

BOEM OCEAN SCIENCE

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

VOLUME 9 ISSUE 2 • APRIL/MAY/JUNE 2012

Special Issue on **Traditional Knowledge**

Science in Transformation

**Traditional Knowledge
and Sociocultural Studies**

**Integrating Traditional
Knowledge into Biological
Resource Studies**

**Cultural Landscapes:
Traditional Knowledge
Across the Pacific Rim**

**Fenton Rexford (Interview),
Tribal Administrator of the
Native Village of Kaktovik**

**Where Do We
Go From Here?**



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

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ON THE COVER

Barrow, Alaska, Native whaling crew searches for bowhead whales from their traditional *umiq* boat. Photo by Luciana Whitaker/AccentAlaska.com.

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

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FREQUENTLY USED ABBREVIATIONS

BOEM	Bureau of Ocean Energy Management
DOI	Department of the Interior
EIS	Environmental Impact Statement
ESP	Environmental Studies Program
OCS	Outer Continental Shelf
NEPA	National Environmental Policy Act
TK	Local and Traditional Ecological Knowledge

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THE DIRECTOR'S MESSAGE

Growing up in Alaska brought me close to nature every day—and ingrained in me an appreciation that the extremes of the North can be unforgiving to the unprepared and unaware. Alaska Natives possess a deep understanding of the land and sea that has made it possible for them to survive for thousands of years in one of the most challenging environments on Earth. Traditional knowledge, or TK, as this fascinating reservoir of information is known, is the focus of this issue of *BOEM Ocean Science*.

Over the past 20 years, traditional knowledge has become increasingly integrated with social, biological, and physical scientific disciplines. Listening to indigenous perspectives and taking local knowledge into account are vital to achieving informed decision-making in ocean resource management. Although traditional and scientific knowledge may arise from different cultural traditions, they are compatible and allow for a powerful synergy when integrated appropriately.

BOEM is working to be on the cutting edge of developing that synergy, and this special issue will provide specific examples of how BOEM gathers and uses traditional knowledge information from pioneering research conducted through its Environmental Studies Program. The issue will also aim to enhance ongoing dialogue with Alaska Native groups by sharing focused commentary about some of the areas for improvement in the application of traditional knowledge. Understanding and respecting Native cultures and using traditional knowledge is vital to fulfilling our stewardship role. For this reason, BOEM has strived to institutionalize the use of traditional knowledge in our ongoing ocean research and the NEPA process. Please enjoy this issue of *BOEM Ocean Science*.

Tommy P. Beaudreau, Director



FOR MORE INFORMATION

BOEM Environmental Studies Program

www.boem.gov/Studies/

BOEM Environmental Studies Program Information System (ESPIS), searchable database of completed study reports

www.data.boem.gov/homepg/data_center/other/espis/espismaster.asp?appid=1

Barrow, Alaska, Native whaling crew watches for bowhead whales from the edge of the sea ice.
Photo by Luciana Whitaker/AccentAlaska.com.

Science in Transformation



Alaska. Photo courtesy of NOAA.

In the early years of the 21st century, a powerful idea about data collection and scientific authority is slowly gaining momentum. Environmental scientists and their institutions are waking to the realization that *how we conduct science* (as a social process) often constrains *what we can discover*. In other words, science is increasingly motivated to harness the power of social networks. Contrary to previous thinking, environmental knowledge production can be dramatically accelerated by increasing opportunities for public participation and by decreasing entrenched exclusionary practices. The new opportunities afforded by an emergent “citizen science” are both exciting and progressive, so long as appropriate standards of data collection, verification, and quality control remain intact.

One important precursor and source of “citizen science” is the gradual but deliberate incorporation of local and traditional ecological knowledge, or “TK,” within government-funded science programs over the past few decades. In particular, the Arctic region of Alaska has become a focal point for progressive dialogue, experimentation, and incorporation of TK into the processes of environmental science and impact assessment activities, especially with regard to marine and coastal resources. In recognition of recent substantive progress, BOEM has dedicated this issue of *Ocean Science* to reflect and report on some of the ways in which BOEM, especially in the Alaska OCS Region, actively collects TK input and integrates it within NEPA documents and decision making.

WHAT IS “TK”?

By TK, BOEM refers to a body of evolving practical knowledge based on observations and personal experience of local residents over an extensive, multi-generational time period. TK typically finds expression in a specific environmental context, as technical mastery or expertise that promotes survival and well-being in that location and is shared primarily through kinship or household networks.

By definition, TK is local rather than global in scope; it favors a dynamic rather than rigid approach to understanding; it is based on experience rather than innate qualities; and it is unevenly accumulated among residents. Some residents are more knowledgeable than others on specific topics of interest, and such expertise usually enjoys wide recognition within

each community. Equally evident, TK involves much more than a mere collection of factual observation—it also yields an understanding of the landscape and one’s place in it that inspires others and anchors community values. Fundamentally more profound than other popular expressions of “citizen science,” TK retains a distinctive quality by emphasizing a fundamental sense of unity between humans and nature. For this reason, meaningful discussion of TK and its applicability to government decision making must distinguish clearly among three types of knowledge: facts (based on observation), inferences (based on hypotheses), and values (based on longstanding norms and preferences).

WHY FOCUS ON ALASKA?



Alaska is home to 229 federally recognized tribes. More than 120,000 Eskimo, Indian, and Unangax (Aleut) people call the Great Land home. Alaska’s Native peoples make up nearly 20 percent of the state’s total population.

Alaska has been fertile ground for active contributions from TK for many apparent reasons, starting with the persistent demand from Alaska Natives to be heard and engaged in resource management decisions that affect them. For example, since at least the 1940s, Iñupiat residents of the North Slope

Borough have actively assisted government scientists and projects at the Naval Arctic Research Laboratory, providing knowledge about survival techniques, natural history, and ice dynamics. By 1994, Iñupiat hunters successfully pressed for amendments to the Marine Mammal Protection Act that authorized them to enter into co-management arrangements with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. Concurrently, anthropologists and other professional scholars collected evidence to promote the idea that indigenous peoples of the North possess unique systems of knowledge that can improve the success of development projects. While BOEM acknowledges that TK is present and used by Native peoples all over the world, this issue will focus primarily on Alaska, with its extensive ocean coastline.

