts of petroleum present, respectively. The 95- and 5-percent probabilities are considered reasonable minimum and maximum values, and the mean is the average or expected value.

Table 1. Undiscovered Technically Recoverable Resources of the OCS

Region	Oil (Bbo)			Natural Gas (Tcf)			BOE (Bbo)		
	F95	Mean	F5	F95	Mean	F5	F95	Mean	F5
Alaska OCS	8.66	26.61	55.14	48.28	132.06	279.62	17.25	50.11	104.89
Atlantic OCS	1.12	3.82	7.57	14.30	36.99	66.46	3.67	10.40	19.39
Gulf of Mexico OCS	41.21	44.92	49.11	218.83	232.54	249.08	80.15	86.30	93.43
Pacific OCS	7.55	10.53	13.94	13.28	18.29	24.12	9.91	13.79	18.24
Total U.S. OCS	66.60	85.88	115.13	326.40	419.88	565.87	124.68	160.60	215.82

(Bbo-billion barrels of oil; Tcf-trillion cubic feet of gas; BOE-barrels of oil equivalent. F95 indicates a 95-percent chance of at least the amount listed; F5 indicates a 5-percent chance of at least the amount listed. Only mean values are additive.)

The total hydrocarbon endowment of an assessment area is defined as the sum of historical production, current reserves, future reserves appreciation, and UTRR. As of the 2006 Assessment (Jan. 1, 2003, cutoff date), mean estimates of the OCS total hydrocarbon endowment were 115.4 billion barrels of oil (Bbo) and 633.6 trillion cubic feet (Tcf) of gas (a total of 228.2 billion barrels of oil equivalent [BBOE]). More than 18 percent of this total endowment (mean estimate barrels of oil equivalent [BOE]) has already been produced, and an additional 11 percent is contained within the various reserves categories, the source of near and midterm production. Notably, even after more than 50 years of exploration and development on the OCS, 70 percent of the mean BOE total endowment is represented by undiscovered resources. More than half of this potential exists in areas of the OCS outside of the Central and Western Gulf of Mexico.

An economic analysis follows the assessment of the UTRR and represents the portion of the mean UTRR that is economically producible under given engineering, commodity price, and

development cost scenarios. Results of this economic analysis are called Undiscovered Economically Recoverable Resources (UERR).

For the 2010-2015 Draft Proposed Program, UERR's were generated using oil prices of $60/barrel (bbl), $1 10/bbl, and $160/bbl. Results are shown in Table 2 and indicate that approximately 53 percent of the total UTRR is economically recoverable on an oil-equivalent (BOE) basis, with an oil price of $60/bbl and corresponding gas price of $6.41/thousand cubic feet of gas (Mcf). This increases to about 78 percent with an oil price of $160/bbl and corresponding gas price of $17.08/Mcf.

Table 2. Mean Undiscovered Economically Recoverable Resources of the OCS

Region	$60/bbl and $6.41/Mcf			$110/bbl and $11.74/Mcf			$160/bbl and $17.08/Mcf		
	Oil (Bbo)	Gas (Tcf)	BOE (Bbo)	Oil (Bbo)	Gas (Tcf)	BOE (Bbo)	Oil (Bbo)	Gas (Tcf)	BOE (Bbo)
Alaska OCS	4.45	7.20	5.73	11.45	30.01	16.79	15.46	50.78	24.50
Atlantic OCS	2.58	14.55	5.17	3.07	21.85	6.96	3.28	25.79	7.87
Gulf of Mexico OCS	36.75	165.94	66.28	41.04	203.43	77.24	42.56	214.87	80.79
Pacific OCS	8.38	13.16	10.72	9.29	15.14	11.98	9.49	15.60	12.27
Total U.S. OCS	52.16	200.85	87.90	64.85	270.43	112.97	70.79	307.04	125.42

(Bbo-billion barrels of oil; Tcf-trillion cubic feet of gas.)

