BOEM OCEAN SCIENCE

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BOEM Social Science, The Human Environment

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Frequently Used Abbreviations

DWH	*Deepwater Horizon*
EIS	Environmental Impact Statement
ESP	Environmental Studies Program
GIS	Geographic Information System
GOM	Gulf of Mexico
GPS	Global Positioning System
MMS	Minerals Management Service
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
OCS	Outer Continental Shelf
PROUA	Pacific Regional Ocean Uses Atlas
TCL	Tribal Cultural Landscapes
TK	Traditional Knowledge

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For More Information

Check out the Bureau of Ocean Energy Management website at **www.boem.gov**.

The Director's Message

By definition, the use of social science examines the ways in which we humans interact with one another and affect our environment. At BOEM, we have acquired and used information obtained by various disciplines of social science such as economics and archaeology, as well as traditional knowledge, to inform decisions related to our nation's comprehensive offshore energy policy. Only by studying and monitoring the social systems of coastal residents can we determine the impact of our work on society.

Social sciences are cornerstones that create a strong foundation for our applied research programs. This issue of *BOEM Ocean Science* delves into our use of social science to study human as well as coastal and marine environments. One article in this issue discusses how our social science studies inform lease sales for traditional offshore energy as well as renewable energy programs. Our researchers look at how recreation, tourism, and other industries, and the culture of indigenous peoples within the U.S. coastal states are affected by our leasing and permitting activities on the Outer Continental Shelf (OCS).

Because each OCS region is distinct in geography, culture, and economy, the range of social science research we conduct varies widely. For example, studying the potential impact of oil and gas exploration on subsistence fishing and whaling is essential in the Arctic region of the OCS. Similarly, another ongoing study is developing the first geo-referenced database of historic shipwrecks off the main Hawaiian Islands. Our social science research also explores landscapes and property types that could be adversely affected by an altered view of the ocean with the addition of offshore wind turbines. Social science is prominent in our work with the indigenous Native Hawaiian community in order to help identify areas of significance for their culture when planning for renewable energy areas.

Social science helped us understand the impact of the *2010 Deepwater Horizon* oil spill on the Gulf of Mexico fishing and tourism industries. Social science also helped us understand the impact of the *Exxon Valdez* oil spill on Alaskan commercial fishing and tourism industries, subsistence harvesting, and recreational practices. This type of research provides information that will be used to improve the nation's response in the event of a future incident.

We are able to achieve our mission of responsible development of OCS resources by using the broadest array of scientific disciplines available and social science allows us to continue to seek a full understanding of the effects of our work on society as a whole. Please enjoy this issue of *BOEM Ocean Science.*

– Abigail Ross Hopper, Director

Composite nighttime satellite imagery showing the continental U.S. and the human-built environment. NASA Earth Observatory/NOAA National Geophysical Data Center.

For More Information

BOEM's Environmental Studies Program
http://www.boem.gov/Studies/

The Human Environment

What is Social Science?

Social science is aimed at enhancing our understanding, through systematic study, human groups and individuals and their relations between one another and the surrounding environment to resolve societal problems. Government policy, plans, programs, and projects are developed in response to identified or anticipated problems. An impact assessment—whether social, economic, or environmental—is a tool to help make decisions. Properly done social science can help the affected community or communities and agencies plan for social change resulting from a proposed action.

Prior to the enactment of the National Environmental Policy Act (NEPA) of 1969, concerns about the social consequences of major development projects often were fragmented and lacking in focus. For example, when construction-related impacts of public works projects (e.g., the Federal-Aid Highway Act of 1956) were at issue, attention was generally centered on cost-benefit analysis. The prevailing view was that money could compensate for any adverse impacts. There was minimal concern for social impacts even if entire neighborhoods had to be displaced, so long as comparable housing could be located elsewhere. There was even less concern for the distribution or "equity" of these impacts on different populations. Also lost in this process was the importance people attach to their communities and neighborhoods, the long-standing social networks that form the basis of support both for daily living and during periods of extreme stress and hardship.

The passing of NEPA created a different, but somewhat vague set of requirements for federal agencies including the "integrated use" of the social sciences in assessing impacts *on the human environment*. Over the years, the legal definition of *human environment* has undergone substantial modification as a result of court decisions stemming from NEPA-related litigation. The Council on Environmental Quality's (CEQ) 1986 "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" point out that the "human environment" is to be "*interpreted comprehensively*" to include the *natural and physical and social environment* [emphasis added] (40 CFR 1508.14). Agencies needed to assess not only so-called "direct" effects, but also "aesthetic, historic, cultural, economic, social, or health" impacts, "whether direct, indirect, or cumulative" (40 CFR 1508.8) of their proposed actions.

The 1986 CEQ Regulations also contain another key provision that should be noted; that "economic or social effects are not intended by themselves to require preparation of an environmental impact statement." However, when such a document is prepared "and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment" (40 CFR 1508.14). The Environmental Impact Statement (EIS) is thus intended to provide a full disclosure procedure for federal decision-makers, who are then expected to consider the negative and the positive implications of potential courses of action, as well as the unintended and the intended consequences, before they proceed. NEPA also provides citizens with the opportunity to challenge agency decisions in court; however, NEPA's provisions are often misunderstood.

Social Impacts

By *social impacts* we mean the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society. The term also includes cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize their cognition of themselves and their society.

How Does Social Science Help in the Decision Making Process?

Sound social science brings the social circumstances of potentially affected populations to the decision process. Social science research saves both time and money as affected populations are better identified, understood, and involved in the process. These efforts also help agencies identify and consult key stakeholders during the decision-making process.

In summary, social science provides information to agencies and communities about social, cultural, historic, and economic factors that need to be considered in any decision. Social science also provides a mechanism for informing resource decisions on the relevant social context, and can facilitate the selection of the most socially beneficial course of action for local, regional, and national interests.

Participants at a recreational ocean users meeting learn about GIS used to gather information about human uses of offshore waters in the Atlantic. Photo by MARCO staff.

The Complexities of Social Science Assessments

Historically, many social science assessments were formulated to measure impacts from a single, often one-dimensional event, in which an external cause overwhelms the community's institutional structures, infrastructural capacities, and labor force. Oil development in the Gulf of Mexico, for example, lies at the opposite end of the continuum for each of these qualities. The industry is immensely varied and complex; it has evolved over generations and in concert with other social, political, economic, and technological changes that often dwarf, mask, inspire, and mitigate the more conspicuously oil-related effects; and it has grown enormously. Its influence has reached across the seas, its end is not in sight, and no final tally of impacts is possible.