SELECT GOVERNMENT ACTIONS IN THE RECOGNITION OF TK

Some key highlights in the historical progression of government recognition of TK in Alaska are noteworthy. In 1980, the Alaska National Interest Lands Conservation Act established specific public processes that enable knowledgeable local residents to play a meaningful role in decisions about fish and wildlife conservation for terrestrial resources, though the Supreme Court later ruled this Act does not apply to Federal waters. In 1993, the Secretary of the DOI issued Order 3175, which required consultation with tribal governments whenever departmental actions pose potential impacts on tribal resources. In 1994, President Clinton issued Executive Order (EO) 12898 on Environmental Justice, which encouraged the collection of community knowledge as a means to avoid disproportionate environmental impacts on minority and poor communities. In 2000, President Clinton signed EO 13175 on Tribal Consultation, which formalized new Government-to-Government negotiations with Native tribes and implied an ongoing obligation to collect community knowledge from



President Obama established the National Ocean Council to protect the health of oceans.

Concurrent Resolution 331



Painting of Benjamin Franklin by Joseph Siffred Duplessis

Following the sentiment of Benjamin Franklin, in 1988 both Houses of Congress passed Concurrent Resolution 331, which formally acknowledged the contributions of indigenous peoples (Iroquois Confederacy) to the conceptual framework of the United States Constitution. The Resolution also acknowledged the ongoing obligation of the United States Government to federally recognized tribes for “their preservation, protection, and enhancement...”

them. In 2001, a DOI-Alaska Policy supplemented EO 13175 to assure consistency among DOI agencies.

In 2000, Congress enacted the Data Quality Act, which required the Office of Management and Budget to issue policy and procedural guidance to federal agencies for ensuring and maximizing the “quality, objectivity, utility, and integrity” of information disseminated to the public. It also required agencies to issue their own information quality guidelines, which were completed in 2002. Apparently, the relevance of the Act to government collection of TK has never been legally clarified or challenged.

In 2010, President Obama signed Executive Order 13547 to establish a national policy that protects the health of oceans, coastlines, and Great Lakes under the guidance of a National Ocean Council. The implementation plan specifically identifies a need to improve Arctic environmental response management and calls for “scientific research as well as TK related to impacts of resource development and pollution.”

This brief history demonstrates that government agencies have experienced growing political pressure to use TK in their work, but those expectations increase without clear guidance about how to make it happen.

FOR MORE INFORMATION

What is Traditional Knowledge?

www.nativescience.org/html/traditional_knowledge.html

Examples of Citizen Science

www.scientificamerican.com/citizen-science/

Traditional Knowledge and Sociocultural Studies

BOEM actively expands the collection and use of TK, primarily through its Environmental Studies Program (ESP). The ESP designs, funds, and manages research efforts that are conducted by external Principal Investigators. Research strategies have evolved over the years, and different projects have included a wide variety of data collection efforts, including: life history interviews, ethnographic fieldwork, workshops, focus groups, household surveys, community expert review panels, TK database construction, and collaborative wildlife tagging studies.

These types of projects involve some consistent procedural methods, including an evolving commitment to the following steps: listen and show respect for community input; establish trusting relationships with local leaders and institutions; identify local experts on topics of interest through systematic and documented procedures; involve local experts in research design; adopt local terms into fieldwork as appropriate; provide funding to pay local residents for participation in projects; allow opportunities for community review of draft reports; and give something substantial back to host communities (such as presentation of findings, summary reports written in lay terms, display posters or video products, etc.). Some key projects are discussed in greater detail.

POINT LAY BIOGRAPHIES

Located about 300 miles southwest of Barrow, Point Lay is a small Iñupiat community situated on the shores of Kasegaluk Lagoon, off the Chukchi Sea. The people practice a subsistence lifestyle, and focus their offshore hunt on beluga, rather than bowhead whales. The study, completed by Impact Assessment Inc. in 1989, contains a wealth of information about four individual elders, their families, traditional Iñupiat values, and the history of the region. The study was so popular among local residents that the North Slope Borough School District adopted it into the Point Lay educational curriculum. Their objectives were to involve the students in: (1) elaborating on the elder profiles, supplementing them with photographs and family documents; (2) tasking students with extending sections of narrative; (3) engaging teachers to write study guides; and (4) empowering the students and the community with published materials and personal credits. The end result was a wonderful collaboration among scientists, government staff, and community residents to incorporate



Barrow artisan creates 'tattooed' faceworks. Using all parts of a harvested whale is an important tradition to Iñupiat Eskimos. Photo by John Callahan, BOEM.

TK from known elders directly into public school education materials.

SYNTHESIS: THREE DECADES OF RESEARCH ON SOCIOECONOMIC EFFECTS RELATED TO OFFSHORE PETROLEUM DEVELOPMENT IN COASTAL ALASKA

A key theme in the 2009 *Synthesis Report*, edited by Stephen Braund and Jack Kruse, is the longstanding and significant contribution that the ESP has made to the broader understanding of indigenous coastal tribes. Since 1978, the ESP has consistently invested more than any other institution in contracting socioeconomic and sociocultural studies to advance understanding about TK and the complex social systems of Alaska

Natives in coastal communities. The studies resulted in more than 200 separate technical reports, which are available on the agency website.

Before the ESP, only a handful of ethnographies about the Iñupiat Eskimo culture existed. The prevailing mainstream assumption was that modernization would force indigenous cultures to assimilate into the dominant capitalist society through pressures of education, religious conversion, and economic enterprise. However, ESP studies described the persistence of core cultural values among Alaska Natives, particularly subsistence hunting, which grounds the people in a landscape, seascape, and icescape that has been theirs for millennia. Authors noted that the Iñupiat tend to negotiate a path that allows them to selectively adopt changes while consciously retaining traditions. For example, they shifted from dog sleds to snow machines for winter transportation, but retained the tradition of subsistence hunting and sharing networks. ESP studies also documented that traditional core values persist across generations, especially Iñupiat whaling culture.