New areas in the Atlantic, Eastern Gulf of Mexico, Pacific, and Alaska OCS have been identified for inclusion in the 2010-2015 Draft Proposed Oil and Gas Leasing Program. Although leasing has not occurred in these areas for about 25 years, previous exploration has occurred in portions of these areas, and some of these areas contain active leases with producing oil and gas fields. Updated research and exploration regarding the likely location of energy resources and environmental impacts are necessary to fill in data gaps.

Safety and the Environment

Oil Spill Risks

Oil spills are of major concern to the public, offshore industry workers, and Federal and State regulators. Spill prevention offshore is achieved primarily through required, extensive safety procedures and practices, and engineering requirements such as the use of downhole shut-off valves and blowout prevention devices. The record shows good results in preventing and minimizing spills. In 2003, the National Research Council reported (for the period 1990 through 1999) that offshore oil and gas development was responsible for only 2 percent of the petroleum found in the marine environment for North America. The MMS employs advanced oil-spill risk analysis to inform its environmental assessments of offshore activities. Spill prevention, mitigation, and response plans are required and tested frequently to maintain readiness offshore.

Geologic and Meteorological Hazards

Seafloor instability is the principle geologic hazard and, thus, engineering constraint to the emplacement of offshore bottom-founded structures. The MMS addresses and mitigates these hazards through the regulatory process. The MMS and USGS also conduct ongoing research that identifies and assesses hazards to offshore infrastructure.

The integrity of offshore infrastructure is also subject to changing ocean conditions and extreme weather events that generate intense winds, strong ocean and tidal currents, large waves, and heavy storm surges. With a large portion of OCS production located in an active hurricane corridor, many changes in industry requirements have taken place due to the recent damages and curtailment associated with hurricanes.

Global Climate Change

Uncertainty exists about the potential effects of global climate change on energy production and distribution, in part because the timing and magnitude of climatic effects are uncertain. An overarching concern for all coastal and marine areas is how environmental factors such as temperature, sea level, availability of water from precipitation and runoff, wind patterns, and storminess will be affected.

The Environmental Review Process

The environmental review process for renewable energy or oil and gas development activities includes compliance with various laws and regulations. The National Environmental Policy Act (NEPA) of 1969 requires that all Federal Agencies use a systematic, interdisciplinary approach that will ensure the integrated use of the natural and social sciences in any planning and decision making that may have effects on the environment. The goal of the NEPA process is to help public officials make decisions based on an understanding of potential environmental consequences and take actions that protect, restore, and enhance the environment. The MMS evaluates all aspects of the marine, coastal, and human environments including a detailed oil- spill risk analysis.

A tiered process has evolved for OCS oil and gas activities to evaluate the potential environmental consequences for each successive management decision starting with a proposed program, then individual lease sales, and finally project-specific plans. The 5-Year Programmatic Environmental Impact Statement analyzes the proposed leasing schedule, focusing on the size, timing, and location of proposed lease sales for the 5-year period identified in the proposed program document. Once the lease sale schedule is approved, more detailed environmental analyses are conducted for proposed lease sales in a given area. At that point, lease stipulations protective of the environment are identified and included in the leases granted to industry. After leases are issued, further environmental reviews of specific projects are conducted to ensure that the proper environmental protective measures are employed and site-specific mitigation measures are implemented. The mitigations may include, for example,

avoidance of sensitive biological communities and archaeological resources, or inclusion of specialized discharge requirements. It is anticipated that a similar tiered process will be used for renewable energy to ensure that each management decision has undergone an appropriate environmental review with input from stakeholders and the public.

Biological Habitats and Environmental Resources

Seafloor Habitats

An understanding of seafloor habitats is an important consideration in making leasing decisions. Some information is available on seafloor habitats for portions of the OCS, but there are significant data gaps for a number of areas. In some cases, exploration seismic surveys for oil and gas production, followed by required site-specific high-resolution "hazard" surveys, could provide detailed information about the seabed with regard to drilling hazards as well as for evaluating benthic habitats. In other cases, additional detailed, high-resolution mapping may be necessary along with ground-truthing with sediment samplers, remotely operated vehicles, or even submersibles in order to verify community makeup to allow for mitigation and avoidance of habitats.