BOEM's analysis of the industry's demographic effects has been forward-thinking in that our approach has not been based on a single explanatory model that cannot possibly be suited for a varied assessment situation. In complex situations, a model for assessing state-level impacts would not necessarily be useful for local-level ones. Models are simplifications of reality; they are frequently scale-dependent and reflect the limits of human cognition, available data, and current scientific practice.

Fortunately, BOEM's Environmental Studies Program (ESP), created under Section 20 of the Outer Continental Shelf Lands Act, allows us to explore possible effects by topic. Our strategy began by addressing each topic separately, while accepting that the mechanisms by which it is affected, the degree to which it is affected, how these effects relate to others, and whether they merit inclusion in the final assessment ***are all empirical questions***. For each topic, analytic coherence will come from the logic and findings of relevant academic fields—from criminology when looking at crime, for example—and not from the topic's role in an a *priori* model. Indeed, an empirical approach to impact topics provides a more useful foundation on which to build future monitoring and mitigation efforts.

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This same approach is being utilized across BOEM regions, offices, and programs. Topic selection always recognizes differences in assessment situations as the human environment varies in space and time. Analytical strategies should also reflect such differences. Similarly, the need to assess lease sale-level effects turns the problem of linking regional- and local-level effects into a strategic science one.

While this strategy will not draw the picture of tightly linked effects provided by a single multi-dimensional model, it will produce one that is more complete and is coherent given the region and sub-region at hand. Consistency will come from the need to assess each topic in terms of its role in overall effects and from addressing the particulars of the assessment situation.

This edition of *BOEM Ocean Science* highlights BOEM's approach to social science and a select group of key studies conducted through the ESP to address important social science issues.

– Dr. Rodney E. Cluck, Chief
Division of Environmental Sciences
Environmental Studies Program

Selected excerpts from *Applied Social Science in MMS: A Framework for Decision-Making* by Luton and Cluck, unpublished.

BOEM's Social Science Research

The Outer Continental Shelf (OCS) has provided the U.S. with a rich source of oil and natural gas, and it is now increasingly recognized as a place to harness renewable energy sources, such as wind, tidal, and wave energy, and mineral resources. The management of these resources in U.S. OCS waters falls under the jurisdiction of BOEM and the Bureau of Safety and Environmental Enforcement. BOEM conducts environmental research in the biological, physical, and social sciences to inform resource management decisions. BOEM's Environmental Studies Program has been in existence for over 40 years and has funded more than 200 social science-related studies, totaling more than $40 million in just the last 20 years.

BOEM's Mission and the Human Environment

BOEM is charged with developing the Nation's OCS energy and mineral resources in an environmentally responsible manner. BOEM's social science research informs its decision-making, enhancing our understanding of the "human environment" through baseline research and by describing, explaining, and estimating the impacts of OCS actions on this environment. While there are basic information needs across OCS regions, such as employment trends and population shifts, variations in the human environment are significant, and research topics must vary. Recognizing the range of natural and social impacts on the human environment, BOEM's social science research focuses on the economic, historic, cultural, social, and aesthetic dimensions of these impacts.

Impacts Vary

Activities generated by the Bureau's three programs—oil and gas, renewable energy, and marine minerals—have the potential to impact the human environment in diverse ways. For example, wind energy development on the Atlantic or Pacific Oceans may have aesthetic, cultural, or social effects as a result of changes to scenic, historic, or traditional viewsheds. While such impacts are possible, wind energy development would also create jobs and renewable power. In Alaska, OCS oil and gas resource activities may create social disruption by negatively impacting the harvest of marine species (e.g., as a result of untimely ship traffic) and thus potentially affect an intricate and complex social network that relies on the acquisition and sharing of subsistence foods. The Gulf of Mexico's oil and gas industry employs thousands of people and contributes significantly to state, local, and national economies. In turn, the dynamics of the Gulf's oil and gas industry may result in negative social and economic effects by reducing or shifting the location of jobs, potentially disrupting family and community life. Marine mineral extraction may bolster regional and local interests in publicly accessible beaches and protect valuable public infrastructure from storm damage. Conversely, marine mineral extraction may have a negative cultural impact by physically disturbing a submerged cultural resource, as well as a negative social or economic impact by temporarily disrupting commercial or recreational fishing during dredging operations.

Informing Management Decisions

Social science findings can inform OCS resource decision-making in regards to leasing and site selection in various ways. The identification of potential temporal and spatial conflicts with subsistence activities, commercial fishing, or scenic viewsheds may result in excluding or deferring a particular area from leasing to prohibit and mitigate impacts on these activities and views. For example, a 'spatial' deferral could prohibit the sale of a lease block, while a 'temporal' deferral could set specific time periods that limit the occurrence of an activity (e.g., survey work, shipping, construction) in a specified area such as during subsistence whaling in the Arctic. Findings from BOEM's social science studies have also influenced the specific criteria the Bureau uses to assess environmental impacts.

Topics of Study

The breadth of social science research conducted by BOEM is extensive in its focus and approach. Such topics include: the history and development of the oil and gas industry in the Gulf of Mexico; the subsistence harvest of bowhead whales, and other marine and land mammals in the Arctic; subsistence sharing networks; tourism and recreation (e.g., impact studies, baseline studies); fisheries (e.g., space-use conflicts, economic impacts, seafood supply chain); demographic patterns; ethnic, rural, and Indigenous communities; OCS-related infrastructure (e.g., shipping, fabrication); historic shipwreck sites; traditional cultural properties; submerged landscapes; and historic properties. BOEM also studies trends through economic modeling to assess the socioeconomic "net benefits" of proposed OCS actions, and the scale and distribution of economic impacts of oil and gas activities, using mathematical models. In short, BOEM's body of social science research is rich and diverse.

– John Primo and Harry Luton, BOEM

For More Information

BOEM's Environmental Studies Program

http://www.boem.gov/studies/

BOEM's ongoing social science study profiles

http://www.boem.gov/BOEM-Social-Sciences-and-Economic-Studies/

Spotlight on A Scientist: Harry Luton

What is your job at BOEM?

I was first hired by the Alaska OCS Region soon after the Minerals Management Service (MMS) formed in 1982. I think my big selling point was that I had some experience with Arctic social science. This was truly a frontier region for OCS petroleum—the promise of OCS oil loomed large and the adjacent coastal areas were sparsely populated with little infrastructure. Our early rounds of environmental assessments were done from scratch; they were research projects.