In sum, Alaska Native social systems have proven adaptive and enduring, while individuals actively make their own decisions, essentially choosing optimal features from both traditional and modern lifestyles.

FOR MORE INFORMATION

Point Lay Biographies: Social and Economic Studies

www.data.boem.gov/PI/PDFImages/ESPIS/1/1672.pdf

Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska

www.data.boem.gov/PI/PDFImages/ESPIS/4/4862.pdf

Subsistence Use Mapping Reveals Valuable Traditional Knowledge

The BOEM Environmental Studies Program has designed and funded several highly regarded long-term studies that collect community TK and map subsistence harvest hunting areas. The data collected helps BOEM gain a better understanding of traditional as well as contemporary subsistence hunting, as the observations of hunters enable a more thorough look at the effects of offshore oil and gas activities.

ANNUAL ASSESSMENT OF SUBSISTENCE BOWHEAD WHALING NEAR CROSS ISLAND

Iñupiat whalers from Nuiqsut hunt for bowhead whale in the fall from Cross Island, a low sand barrier island in the Beaufort Sea that is constantly changing due to deposition and erosion. Located 11 miles (18 kilometers) offshore, it is about 100 miles (161 kilometers) northeast of Nuiqsut.

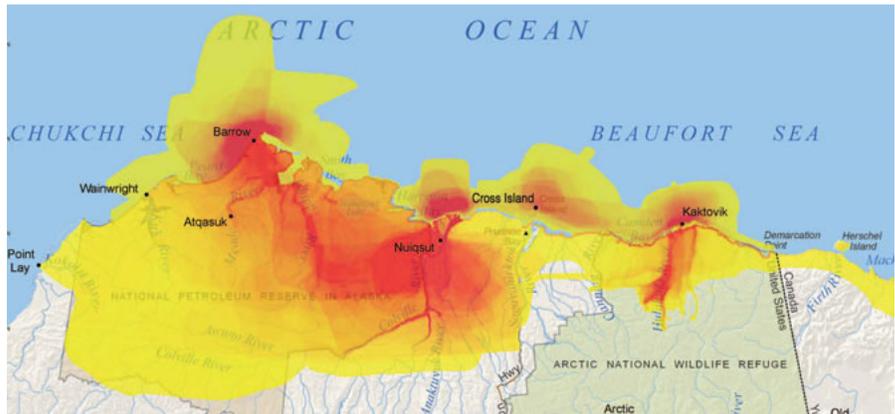
Whaling at Cross Island is based on strong cultural continuity and occurs in the fall when the whales, on their return migration to the Siberian coast, travel closer inshore than in the spring. Whalers observed this pattern and developed techniques for successfully hunting in the autumn. In the fall, Arctic waters are too rough for the *umiak* (traditional boats made of seal skin), so the whalers use small boats with outboard motors. The open sea in fall is generally more noisy than in the spring lead system (openings in the ice), so silence is less crucial, and there is a greater need for speed to pursue whales in the open sea and tow them quickly to the shores of Cross Island to prevent spoilage.

The ongoing ESP study, conducted by Applied Sociocultural Research with fieldwork every year since 2001, outfits whalers with GPS (Global Positioning System) units to map their hunting tracks. These tracks are geospatially mapped and color-coded by year. The study integrates local TK and GPS track lines to document and facilitate protection of whaling interests. The study has been so successful that a companion effort was launched in the Chukchi Sea in 2009.

SUBSISTENCE MAPPING OF NUIQSUT, KAKTOVIK, AND BARROW

This study, contracted to Stephen R. Braund & Associates, gathered and consolidated geospatial and ethnographic data (including TK) that could be used to describe contemporary subsistence use patterns from Beaufort Sea communities over the last decade. The study produced graphical displays that not only illustrated geospatial extent of subsistence harvest by species on a community level, but also the *duration* and *intensity* of use.

The study records direct quotations made by key harvesters who participated in the geospatial mapping exercises. Close



Map of Beaufort Sea coast. Red denotes intensity of subsistence use areas for Barrow, Nuiqsut, and Kaktovik. Map by Stephen R. Braund & Associates.

reading has revealed hundreds of elements of TK, including observed changes by hunters intimately familiar with their environment who noted nuanced and subtle factors relating to these topics. For example, hunters from Barrow made the following comments:

On Caribou: *The most exciting [hunting site] is before they start going back south, near the mouth of the Meade River. We go in through there, right at this point. That's one major crossing point....The caribou are eating the greens, and they taste like them.*

On Bowhead Whales: *When I first started whaling, [the lead] was way out there. It's gotten closer and closer in the last few years. [We] usually [hunt] right there on the lead, because we are in skin boats....The captain that I go whaling with likes to go north; he likes to find something that has a bay like this.... The first pod of whales was kind of early, last year was the latter part of April, they are a week to two weeks earlier because of global warming. At least a couple of years now, the conditions are getting real dangerous; we have to find a place where the ice is thick enough to pull a whale onto it.*

The study includes detailed hunter observations about changes in the timing of migrations or ice conditions for all species. The subsistence hunters described what they learned from their elders, what they have observed and integrated through their lifetimes, and rapid changes in the past decade associated with climate change.

FOR MORE INFORMATION

Annual Assessment of Subsistence Bowhead Whaling Near Cross Island
http://alaska.boemre.gov/reports/2009rpts/2009_038.pdf

Subsistence Mapping of Nuiqsut, Kaktovik, and Barrow
http://alaska.boemre.gov/reports/2009rpts/2009_003/2009_003a.pdf

Integrating Traditional Knowledge into Biological Resource Studies

The Environmental Studies Program (ESP) has made notable progress in collecting TK and promoting a dialog with Western scientists on complex biological topics. Studies that involve local experts in scientific research and TK provide BOEM with invaluable insights gained from generations of personal expertise and practical knowledge.

VARIATION IN THE ABUNDANCE OF ARCTIC CISCO IN THE COLVILLE RIVER

Fall fishing for Arctic cisco under the ice of the Colville River is considered an important aspect of local culture and a vital subsistence harvest for the village of Nuiqsut. The subsistence fishery is especially important because it provides a seasonal buffer for potential shortfalls in the winter supply of caribou and whales. Alaska Natives are concerned that Arctic cisco in the Colville River have been less abundant during the last few years than in the years preceding offshore oil and gas development.