Key challenges for renewable energy activities on the OCS are similar to those for oil and gas activities, such as evaluation for sensitive biological habitats. These activities are initially done through large-scale studies of a particular region using existing information if available, and subsequently site-specific higher-resolution mapping if necessary.

Coastal Habitats

Coastal habitats can be impacted by OCS development. In the Gulf of Mexico, for example, wetland losses have been associated with onshore energy infrastructure. Utilization of existing onshore facilities is a potential way to prevent further damage. Along the Pacific Coast, the heavily protected or developed coastline reduces options for pipeline or utility corridor sites required to support shore-based construction. While there are refineries and ports capable of supporting heavy industry, for the most part, the Atlantic region lacks existing onshore infrastructure geared to supporting offshore activity. Additionally, a significant portion of the coast, except portions of South Carolina and Georgia, are either developed or are State or federally protected shorelines. In Alaska, coastal environments are considered fragile; thus, it would be essential to accurately identify the sensitive habitats so they can be avoided by proper site selection and routing of support services.

Fishery Resources

Key challenges for oil and gas development that are common to all OCS areas include accidental oil spills, the threat of space-use conflicts, habitat alteration, and seismic surveys. The threat of oil spills and their direct and indirect effects on fisheries is central to the concerns about offshore oil and gas development. There is extensive information on the detrimental effects of oil on fisheries in coastal and ocean situations. Space-use conflicts, at the dock or offshore, and habitat alteration from pipeline installation are important challenges that should

be addressed by working closely with all interested stakeholders, encouraging multiple use of infrastructure and open consideration of alternative locations and routes. Seismic surveys are a challenge, as noise can negatively affect fishing activities and can limit access to an area. Seismic survey mitigations for fisheries include timing and notification so that there is the least amount of interference with fishing; avoidance of fish spawning locations, spawning seasons, and areas of concentrated fishing activity; limitation to the smallest area possible for the shortest amount of time; modifying frequency and duration of air-gun noise emission for least impact; and ramping-up so that sound energy emissions are gradually increased.

Key challenges for renewable energy development common to all OCS areas include offshore space-use conflicts, artificial reef effects, habitat alteration, noise from pile driving, and effects from electromagnetic fields (EMF). The MMS has funded research into the nature of space-use conflicts and offshore oil and gas structure siting, and is in the midst of a major study to delineate commercial fishing space-use conflicts for renewable energy. As with oil and gas, space-use conflicts for renewable energy activities are a challenge that should be addressed by working closely with all interested stakeholders. The artificial reef effect of offshore renewable energy structures will occur, and localized fisheries will likely change, becoming more or less attractive to fishermen. Noise from pile driving is localized, temporary, and potentially can be mitigated by the use of bubble-curtains, air gaps, and the quietest possible equipment and techniques. Habitat alteration, as power cables come ashore, potentially can be minimized by horizontal directional drilling and open consideration of alternative locations and routes. The subject of EMF continues to be studied globally, and MMS has an ongoing study to further address EMF. Mitigations for EMF include cable burial and proper shielding.

Marine Mammals

Overall, there is some baseline information available for predicting areas of likely presence and absence of marine mammals on the OCS. Information is available on some species (e.g., nearshore movements of baleen whales, bottlenose dolphins, and manatees) while data on other species are limited (e.g., offshore distribution of baleen whales, Arctic species). Effects for some activities are well understood (e.g., contaminants and marine debris, vessel strikes), while less known for others (e.g., anthropogenic noise, climate change).