I moved from Alaska to Headquarters in Herndon, Virginia, where I worked for several years in the Environmental Studies Program as the Social Science Coordinator. After several years at Headquarters, I transferred to the Gulf of Mexico OCS Region (GOMR) in New Orleans. I enjoy more the "hands on" and practical work in the regions than the review and oversight work of Headquarters. If you are interested in applied social science and the effects of offshore oil and gas development, the Gulf is the place to be. Here, oil and gas raise a myriad of issues that beg understanding, and that keeps me learning new things. Now, I serve as the GOMR's "Senior Social Scientist." I see my job as coordinating the analytical needs of BOEM social scientists, particularly as those needs relate to socioeconomic assessments in the Gulf Region.

Why did you decide to work for BOEM?

I came to BOEM (then MMS) by luck, really, because the agency was looking for someone with my skill set and I wanted to stay in Alaska. I had been in graduate school for years, taught part time, and worked on research projects, but I never had a permanent, career-type position. At the time, I was thinking of being a teacher and part-time researcher because that's what I had been trained to do.

It wasn't just the opportunity to stay in Alaska that made the job attractive; it was my desire to pursue the subject matter. Both urban and rural Alaska were changing rapidly, mostly due to the Alaska Native land settlement and North Slope petroleum developments. I found the North Slope exciting because things were so dynamic—in such flux. Also, relatively little social science research had been done in Alaska. It was a good place for a dissertation topic and I completed mine on subsistence and social change in Wainwright.

How has your educational background and experience prepared you for the work you do?

I completed my undergraduate degree in four years—history and literature—and earned a Master of Arts degree in American Studies—U.S. history and sociology. I entered a PhD program and studied for nine years. I liked the class work, studying and research, and I paid for it with part-time teaching and work on research projects. It was great preparation for a career at BOEM. We do socioeconomics, which is not an academic field like biology or oceanography, but rather pieces of many academic fields—economics, sociology, anthropology, demography, etc. Socioeconomics is eclectic: it applies a grab-bag of techniques. My education helped, as did the applied research I conducted. The experience in other regions and Headquarters also prepared me for this work. The challenge of socioeconomics has kept my job interesting for the 30-plus years I've been here. I've had to learn things here that I never would have otherwise, like economic/demographic modeling.


Harry Luton, BOEM

What role do you play in BOEM's Environmental Studies Program?

I see my most important role as representing the interests of the GOMR socioeconomic staff within BOEM's Environmental Studies Program. My role is to identify research that will facilitate their environmental work and then, to the extent that budget and policies permit, get these ideas translated into studies that are funded, completed, available, and prove to be helpful.

Another role consists of participating in frequent meetings with the social scientists who conduct environmental assessments. We, as a group, discuss our work and current issues, as well as new study ideas and problems with ongoing studies. Some are formal meetings, such as when we review study proposals, but most of the meetings are not. They meld the concerns of socioeconomic assessment with those of studies. To emphasize this seamlessness, I participate in some of the assessment functions; for example, sometimes serving as a reviewer for portions of environmental assessments.

I also like to think of myself somewhat as a mentor. I like this work and want to pass that feeling on. I couldn't do my job without the group; my job may be to bring a bit of coherence to the planning, but the material and the ultimate shape is the group's energy and thought. Another role is to represent BOEM at scientific events, meetings, and planning workshops. Some of my responsibilities include coordinating research with Federal and State agencies. These are all areas about my job that I find rewarding.

The Gulf of Mexico - An Historical Review

The earliest years of the offshore oil and gas industry and its associated support industries as well as its expanding physical, social, and economic presence are not well documented. The industry became a major presence in Louisiana's wetlands and expanded into the Gulf of Mexico (GOM) before the U.S. Government had even asserted sovereignty over the Outer Continental Shelf (OCS), and before there were Federal environmental regulations or socioeconomic impacts to be considered. When the Federal Government assumed control, the Gulf was already a well-developed, thriving oil province. The assumption at that time was that all significant socioeconomic impacts had already occurred; the small input from an additional sale would not be significant. Over many decades, the industry did maintain growth and development in offshore drilling and technology that brought continued economic benefit to the Gulf States. It wasn't until the oil price collapse in the mid-1980s and, in the face of massive industry layoffs, reorganizations, mergers and bankruptcies, that social science questions arose about employment and economic growth, immigration and community change, adjustments to offshore work, infrastructure needs, traffic, beach use, fishing, local tax revenues, and new demands on schools became a concern for the Gulf States and the U.S. Government.

Initially, BOEM's predecessor agency, the Minerals Management Service (MMS), defined the industry narrowly as offshore operations only—the platforms, crews, and supply vessels. However, as the circle of participating industries expanded and the increasing variability and complexity was realized, the research focus shifted to onshore socioeconomic impacts on various industries, communities, and families.

Expansive Infrastructure

Much research has gone into identifying, characterizing, and measuring this ever-widening circle of industries and associated infrastructure. In order to assess socioeconomic impacts, it is necessary to develop an understanding of the many facets of the industry. Three BOEM study reports provide an idea of the breadth of this aspect of the research effort.

The "OCS-Related Infrastructure Fact Book" study examined the wide range of onshore energy infrastructure assets along the GOM that support, or are supported by, offshore oil and gas production and provided an understanding of their current economic status and future trends. The "Idle Iron in the Gulf of Mexico" study examined the decommissioning of OCS

Photos, page 8, top left to right: Alabama State docks; deck removal of a decommissioned oil and gas platform; fuel barge; workboat traveling offshore in the GOM; a shrimp boat in Hopedale, Louisiana; two views of a processing plant.
All photos by MMS/BOEM.

structures due to Federal regulations that require them to be cleared after production ceases. Decisions about when and how a structure is decommissioned involve issues of environmental protection, safety, cost, and strategic opportunity. Finally, the "Alternative Uses of Hydrocarbon Infrastructure" study looked toward the future and examined the potential of using oil and gas platforms in the GOM as support for alternative marine and energy applications, i.e., as bases for offshore mariculture, as foundations for wind turbines, or for use in artificial reef programs.

Socioeconomic Impacts – Family and Community

BOEM is tasked with the significant challenge of identifying impacts in 133 coastal counties and parishes ranging from the Texas-Mexico border across all five Gulf States to the Florida Keys. Across this enormous area there is much geographic, cultural, economic, and demographic variability and complexity. Even though OCS oil and gas industry activities take place offshore, the socioeconomic impacts occur onshore, within families and communities. Therefore, BOEM research has focused on the impacts to families and to community-industry interactions.