Nuiqsut villagers worry that actions such as trenching for pipeline to Northstar and building ice roads and bridges have affected the abundance of Arctic cisco in local streams. They are also concerned that drilling muds, spilled underground during the construction of the Alpine pipeline (onshore State land), could be entering the river. Other factors that could affect Arctic cisco populations include variables affecting recruitment at the Mackenzie River, changes in the channels of the Colville River, climate change, and possibly, the cumulative effects of onshore and offshore oil-related development. A study was needed to establish the observed trends in Arctic cisco abundance and to assess which factors most influence population variation.

In order to optimize TK input from local residents, BOEM held a workshop in 2003 in the village of Nuiqsut. The workshop involved a 3-day meeting of individuals with traditional and scientific knowledge about Arctic cisco abundance and fishing success, stock exploitation, long-term climate related changes, and Arctic cisco genetics. The goal was to ensure local experts an equal voice with non-local scientists in identifying and prioritizing issues and concerns. Local elders were arranged in a talking circle to discuss Arctic cisco locations and variability, possible causes of the variability, and suggestions of studies to test the possible causes. The elder panel presentation was followed by scientists reviewing existing scientific research and agency information needs. Elders and local residents were then provided time for their response to presentations. Participants identified factors that might contribute to observed variation in Arctic cisco abundance and were asked to recommend a study design for further scientific inquiry.

Based on the results of the 2003 workshop, a field study (jointly conducted by ABR Environmental Research and Services, Stephen R. Braund & Associates, and Kuukpik Subsistence Oversight Panel) was initiated to review correlations



Resident fishing for Arctic cisco, November 2005.

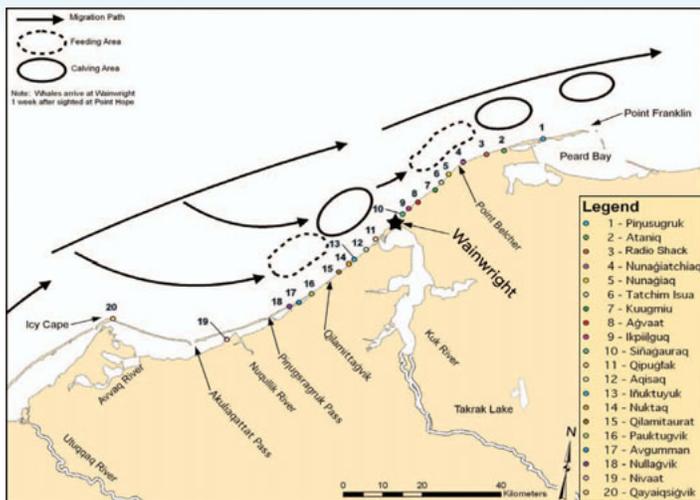
within existing data and to answer as many questions as possible. The study included a panel of local experts to review and partner with the scientists, concluding that summer winds account for 80 percent variation in first-year arrival of cisco. This consultation and validation occurred throughout the full period of the study rather than only at the final report stage. The ESP demonstrated respect for local expertise through compensation to local experts and outreach for participation. Final workshop proceedings were provided to each local participant and all technical reports were reviewed by panel members and community residents.

TRADITIONAL KNOWLEDGE REGARDING BOWHEAD WHALES IN THE CHUKCHI SEA

Bowhead whales are an endangered species that migrate in the spring from Russian waters eastward to Canadian waters, and return in the fall to the Russian coast. They are hunted for subsistence by the Iñupiat under conventions established by the International Whaling Commission. This traditional whale hunt occurs every spring as it has for at least a millennium. The *muktuk* (whale blubber) and meat contribute to Iñupiat nutrition. The Iñupiat state that the bowhead whale hunt is emblematic of the culture: it is an intergenerational activity that involves working cooperatively, celebrating success, sharing, and showing mutual respect. Hunting TK is passed from one generation to another orally and through example.

I was a boy on my dad's whaling crew. I was in the stern training to oar and be quiet, and the oar hit the side of the boat. It made a little sound — a little 'ping!' — my father reached over and [cuffed] me on the side of the head. He said, "We are in a very sensitive environment, we have to be silent so the whales can't hear us, naqaiabuk [be quiet, take care]," and that was the way my father was passing on TK. ...I never forgot that lesson, and my oar never touched the side of the boat again. (Gordon Brower, Barrow, March, 2011)

Since 2006, the ESP has invested more than \$40 million in new oceanographic and biological research in the Arctic



Movements and behavior of bowhead whales in spring as recorded by Wainwright whalers relative to local landmarks and other coastal features. Whales have been observed calving, mating, and feeding in the nearshore lead. Map by Lori Quakenbush.

to improve understanding of bowhead whale behavior and their migratory life cycle. At the request of hunters, some of these research efforts included Alaska Natives in tagging and tracking whales with satellite transmitters (see page 10, Bowhead Whale Tracking Project).

In addition to hunter participation in the marine research activities, the ESP also provided co-funding for a dedicated workshop that invited local experts on whale behavior to document input from TK sources about whale movements and behavior near the village of Wainwright. The researchers, Lori Quakenbush and Henry Huntington, talked with seven whaling captains about their knowledge of ice conditions, timing of the bowhead whale migration, feeding and mating behavior, conditions necessary for whaling, and their concerns about offshore oil and gas activities. The conversation was informal and free flowing, while participants controlled the order of discussion and made connections between various topics that the researchers had not considered. This process provided observational insights on multiple key topics, including: patterns of spring migration structure segregated by whale size; patterns of feeding along the margin of the ice; changes in the timing of migration; changes in ice conditions; and changes in traditional Iñupiat conservation practices.