One of the major challenges for OCS energy development activities to coexist with marine mammals is the issue of anthropogenic sound. Sound is of vital importance to marine mammals, and anthropogenic sound can temporarily or permanently impair their ability to process and use sound. Potential threats from noise include seismic airguns, explosive removals of structures, and pile driving. It appears that the use of ramp-up as a mitigation tool may reduce or prevent the sudden exposure of marine mammals to maximum airgun output levels, and allows for them to leave the immediate vicinity. More data are needed regarding impacts on marine mammals as a result of noise produced by OCS energy activities. Behavior impacts have been documented from traditional and renewable energy activities, although these types of effects are still not well understood. Other threats to marine mammals include marine debris such as lines from ships and garbage, vessel strikes, oil spills, contaminants, and construction activities.

Sea Turtles

Sea turtles are highly migratory with a wide geographic range. The key challenges for both renewable energy and oil and gas development in relation to sea turtles are similar to those for marine mammals, and include anthropogenic sound resulting from the use of seismic airguns, explosive removals of structures, and pile driving; the release of marine debris such as lines from ships and garbage; vessel strikes; oil spills and contaminants; and construction activities that disturb the bottom floor. The available information on sea turtle behavioral responses to sound levels from anthropogenic activities indicates that individuals are likely to actively avoid ensonified areas. However, the biological importance of behavioral responses to construction noise is unknown, and there is little information regarding short-term or long-term effects of behavioral reactions on sea turtle populations.

Marine and Coastal Birds

Large oil spills from oil and gas development activities could have a large impact to birds. The prospects for near-term wind energy developments off the mid-Atlantic coast of the United States has created concern about potential impacts of wind turbines on marine and coastal birds. In addition to legally protected species, millions of migratory birds traverse the Atlantic Flyway twice each year, and thousands more either nest on the Atlantic coast of the United States or overwinter in nearshore and offshore waters of the Atlantic OCS. The challenge is to locate and operate wind energy facilities in such a way as to minimize bird mortality.

Socioeconomics

Socioeconomic effects of the OCS program have been studied by MMS and others over many years. In addition to substantial revenues generated by offshore oil and gas development, the offshore oil industry is comprised of a great number of enterprises that provide innumerable goods and services in support of the exploration, development, and production of offshore oil in U.S. waters and abroad. Overall, an adequate baseline of information exists to address the socioeconomic effects of the OCS oil and gas program and the renewable energy program for leasing decisions. However, predictions of future industry activities are best built on past industry behavior. Therefore, as the renewable energy industry develops, new data on OCS operations will be needed to improve MMS estimates of the economic and demographic consequences.

Information Data Gaps

As we move into an era of renewable energy in some areas and the continued development of more traditional energy sources in others, our information base is not always complete. Additional geographically-based, targeted research will be required in some areas and for some disciplines. The data and information gaps identified in this report must be viewed in terms of a broad range of decisions – over broad geographic areas - that will need to be made in the future. Note too, that data gaps identified in this report will be supplemented with input from stakeholders at the Federal, State and community levels as regional and project-level decision making proceeds.

Renewable Energy Resources: Quantifying the potential offshore renewable energy resource is reasonably straightforward, and great strides are being taken to map the offshore wind, wave, and tidal resources. However, there is a high degree of uncertainty in estimating the actual extractable or developable amount of energy given the many uncertainties in societal preferences, technological developments, environmental sensitivities, transmission capacity, grid connection availability, and potential space-use conflicts in the ocean environment. Offshore renewable energy technologies are still developing, particularly for wave, tidal, and current power; and there is a need for standardized protocols and criteria in technical evaluation and design. Also, resource assessment methods for wave, tidal, and current energy are less developed compared to wind energy; resource assessments are incomplete; and the actual amount of developable energy is dependent upon a host of factors that need to be examined more closely.

Oil and Gas Resource Evaluation: Seismic surveys are the primary method of exploring for oil and gas. Most of the seismic data acquired in the potential new lease areas are more than 25 years old and may not be adequate for detailed prospect mapping or for lease sale bid formulation and evaluation, especially in geologically complex areas. New seismic and related data will likely be required for some areas (especially in the Atlantic OCS area and Eastern Gulf of Mexico) and is typically used by the oil and gas industry as part of their pre-leasing evaluation. Prior to acquisition of seismic data, NEPA and other environmental analyses may be required to better inform decisions.