Family Dynamics

The "Social and Economic Impacts on Individuals and Families" study was conducted within two communities of Acadiana in southern Louisiana: Morgan City and New Iberia. Both are involved in diverse activities associated with the exploration, development, and production of oil and gas from the OCS. The study documents the factors that influence impacts to families, including stability and vulnerability of employment and wages, opportunities for advancement, patterns of work scheduling, and safety.

Environmental Justice

The "Environmental Justice Study" was initiated to identify any disproportionate impacts of OCS oil and gas-related activities on minority or low-income populations. Five activities were identified as being potentially hazardous to nearby communities—transportation corridors, oil and natural gas pipelines, petroleum bulk storage facilities, shipyards, and natural gas processing plants. Other areas of environmental concern addressed in the study were the populations who hunt, trap, and fish in the region. This study underlines the inherent difficulty of environmental justice analysis; at-risk populations do not exist in a vacuum. The study found that vulnerable populations were not disproportionally affected from OCS activities.

And Then - Disaster

On April 20, 2010, the *Deepwater Horizon (DWH)* blowout and oil spill occurred, eventually becoming the largest oil spill in U.S. history. The "Offshore Oil and Deepwater Horizon" socioeconomic impacts study was initiated within days of the blowout, before any oil reached land, to document the effects of the spill and its aftermath on coastal Louisiana and Mississippi families, communities, businesses, commercial fisheries, tourism, and non-governmental organizations. The drilling moratorium and slowdown in the issuance of permits had differential effects on workers, companies, and communities. This study became the only on-the-ground account of the spill's socioeconomic impacts during the first year. BOEM's Environmental Studies Program (ESP) has also examined the impacts of the *DWH* spill on the tourism and seafood industries.

Summary

Risk, failure, innovation, and fortune have always characterized exploration. The history of the oil and gas industry, from its early days on the Texas-Louisiana coast to its recent developments in the deepwater Gulf, exemplifies the transformation of oil and gas exploration from an unsophisticated prospecting endeavor to a high-tech business. The ESP has undertaken various studies to better understand the complex and evolving impacts of the GOM offshore oil and gas industry.

– By Janet Purdy, Schatz Publishing

For More Information

OCS-Related Infrastructure Fact Book Volume II: Communities in the Gulf of Mexico
http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5158.pdf

Idle Iron in the Gulf of Mexico
http://www.data.boem.gov/PI/PDFImages/ESPIS/4/4254.pdf

Assessment of Opportunities for Alternative Uses of Hydrocarbon Infrastructure in the Gulf of Mexico
http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5153.pdf

Social and Economic Impacts of Outer Continental Shelf Activities on Individuals and Families
http://www.data.boem.gov/PI/PDFImages/ESPIS/2/3062.pdf

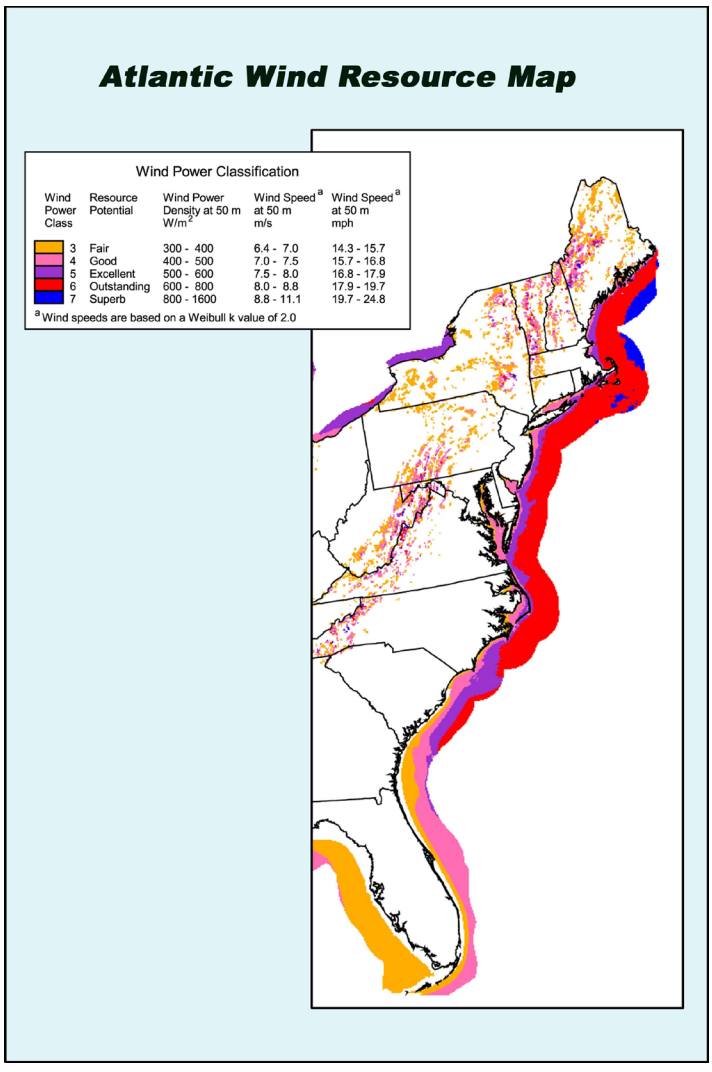
Environmental Justice Considerations in Lafourche Parish, Louisiana
http://www.data.boem.gov/PI/PDFImages/ESPIS/2/3024.pdf

Offshore Oil and Deepwater Horizon: Social Effects on Gulf Coast Communities Volume I: Methodology, Timeline, Context, and Communities
http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5384.pdf

Research in Support of Offshore Wind Energy Development in the Atlantic Region

Worldwide, there are almost 9.0 gigawatts of offshore wind energy capacity. The U.S. Department of Energy suggests that U.S. offshore wind energy facilities could supply 22 gigawatts of renewable energy by 2030, powering 4.5 million homes. BOEM plays a vital role in ensuring that OCS wind energy development occurs in a deliberate and responsible manner. Stakeholder needs must be balanced and it is important for all to understand the environmental and socioeconomic consequences. BOEM's research is aimed at understanding baseline conditions and the potential effects of federal decisions.

Social, economic, and cultural research in the Atlantic OCS Region started decades ago and initially focused on supporting oil and gas resource decisions. While oil and gas resources in the Atlantic region may still have potential, the Bureau's emphasis is on renewable energy, particularly wind energy.