SUBSISTENCE USE AND KNOWLEDGE OF BEAUFORT SALMON POPULATIONS

In Alaska, salmon are a significant subsistence resource for indigenous people. The five salmon species are sea-run fish that return to their natal fresh water streams to spawn. Some drainages support all five species, and others may only support a single species. Over the past decade, local residents of the North Slope Borough have noted the increasing presence of salmon along the coastline, likely in association with climate change factors. To document and understand the changes underway, in 2009 BOEM co-funded a study proposal from the University of Alaska through the Coastal Marine Institute. The researchers, Courtney Carothers and Shelley

Long, conducted 2 years of field work in the communities of Barrow and Nuiqsut to gather TK of historic and recent trends in salmon abundance, and to obtain spatial and ethnographic data to identify streams and coastal areas where salmon have been observed.

The growing subsistence salmon harvest near Barrow is noteworthy. The Elson Lagoon salmon fishery first began in the 1980s. In 2008 more than 20 fishermen harvested a total of 20,000 pink salmon. The study found that, in contrast to their familiarity with white fish species, salmon species identification is problematic for all local fishermen.

The Iñupiat mention no traditional processing of salmon. Knowledge about salmon and processing techniques increases gradually year by year. Although the Iñupiat traditionally dried other fish species, only recently have they begun to smoke and dry salmon. One popular dish is “poke,” a Hawaiian recipe that marinates raw salmon in soy sauce and ginger. Some residents described salmon as “wolves of the sea,” implying that they have voracious appetites and could have ecological impacts for the Arctic Ocean ecosystem.

Through such research BOEM gathers and uses TK information to enhance dialogue with Alaska Native groups. In this way, BOEM can gain a better understanding of the Arctic from those who have called it home for generations.



Interviewing expert Iñupiat fishers. Photo by Courtney Carothers.

FOR MORE INFORMATION

Proceedings of a Workshop on the Variability of Arctic Cisco (Qaaktaq) in the Colville River

www.data.boem.gov/PI/PDFImages/ESPIS/3/3344.pdf

Variation in the Abundance of Arctic Cisco in the Colville River: Analysis of Existing Data and Local Knowledge. Volume I: Final Report

www.data.boem.gov/PI/PDFImages/ESPIS/4/4279.pdf

Traditional Knowledge Regarding Bowhead Whales in the Chukchi Sea near Wainwright, Alaska

www.data.boem.gov/PI/PDFImages/ESPIS/4/5085.pdf

Subsistence Use and Knowledge of Beaufort Salmon Populations: Ongoing BOEM Study (AK 08-12-04)

www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/Alaska_Region/Alaska_Studies/SS_081204.pdf

Department of the Interior “Partners in Conservation” Awards

Recently, two partnership research projects managed by the BOEM Alaska OCS Region received the Partners in Conservation Award from the Secretary of the Interior. Such awards recognize exceptional project partnerships that contribute to the DOI goals of protecting and conserving cultural resources, advancing relationships with Native communities, and exemplifying best practices for collaboration. These awards reaffirm the commitment of DOI and BOEM to Alaska Native subsistence activities, and honor their TK for the valuable role they hold in our culturally diverse nation.

BOWHEAD WHALE TRACKING PROJECT

The Bowhead Whale Tracking Project is a unique collaboration among governmental and Native organizations to document the movements and habitat utilization of endangered bowhead whales, combining state-of-the-art satellite technology with TK and hunting methods. With funding from BOEM, the study involves partnerships among the Alaska Department of Fish and Game (ADFG), the Alaska Eskimo Whaling Commission, the North Slope Borough, the Canadian Department of Fisheries and Oceans, Greenland Institute of Natural Resources, and Tuktoyaktuk and Aklavik Hunters and Trappers Committees in Canada.

Although tagging bowhead whales in the Arctic has been attempted in the past, previous efforts have yielded only modest results. The success of the current project is largely due to the skills of Native hunters who approach and tag whales. From 2006 through 2011, 57 whales have been efficiently instrumented in U.S. and Canadian waters, nearly all by Native hunters. The satellite tags, modified for bowheads, have exhibited remarkable longevity. Some whales have been tracked for nearly a year during their annual migration through coastal waters, between wintering areas near the Gulf of Anadyr in Russia and summering areas in the eastern Beaufort Sea in Canada. Maps that summarize incoming data have been shared weekly with the scientific community and the public through email and a popular website. This information complements the hunter’s knowledge about bowhead movements, which was documented in an associated study.

STUDY OF SHARING NETWORKS TO ASSESS VULNERABILITIES OF LOCAL COMMUNITIES TO OIL AND GAS DEVELOPMENT IMPACTS IN ARCTIC ALASKA

The Subsistence Sharing Network Project involves an unprecedented collaborative social science effort on the North Slope of Alaska. It advances scientific, institutional, and methodological progress in monitoring the sensitivity of Native subsistence activities to potential disruption by changing Arctic conditions. Partner institutions include BOEM,



Award recipients with Secretary of the Interior, Ken Salazar. From left to right: Jennifer Ewald, BOEM; Gary Kofinas, University of Alaska; Lizzie Bodfish, Wainwright, Alaska; Ken Salazar; Shauna Burn Silver, Arizona State University; Dee Williams, BOEM; and Walter Cruickshank, BOEM. Missing from photo: Jim Magdanz, ADFG; and Chris Campbell, BOEM.

the University of Alaska Fairbanks, the Alaska Department of Fish and Game, the North Slope Borough Department of Wildlife, Venetie Village Council, Wainwright Traditional Council, Native Village of Kaktovik, and the National Science Foundation. The project was initiated and funded by BOEM under a cooperative agreement with the University of Alaska's School of Natural Resources and Agriculture through the North and West Alaska Cooperative Ecosystem Studies Unit.

Although studies of Alaska Native subsistence activities have been undertaken for decades, most of the research has been limited to recording harvest levels. This project used new methods of social network analysis to document and analyze subsistence food sharing networks, cooperative hunting, participation in the cash economy, and issues of food security. The study provides a novel means to quantify the traditional values of respectful and reciprocal relationships among Alaska Native people bonded by deeply embedded cultural sharing behaviors. It also identifies the relative resilience of communities, as well as the relative vulnerabilities of resident households, to forces of change and potential disruption. The study sets new professional standards for how social science projects could be conducted on the North Slope to achieve broad community support and participation.