Sensitive Environmental Areas and Resources: Overall, an adequate baseline of information exists to address the environmental effects of the OCS oil and gas program and the renewable energy program in support of leasing decisions. A key challenge in many areas will be to gather and synthesize existing information. In addition, new information is continually being gathered by MMS, USGS, and others. Once specific areas are identified for development, additional information may be needed for some biological resources. Some of the key information needs follow.

Seafloor Habitats: There are some areas with limited information, and additional site-specific high-resolution mapping may be required to allow mitigation and avoidance of sensitive biological habitats such as coral reefs.

Coastal Habitats: While there is a large information base that provides a general understanding of coastal habitats, these efforts do not always reflect the most recent conditions of coastal shorelines, where severe weather conditions and changes in sea level may be altering the area.

Marine Fish Resources: The key information need related to fisheries is that regarding potential space-use conflicts for commercial fishing, which requires identification of important fishing grounds.

Marine Mammals: Key information needs include increasing our understanding of: (1) specific life history traits and critical habitat areas for some key marine mammal species (i.e., important feeding, mating and nursing behaviors and habitat for baleen whales and Endangered Species Act-listed species); (2) potential effects from noise-producing activities; and (3) potential non-acoustic effects from renewable energy technologies (e.g., potential entanglement with anchoring array, large footprint of some facilities, and potential effects on migration).

Sea Turtles: Little is known about the effect of noise on sea turtles in the marine environment. In particular, their basic auditory system and hearing mechanisms or the role of sound in their life cycle are not well understood.

Marine and Coastal Birds: The existing information on seasonal distribution and abundance of marine birds is sparse. Such information is critical to understanding the potential for exposure to offshore wind energy developments and to analysis of collision risk.

Conclusion

While we continue to generate a vast majority of our electricity from fossil fuels, renewable energy sources appear more attractive as we look for ways to address environmental, economic, and energy security. The energy resources of the OCS, and specifically renewable energy sources, are particularly attractive options with significant resources located in close proximity to coastal population centers.

The experience, knowledge, and tools exist to ensure that offshore energy is developed in a comprehensive and environmentally sound manner. By obtaining stakeholder input (locally and nationally); compiling existing information and acquiring new data, where needed; conducting objective analyses using monitoring data to manage adaptively; and applying the necessary mitigations and safeguards along the way, we can achieve our national energy, economic, and environmental goals.

List of Terms Used in the Executive Summary

Probability*:* A means of expressing an outcome on a numerical scale that ranges from impossibility to absolute certainty; the chance that a specified event will occur.

Prospect: A geologic feature having the potential for trapping and accumulating hydrocarbons; a pool or potential field.

Reserves: The quantities of hydrocarbon resources anticipated to be recovered from known accumulations from a given date forward. All reserve estimates involve some degree of uncertainty.

Reserves appreciation: The observed incremental increase through time in the estimates of reserves (proved and unproved) of an oil and/or natural gas field as a consequence of extension, revision, improved recovery, and the addition of new reservoirs.

Resources: Concentrations in the earth's crust of naturally occurring liquid or gaseous hydrocarbons that can conceivably be discovered and recovered.

Total endowment: All technically recoverable hydrocarbon resources of an area. Estimates of total endowment equal undiscovered technically recoverable resources plus the EUR.

Undiscovered resources: Resources postulated, on the basis of geologic knowledge and theory, to exist outside of known fields or accumulations.

Undiscovered technically recoverable resources (UTRR): Oil and Gas that may be produced as a consequence of natural pressure, artificial lift, pressure maintenance,
or other secondary recovery methods, but without any consideration of economic viability. They are primarily located outside of known fields.

Undiscovered economically recoverable resources (UERR): The portion of the undiscovered technically recoverable resources that is economically recoverable under imposed economic and technologic conditions.