Atlantic wind resource map. U.S. Department of Energy, National Renewable Energy Laboratory.

Some of the Bureau's recent studies have focused on the region's tourism and recreation economy, coastal infrastructure, and marine space-use.

Tourism and Recreation

Coastal tourism and recreational economies are typically built or dependent on an area's natural resources, recreational assets, tourism infrastructure, as well as an area's historical, cultural, and aesthetic characteristics. Coastal areas may be sensitive to offshore wind facilities as the presence of turbines on the horizon could result in changes to the viewshed. Construction activities and increased vessel traffic may impact an area's tourism and recreation economy both positively and negatively. BOEM's planning process needs to account for these attributes and potential impacts.

The preceding concerns were addressed in two BOEM studies, 1) "Atlantic Region Wind Energy Development: Recreation and Tourism Economic Baseline Development," and 2) "Atlantic Offshore Wind Energy Development: Public Attitudes, Values, and Implications for Recreation and Tourism." The first study took a county-level look at the industry and outlined its structure (e.g., businesses, recreational assets, and employment). The investigators produced small illustrations that provide easily accessible guides for scientists and others to understand the region's tourism and recreation sector. The second study is in progress and is using simulations (i.e., images of an OCS wind facility) to examine how public beach-goers may respond to OCS development, and provides insight as to what visitors value in the region's coastal settings.

Port Access and Infrastructure

The immense scale of offshore wind turbine components, towers, and foundation structures necessitates port facilities capable of handling large and extremely heavy loads. In order to assess current port attributes and impending modifications necessary to accommodate offshore wind energy development, BOEM funded "The Identification of Port Modifications and their Environmental and Socioeconomic Consequences" study. Some of the attributes include lifting capabilities, bearing capacity of the quayside (i.e., wharf or pier) and storage area, and the available transportation infrastructure. The report identified a number of practical insights, such as facility upgrades (e.g., cranes, bearing capacity); the importance of engaging stakeholders early in the planning process; and the need to recognize that each site will have unique qualities to be considered. BOEM will use the results of this study as baseline knowledge for future, in-depth, site-specific analyses that may be required to approve a lessee's construction and operations plan.

Workers at Gulf Island Fabrication built the steel jackets and decks for the first American offshore wind project.

Port characteristics critical to supporting offshore wind energy development include:

- vessel access (channel width and depth; turning capacity; overhead draft);
- lifting capabilities given the weight and height of components (crane types, height restrictions);
- bearing capacity of the quayside and storage area;
- number of berths and storage area;
- available transportation infrastructure (haul route width and capacity, component load out, and road/rail access); and
- location (e.g., distance from wind energy areas, construction areas, and staging/storage areas, skilled work force), including the impacts from port expansion and changes in port operations.

Coastal and Marine Space Use

While Coastal and Marine Spatial Planning, or CMSP, has risen to prominence in the science and policy community in the past 10 years, it's important to understand that BOEM and its predecessors have engaged in this process for decades. The uses of ocean and coastal space is especially significant when considering OCS wind energy development due to the fact that such facilities can use relatively large spaces that may encroach on commercial navigation and fishing, recreational fishing and boating activity, aquaculture, dive sites, sand and gravel resource sites, and submerged pipelines and cables.

The Bureau uses a variety of tools to understand ocean and coastal space-use, including public scoping and outreach; expert, industry, and interagency exchanges; and systematic socioeconomic research. In 2012, a BOEM-sponsored marine space-use conflict study was completed. The study used anthropological research and geospatial data collection and analysis to identify space-users, their activities, the types of conflicts that might arise with the OCS development, as well as potential conflict avoidance and mitigation measures.

Moving Forward

For the foreseeable future, and pursuant to the Bureau's mission, BOEM's socioeconomic research in the Atlantic OCS area will continue to identify baseline conditions and further our initial understandings of impacts and potential mitigations. The broad topics of study will most likely include familiar ones, such as marine space-use, fisheries, infrastructure, tourism, and recreation, as well as new issues identified as we move forward.

– By John Primo and Amy Stillings, BOEM; and Janet Purdy, Schatz Publishing

For More Information

Atlantic Region Wind Energy Development: Recreation and Tourism Economic Baseline Development

www.data.boem.gov/PI/PDFImages/ESPIS/5/5228.pdf

Atlantic Offshore Wind Energy Development: Public Attitudes, Values, and Implications for Recreation and Tourism (ongoing study profile)

http://www.boem.gov/AT-12-04/

The Identification of Port Modifications and their Environmental and Socioeconomic Consequences

http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5508.pdf

Identification of Outer Continental Shelf Renewable Energy Space-Use Conflicts and Analysis of Potential Mitigation Measures

http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5203.pdf

Fishing, Diving, and Ecotourism Stakeholder Uses and Habitat Information for North Carolina Wind Energy Call Areas

http://www.boem.gov/BOEM-final-report-on-Stakeholder-Info/

Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf

http://www.boem.gov/OCS-Study-BOEM-2014-654/

Quantitative Assessment of Spatially-Explicit Social Values (ongoing study profile)

http://www.boem.gov/Quantitative-Assessment-of-Spatially-Explicit-Social-Values/

Energy Market and Infrastructure Information for Evaluating Alternate Energy projects for the OCS Atlantic and Pacific Regions - Volume 1: Technical Report

http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5263.pdf

Alaska Region: Integrating Indigenous Knowledge

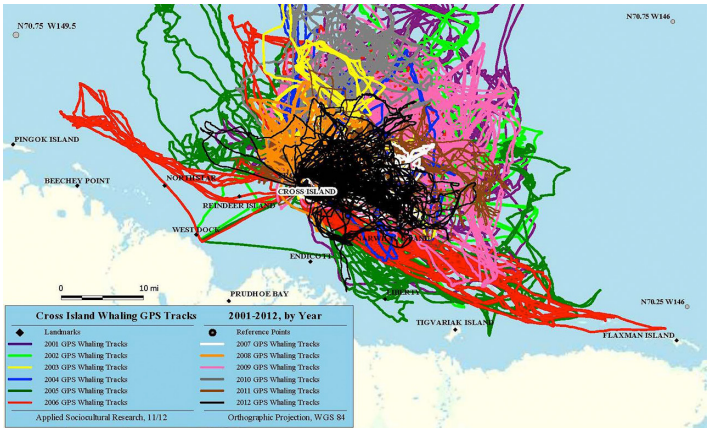
The Arctic is undergoing rapid transformation due to changes in climate with accompanying increase in shipping, tourism, and energy development activities. These changes can affect subsistence harvests on the land and at sea. Frontline observations made by residents of rural communities can readily identify abnormalities in local habitat, prey availability, species composition, and seasonal timing of migratory species. Since these communities rely upon subsistence resources, they are especially concerned about activities that may directly or indirectly affect hunting success or the habitats of the species important to their livelihood. Specifically, the Iñupiat report that their culture is vulnerable, and they are concerned about:

- social disruption and a change in cewultural values through population shifts;
- employment changes that might reduce opportunities for a subsistence way of life;
- spatial and/or temporal conflicts with subsistence harvests due to shipping or leasing activities;
- cumulative effects of multiple industrial activities, alteration of subsistence harvest patterns, and displacement of hunters and subsistence resources; and
- economic and social effects from declines in the oil and gas industry, which the North Slope Borough taxes.