FOR MORE INFORMATION

Satellite Tracking of Western Arctic Bowhead Whales
www.data.boem.gov/PI/PDFImages/ESPIS/4/5047.pdf

Sharing Networks to Assess the Vulnerabilities of Local Communities to Oil and Gas Development Impacts in Arctic Alaska
www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/Alaska_Region/Alaska_Studies/SS_0504a.pdf

Traditional Knowledge and the National Environmental Policy Act Process at BOEM

BOEM seeks to integrate TK into the NEPA process by using input received from three primary channels: the Environmental Studies Program, Government-to-Government consultations, and public testimony. DOI held the first Beaufort Sea Planning Area lease sale on the Outer Continental Shelf in 1979. Since the preparation for that first lease sale, input from North Slope Borough (NSB) residents and federally recognized tribes has been presented and documented at NEPA scoping meetings and public hearings.

In 1995, BOEM (then MMS) began a series of formal meetings with NSB communities and groups such as the Alaska Native Science Commission to chart a path to improve adoption of TK into the agency's NEPA documents. In 1996, the agency followed up with in-house workshops to promote awareness of TK, and hired a contractor to develop a TK database for incorporation into the Beaufort Sea Lease Sale 170 EIS.

Over time, this process led to new agency decisions about deferral areas selected for Beaufort Sea Lease Sale 144 and to new mitigation measures negotiated with the State of Alaska, the NSB, the Alaska Eskimo Whaling Commission, the National Marine Fisheries Service, and industry. Some of the new measures included an improved bowhead whale monitoring program, greater protection for subsistence whaling activities, scientific peer review of monitoring plans, and a conflict resolution process that resulted in the National Marine Fisheries Service Open Water Meeting held each spring.

In 1999, the EIS for production development at Northstar became the first EIS in Alaska to include a dedicated chapter on TK, which described how agency staff worked with local experts to make changes in the design of the project for technical considerations. From that time forward, the agency has included TK from local testimony in the 5-year Leasing Program EIS and all tiered NEPA documents. For example, the Chukchi Sea Lease Sale 193 Final EIS includes Alaska Native views about cumulative effects on subsistence harvest patterns and observations about climate change.

BOEM has adopted lease stipulations and regulatory

practices that support the goal of protecting subsistence activities. BOEM will only permit offshore oil and gas activities when the disruption to subsistence harvest can be minimized such that disruption is short-term and results only from accidental or incidental encounters. Incidental short-term encounters are further minimized through requirements that industry communicate directly with subsistence communities. Lease stipulations include requirements for orientation and training programs for all industry workers and agents; site-specific monitoring programs for marine mammal subsistence resources to be conducted by industry during all activities on a lease; conflict avoidance mechanisms to protect subsistence harvesting activities; and requirements for pre-booming for offshore fuel transfers.

In public comments, stakeholders expressed concerns that the significance threshold for subsistence activities and resources vastly understates their importance for residents of the North Slope. TK indicates that any adverse effect on the subsistence resource population, on the hunt, or on the availability of any subsistence resource constitutes a significant impact.

In response, in 2011 BOEM revised its significance threshold for subsistence-harvest patterns in the Final Supplemental EIS for Lease Sale 193 (Vol. 1, p. 84). A finding of significance is triggered whenever "adverse impacts disrupt subsistence activities, or make subsistence resources unavailable, undesirable for use, or only available in greatly reduced numbers, for a substantial portion of a subsistence season for any community."

The most substantial hurdle to integrating TK into NEPA analyses is the concern about how to interpret information that has not been collected according to standard protocols, has not been subjected to peer review, or has not otherwise achieved a status of "objectivity." Where scientific methods are applied, as in the ESP, the integration of TK has been powerful. Not only is the information accurate, but the results are accepted by both Alaska Native communities and external scientists.



BOEM Director Tommy Beaudreau pledges to use TK during a hearing at Point Hope. *Photo by John Callahan, BOEM.*

Traditional Knowledge and Government-to-Government Consultation

In the search for information, government decision-makers maintain a poetic affinity with hunter-gatherers—they constantly seek knowledge from science and TK. Both sources are essential for comprehensive understanding, and critical to the success of our mission and public trust responsibilities. As BOEM formulates any proposed OCS plans, projects, or programs, we all benefit from the foundational input of TK.

On any given day, walking among the work spaces of BOEM Alaska offices, it is not unusual to overhear managers and staff engaged in conversations with Native leaders and other colleagues in the villages of the North Slope and Northwest Arctic Boroughs.

The Iñupiat understand the high Arctic and waters of the Chukchi and Beaufort Seas. Their traditions and knowledge result from ancestors living in and around these areas for thousands of years—and being kept alive through the shared experiences, counsels, and conversations of daily living. Their sense of homeland and destination are present in every communication with BOEM.

Active Listening is Critical to Our Mutual Successes

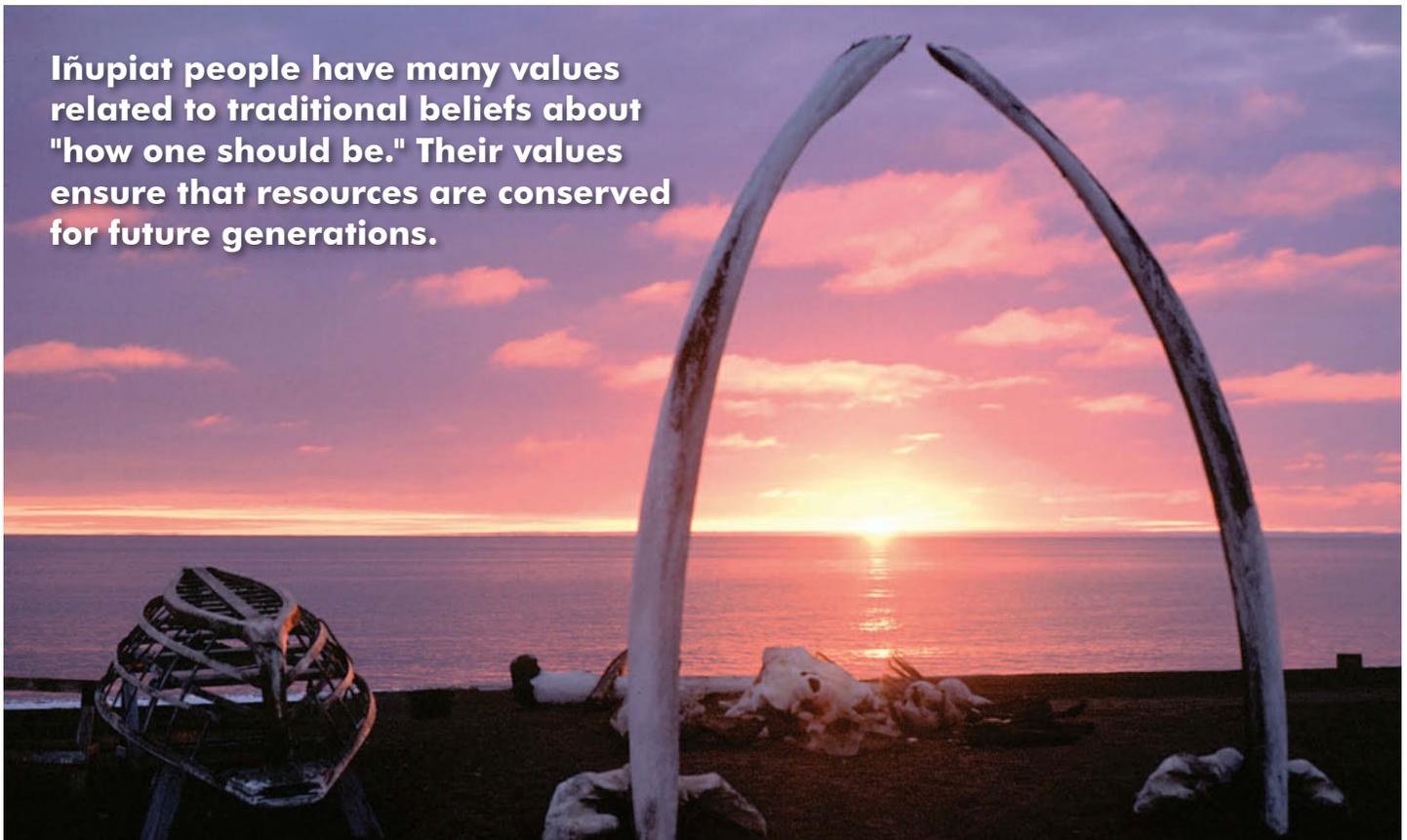
The BOEM Alaska regional office routinely gathers

input and insight through public hearings and meetings. Another effective opportunity to obtain TK occurs during our Government-to-Government consultations with tribal leaders and councils. In these moments, the elders become our teachers, mentors, and coaches. We experience these exchanges as honest, earnest, and personally respectful.

Reflective discussion provides another bridge to comprehending the who, what, why, where, when, and how of year-around life in, on and around the Chukchi and Beaufort Seas. Active listening is essential to obtaining TK.

Whether frozen or splashing the shores, the seas provide life for the Iñupiat. The creatures of the deep, animals of the land, and birds of the air that call the Arctic home are continuously observed by the people. It is through the sharing of their traditional lives that we gain understanding and comprehension, and witness the mix of their universe. To embrace the sharing of an elder's wisdom is to acknowledge the value of their lives. We do that best through the banded conversations within formal consultations. An elder's generosity is found through the gift of their time and devotion to the consultations. We remain appreciative, committed and engaged receivers of traditional knowledge.

Iñupiat people have many values related to traditional beliefs about "how one should be." Their values ensure that resources are conserved for future generations.



Upright whale bones and whaling boat at Browerville in Barrow, Alaska. The northernmost point of North America is surrounded by ice most of the year. Photo by Luciana Whitaker/AccentAlaska.com.

Cultural Landscapes: Traditional Knowledge Across the Pacific Rim

Recognizing the important contributions that indigenous people can make to our understanding of the environment is a practice that is taking hold in the Pacific Northwest and Hawaii. Earlier this year, for example, BOEM reached out to the four Oregon tribes with ancestral ties to the Oregon Coast. Each Government-to-Government consultation included a historical overview from the tribe and discussions about current renewable energy efforts on the OCS and the BOEM Environmental Studies Program.

An ongoing study that incorporates TK is the *Inventory and Analysis of Coastal and Submerged Archaeological Site Occurrence on the Pacific OCS*. This study will result in digital inventories of known, reported, and potential submerged archaeological and prehistoric sites for the Pacific OCS. It is designed to identify potential sites that could be impacted by BOEM-permitted activities.

In Hawaii, TK regarding submerged and terrestrial archaeological sites and traditional cultural properties is necessary for BOEM decision making as it relates to renewable energy development on the OCS. Currently, limited information is available about cultural resources there. TK provided by Native Hawaiians, along with data gathered using other scientific and archival methods, will inform BOEM of the nature of these non-renewable resources and where they most likely may be found.

The Hawai'i Conservation Alliance (HCA), with whom BOEM anticipates working in the future, has recognized that integrating indigenous Hawaiian approaches and knowledge systems may help address the challenges facing delicate island ecosystems and greatly enhance long-term success of modern conservation efforts. Many Native Hawaiians believe the natural world is in a continuous reciprocal relationship with people that requires dedication and effort to maintain, and that the health of one depends upon the health of the other. The tightly integrated relationship between resources and culture deteriorated in Hawaii following Western contact, and reestablishing those relationships offers an opportunity to build a sustainable society that once again values its island legacy. Hawaiian values that align with modern conservation include mitigating abuse, waste, and overuse; pooling of resources and efforts; and acknowledging interdependence between all beings as necessary for survival.

Each valuable piece of TK contributes to the concept of a *cultural landscape*, which can be defined as a distinct geographic



Oregon Coast. Photo by Bill Kuffrey.



Hale o Keawe, which served as a royal mausoleum since A.D. 1700. Photo courtesy of www.nps.gov.

area that uniquely encompasses a series of cultural, religious, and natural resources.

Whether on the mainland, in coastal waters, or on Pacific islands, integrating TK with modern science—particularly when it comes to protecting cultural landscapes—is a win-win scenario, because it allows indigenous people to share their rich cultural knowledge, and provides a fresh perspective for researchers and scientists to protect all resources.