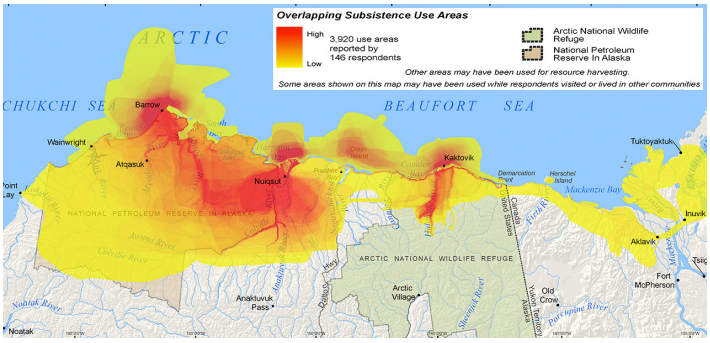
Sensitivity to these concerns warrants an ongoing effort to identify and monitor key indicators of socioeconomic and cultural changes. Over the last four decades, BOEM's Environmental Studies Program has funded more than $500 million in research in Alaska with much of it focused on social and subsistence activities. For example, the "Social Indicators in Coastal Alaska: Arctic Communities" study will provide fresh insights on current conditions and local trends in economic prosperity, education, health and safety, cultural continuity and well-being, status of indigenous rights and local control, and quality of the physical environment.

Collaboration

BOEM strives to incorporate local and traditional knowledge (TK) of Alaska Natives and Alaskan residents directly in the preparation of its study products and interpretation of results. Although their expertise is typically safeguarded, Alaska Native entities, including the Iñupiat of the Arctic, have repeatedly requested that TK be integrated into new scientific research and NEPA documentation. BOEM is entering into a cooperative agreement with the North Slope Borough Department of Wildlife Management in 2016 to implement TK panels. Methods will include creating a transparent process to identify holders of TK and to organize them to interface more directly with scientists on the design and conduct of research on topics that do not typically achieve TK involvement (such as surface current circulation and spawning habitat of marine fish).



Cross Island Whaling Tracks, 2001-2012. M. Galginaitis, 2013, Monitoring Cross Island Whaling Activities, Beaufort Sea, Alaska.



Map showing all Barrow, Kaktovik, and Nuiqsut subsistence use areas by intensity, 1995–2006. Braund & Associates, 2010.

In other studies, BOEM continues to seek and include firsthand knowledge of local subsistence hunters to enhance the scientific knowledge base. In an effort to capture and document community-based observations, BOEM is now partnering with the Alaska Native Tribal Health Consortium (ANTHC) Center for Climate and Health to enhance the Local Environmental Observer (LEO) Network. This network is a citizen-scientist program of community residents who volunteer observational information about environmental events, post observations on public Google maps, and coordinate with technical experts to identify appropriate actions. LEO maintains community-based monitoring observations on a wide range of topics including extreme weather, floods, erosion, ice changes, permafrost thaw, invasive species, infrastructure damage, environmental contamination, and changes in the health, range, and behavior of fish, insects, birds, and wildlife. Its purpose is to increase understanding about climate change and other drivers of environmental conditions to facilitate development of appropriate adaptation strategies.

BOEM and ANTHC are working to extend the LEO program throughout the North Slope and support innovative communication applications on a pan-Arctic basis. This effort has expanded BOEM's ability to reach non-traditional partners, and provides a demonstration project for entering into a cooperative agreement with Indigenous Tribes.

Mapping Subsistence Activities in the Marine Environment for Native Communities

The Alaska OCS Region was the first to outfit hunters with Global Positioning System (GPS) units so they could document their hunting tracks in the marine environment. These studies proved to be invaluable in assessing potential spatial and temporal conflicts of oil and gas exploration and development, and associated activities (vessel and air support) with subsistence practices in the marine environment.

The "Cross Island Whaling" study, initially funded as a 3-year component of a larger monitoring study, grew into a 13-year research project and now represents the most consistent, systematic longitudinal study documenting subsistence hunting patterns (Galginaitis, 2014). The bowhead whale is central to Alaska Native cultural and spiritual life and, therefore, the potential impacts from offshore oil and gas development are of great concern.

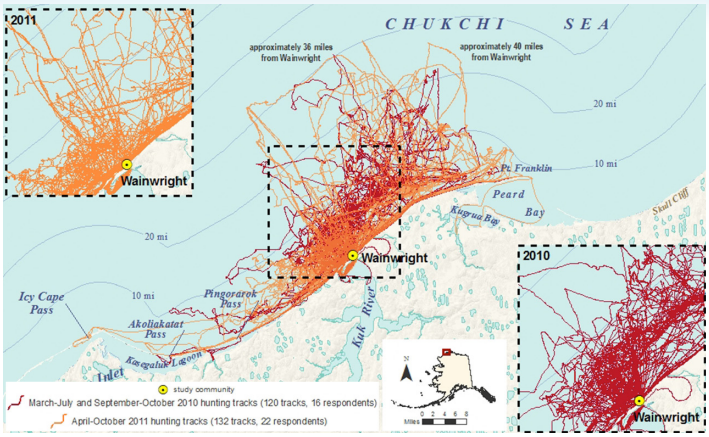
BOEM also initiated "Subsistence Mapping" field studies in Nuiqsut, Kaktovik, and Barrow to gather data relevant to subsistence uses. Maps have been integrated into a Geographic Information System (GIS) designed to document measurement of changes in subsistence patterns over time. The report describes a number of key variables by species and community, including travel routes, months of effort by key resource, active and historically active hunting or fishing camps and cabins, and preferred use areas (Braund & Associates, 2010). Active hunters also provided observational information and TK. This study has been an invaluable asset for assessing potential impacts in NEPA documents and the associated decision-making process to identify and avoid spatial and temporal conflicts with subsistence harvest.

From 2009 to 2013, BOEM initiated subsistence mapping in the Chukchi Sea to document marine subsistence hunting tracks for key marine mammals (bowhead and beluga whales, walrus, seals, and polar bears) by hunters from communities closest to recent OCS oil and gas leases (Braund & Associates, 2013). The "COMIDA" study provides baseline offshore subsistence data to allow NEPA analysis to assess whether OCS oil and gas activities would result in conflicts with, or changes in, offshore subsistence harvesting practices. This study produced a detailed analysis of subsistence practices in the marine environment, and will be invaluable as a benchmark for the future.

The Valuable Partnership

Working in partnership with Alaska Natives to evaluate historical patterns and emerging changes, BOEM will continue to:

- seek an increased understanding about environmental changes;
- identify and enhance indicators available at the community and regional scales to assess effects of proposed leasing activities;
- improve communication and collaboration with affected communities and the State of Alaska; and
- seek to facilitate the development of healthy and effective adaptation strategies.



Map displaying offshore hunting tracks near Wainwright, 2010–2011. Braund & Associates, 2013.

– By Chris Campbell and Dee Williams, BOEM; and Janet Purdy, Schatz Publishing

For More Information

Social Indicators in Coastal Alaska: Arctic Communities
http://www.boem.gov/AK-11-09/

Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter Experts
http://www.boem.gov/SS_1505/

Community-Based Monitoring: LEO Network
http://www.boem.gov/SS_1605/

Monitoring Cross Island Whaling Activities, Beaufort Sea, Alaska: 2008-2012 Final Report, Incorporating ANIMIDA and cANIMIDA (2001-2007). Michael Galginaitis, 2014. OCS Study BOEM 2013-218.
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Subsistence Mapping of Nuiqsut, Kaktovik, and Barrow. Stephen R. Braund & Associates, 2010. OCS Study MMS 2009-003.
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COMIDA: Impact Monitoring for Offshore Subsistence Hunting, Wainwright and Point Lay, Alaska. Stephen R. Braund & Associates, 2013. OCS Study BOEM 2013-211.
http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5431.pdf

Renewable Energy Development for the Pacific Region

Over the 40-year history of the Environmental Studies Program in the Pacific OCS Region, the Region has evolved from a frontier to a mature oil and gas producing area, and has recently become a frontier area for renewable energy production. The BOEM Pacific OCS Region's responsibility now embodies ongoing oil and gas operations, renewable energy development from both wave and wind energy, and potential mineral leasing. The social science program has also evolved to meet the changing needs of the Region, and is currently focused on baseline studies to inform renewable energy leasing decisions. The social science information needed encompasses a wide range of topics including ocean uses, cultural landscapes, and economic impacts.

Pacific Regional Ocean Uses Atlas (PROUA)

BOEM partnered on the PROUA project with the National Oceanic and Atmospheric Administration (NOAA), the Washington State Department of Ecology and Department of Natural Resources, and the State of Hawaii Office of Planning. The PROUA, completed in June 2015, is one of many steps in understanding ocean uses. The project team held 15 mapping workshops in Washington, Oregon, and Hawaii to capture information about ocean uses from community members who use the ocean for various purposes. The effort yielded valuable ocean uses maps, and critical contextual information about the history and drivers of ocean uses (NOAA, 2015). BOEM will use this baseline information to properly consider existing ocean uses when making decisions about renewable energy leasing and management. Specifically, BOEM will use the PROUA to identify ocean use communities that must be engaged further. Additional ocean uses information, along with site-specific community engagement, information gathering, thorough analyses, and public comment will be part of the decision-makingprocess for any proposed renewable energy project.

BOEM collects ocean use information from community members at one of several workshops organized for the PROUA project. Photo by Sara Guiltinan, BOEM.

Characterizing Tribal Cultural Landscapes

The potential for impacts to important coastal and submerged Native American sites will increase as interest in OCS renewable energy development progresses. Understanding the types and locations of significant archaeological and cultural resources is essential to their preservation.

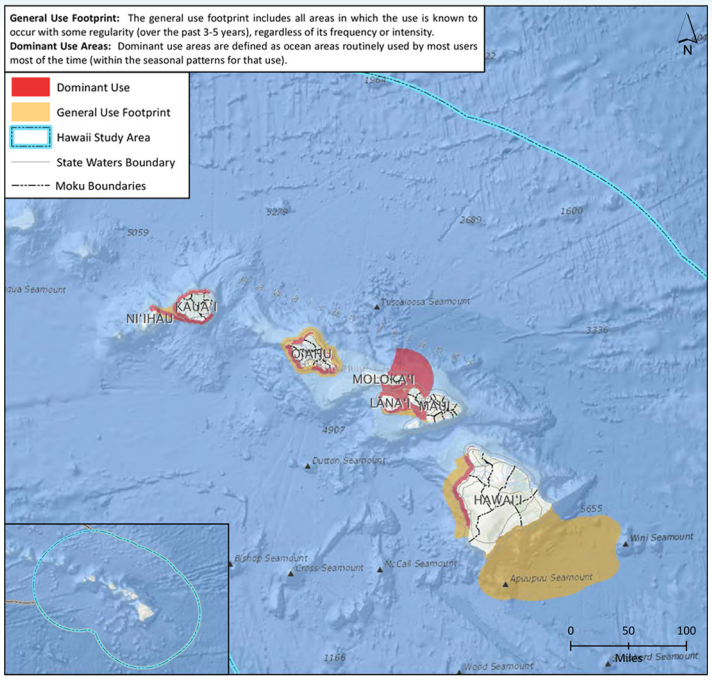
Tribes and indigenous groups have an intimate and historical knowledge of "place." They hold a breadth and depth of understanding of the landscape and this knowledge reflects generations of engagement and interaction with the landscape.

Archaeological sites, burial grounds, and traditional use areas are filled with special meaning to past and present indigenous communities. Connection to a "place" is a nearly universal concept held by indigenous groups throughout the U.S., and is embodied in the tribal cultural landscape (TCL) definition developed during this project: *"Any place in which a relationship, past or present, exists between a spatial area, resource, and an associated group of indigenous people whose cultural practices, beliefs, or identity connects them to that place. A tribal cultural landscape is determined by and known to a culturally related group of indigenous people with relationships to that place."*

Utilizing a cultural landscape approach that integrates traditional knowledge from the indigenous groups with environmental science, historical information, and archaeological knowledge, the *"Characterizing Tribal Cultural Landscapes"* guide outlines a method for tribes with a connection to the coast to document places and resources significant to their communities. This approach and the data it yields are intended to reduce potential conflicts while filling critical data gaps in ocean planning and resource management

Maritime Cultural Resources Site Assessment in the Main Hawaiian Islands

The State of Hawaii has mandated a goal of achieving 100% clean energy by 2045. To meet this goal, development of offshore renewable energy resources may become part of Hawaii's energy portfolio. In preparing for the energy industry growth, NOAA and BOEM have teamed up to support an assessment of historic properties and cultural resources in the main Hawaiian Islands. Little information is currently available regarding potential submerged cultural resources off the main Hawaiian Islands. Hawaii also contains numerous historic and traditional cultural properties that could potentially be impacted visually by offshore facilities. In addition, Native Hawaiian Organizations have ceremonial or religious ties to



Excerpt of an ocean uses atlas map from the PROUA project depicting dominant use and general use areas for wildlife viewing tours offshore Hawaii.

certain areas that could be impacted by offshore renewable energy development. Sensitivity to Hawaii's unique history and a special sense of place is required for understanding cultural resource management in the islands.

Economic Impact Studies

At BOEM's request, the National Renewable Energy Laboratory (NREL) conducted an economic impacts and jobs potential analysis of wave energy technology in Oregon and floating offshore wind projects in Oregon, California, and Hawaii (NREL, 2014, 2016a, 2016b). Some of the realized benefits under the following hypothetical scenarios could be:

- 13 gigawatts of wave energy in Oregon over a 20-year period: >46,000 full-time equivalent construction jobs; 6,800 ongoing operations jobs; $8 billion of gross economic activity during the construction phase, $1 billion by 2045 during the operations phase, and $1 billion annually after 2045;
- 10 gigawatts of offshore wind energy in California over a 30-year period: nearly 3,000 long-term operations jobs could be supported, up to$16.2 billion in cumulative economic valued added for the construction phase, and $3.5 billion added for the operations phase;
- 400 megawatts of offshore wind energy in Hawaii over a 30-year period: construction-phase workers average annual earnings of >$90,000; and operations-phase workers average earnings of $75,000.

Community Perspectives, Recreation, and Tourism Baseline for Offshore Wind Development

A commercial lease request received by BOEM for a floating wind farm offshore Morro Bay, California has presented another need to gather socioeconomic data. The focus of a planned new study is on community perspectives, recreation, and tourism. Some of the areas of interest are beaches, parks, and public areas adjacent to the proposed lease area and project staging locations, popular waterfront areas, sport fishing operations, and other charter boat operations (such as wildlife viewing charters).

Questions to be answered by this new study are: 1) What are the preferences (such as amenities and characteristics of certain coastal areas) that visitors consider to be of value when making their recreation/tourism choices; 2) What are local community (residents, recreators, and tourists) perspectives about offshore wind development before the project is installed; and 3) What is the nature and frequency of recreation, tourism, and visitation rates in the proposed project area before the project is installed?

Looking Forward

BOEM's Pacific OCS Region has a challenging and multi-faceted mission, and must assess impacts from two vastly different types of OCS energy development (conventional and renewable) and three different technologies (oil and gas production, wave energy, and wind energy). In addition, social science research efforts may be developed for the eventual decommissioning of existing OCS oil and gas platforms off southern California and for marine mineral resources.

– By Janet Purdy, Schatz Publishing

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National Oceanic and Atmospheric Administration (NOAA). 2015. The Pacific Regional Ocean Uses Atlas.
http://www.boem.gov/2015-014/

Characterizing Tribal Cultural Landscapes Guide.
http://www.boem.gov/2015-047/

Maritime Cultural Resources Site Assessment in the Main Hawaiian Islands (ongoing study profile).
http://www.boem.gov/pc-13-01/

National Renewable Energy Laboratory (NREL). 2014. Economic Impact from Large-Scale Deployment of Offshore Marine and Hydrokinetic Technology in Oregon.
http://www.boem.gov/2014-664/

NREL. 2016a. Floating Offshore Wind in Hawaii.
http://www.nrel.gov/docs/fy16osti/65481.pdf

NREL. 2016b. Floating Offshore Wind in California.
http://www.nrel.gov/docs/fy16osti/65352.pdf

Community Perspectives, Recreation, and Tourism Baseline for Offshore Wind Development (ongoing study profile).
http://www.boem.gov/pc-16-02/

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New Waves

Late-Breaking News & Information

New 2016 Assessment of Undiscovered Oil and Gas Resources on the OCS

The BOEM Resource Evaluation Division (RED) and the Regional Offices of Resource Evaluation (RE) are pleased to announce the release of the *2016 National Assessment of Undiscovered Oil and Gas Resources on the Outer Continental Shelf*. This latest assessment is the 10th in a series of major OCS Resource Assessments spanning over 40 years.

GOM Assessment Team members Elizabeth Klocek and Tommy Riches.

The National Assessment is typically released every five years in support of the development of the Five-Year Oil and Gas Leasing Program. The 2016 National Assessment reflects the culmination of hard work and dedication of BOEM geologists, geophysicists, engineers, economists, and scientists throughout the resource evaluation community. Regional geologic knowledge and OCS development scenario information are applied to assess undiscovered (yet-to-be-found) resources through the analysis of a series of Geologic Plays. Each geologic play comprises oil and gas opportunities that share a common history of hydrocarbon generation, migration, reservoir development, and entrapment. The resource contributions from each individual geologic play are derived stochastically and aggregated to OCS Planning Areas, BOEM Regions, and the Nation. Results are reported as a range-of-values that reflects the uncertainty associated with undiscovered oil and gas volumes. The mean Assessment results total 89 billion barrels of oil and 327 trillion cubic feet of gas that are believed to be technically recoverable on the OCS.

Prior to the release of the 2016 National Assessment, RED convened an internal review of the Regional assessments. This review included nearly 50 geoscientists and engineers from the regional offices, who presented case studies from each region's assessment and provided input on the National Assessment publication. The National Assessment is the flagship scientific report produced by BOEM RED and RE offices that helps inform important decisions for our energy future.

For More Information

The 2016 National Assessment results are available at:
http://www.boem.gov/National-Assesment-2016/