Fenton Rexford (Interview), Tribal Administrator of the Native Village of Kaktovik

Fenton Rexford, an Iñupiaq Eskimo, was born and raised in Kaktovik. He has been engaged in a variety of scientific studies and now serves as a representative on the North Slope Management Board for the BOEM-funded social indicators study. Rexford is also a whaling captain who believes strongly in passing on tradition to younger generations.

Please explain how you are involved with science projects on the North Slope.

I'm involved with the North Slope Science Initiative (NSSI) on the Science Technical Advisory Panel as a resident and local knowledge expert for the Arctic. I have local knowledge of things going on here on the North Slope.

What do you think external scientists need to understand most about TK?

It is important to many people, and I like to use the example of when the first surveys of bowhead whales were started. We were stopped [from hunting] for a year or so because of a miscount saying that bowhead whales were low in numbers, but local knowledge knew that there were more. It's this kind of traditional knowledge we have gained from living here 365 days a year for many, many years.

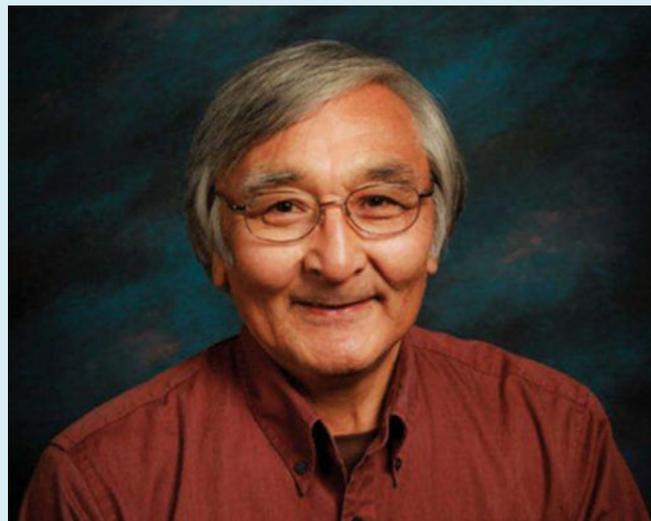
We've also become accustomed to the climate and the seasonal changes, and I think it's important to know or work with people who have traditional knowledge of the Arctic, especially the elders before me.

What projects do Alaska Natives most want government science to undertake in order to integrate with TK?

Things are getting so new in the offshore work, development, and research that it's important to understand not only one species but how things work together as a whole ecosystem. There are so many projects that are important, not only one study or understanding—it's all related—the whole ecosystem and the way the various animals come around during different seasons. We're adapting to the climate change, and the migration patterns have changed as well for various animals: waterfowl, sea mammals and animals, plants, and terrestrial animals.

Are you aware of TK-oriented research funded by BOEM?

Oh, definitely, especially the bowhead and various projects involving the Iñupiat—working together and using their traditional knowledge. I'm very happy about the social indicators project, having established a board for most or all of the villages. One of the recommendations by the board members on our first meeting was to work



Fenton Rexford, whaling captain and Tribal Administrator of Kaktovik.

with Steve Braund and Jack Kruse to have Anaktuvak Pass included in the study—quite a team with quite an extensive knowledge of early work and surveys.

What are your views of how Western science is integrating with TK?

One example that I can think of was international management of polar bears using traditional knowledge and working with biologists and polar bear experts. The end product was the management of the polar bear subsistence hunting and research.

The other one is working again with local people for the musk ox management harvest system. At one time there was musk ox hunting here, managed by the Federal agencies and the village of Kaktovik, and it was a good example of management using local people and knowledge.

Have you noticed any progress in BOEM incorporating TK?

I think it's improved over the years. The activities that are happening here that need to keep going are Government-to-Government consultations—they're important.

Do you have any recommendations about how to move forward to integrate TK with research and consultations?

Government-to-Government agreements for impacts or any kind of work or project that comes near or will affect Kaktovik were a good way to do it, and I encourage that not only for the village of Kaktovik, but for the other tribal entities along the coast as well. I think it's important to be involved in and for the Government-to-Government consultations to continue. I am also fortunate and happy to be involved in NSSI and the Science Technical Advisory Panel for Arctic research.

Where Do We Go From Here?

Editorial by Dee Williams, PhD

While government agencies have encountered and encouraged growing expectations that TK be integrated into science reports as well as NEPA and consultation documents, they have not received much guidance about how to do it, especially within the constraints of other dictates such as quality control, fairness, and legal processes. Further, the means to achieve integration is not clear-cut and a wide variety of cultural and institutional communication challenges impede progress. One essential concern has always been how to establish and verify legitimate TK authority. In a spirit of constructive dialogue, BOEM offers the following specific suggestions about how to overcome current challenges to advance the goal of TK integration within scientific decision making.

Challenge: Stakeholder dialogue about TK is often difficult because public conversation rarely gets precise enough to allow for meaningful exchange.

Suggestion: All stakeholders could help improve communication about the TK process by getting specific in three major areas: field of expertise (What is the speaker observation about? Caribou hunting, ice fishing, etc.); credentials (How does the speaker qualify as a topical expert in the community?); and knowledge type (Is the speaker comment a fact, an inference, or a value statement?). Such information is necessary to establish TK with more authority than ordinary public comment in the NEPA process.

Challenge: Research and dialogue about TK from diverse sponsors is often decentralized, inconsistent, and repetitive, which increases community burden hours and general frustration for all.

Suggestion: Scientific institutions and personnel (beyond BOEM) could improve upon commitments to include and to document specific TK input through employment of qualified persons who use accepted and standard field methods to establish valid results. This necessitates both consistency and appropriate compensation to local participants. Institutions with appropriate authority and experience could initiate more detailed efforts to define acceptable standard methods of recording and processing TK. Regional and community leaders could identify local subject matter experts and review panels, which may be pre-authorized to speak with authority on TK matters. Regional and community leaders could also facilitate research involving human subjects by creating a local permitting process that involves formal review and approval by some local TK entity. Government agencies would likely need to help empower and financially support such an entity.



The North Slope tundra in bloom. Photo by John Callahan, BOEM.

Challenge: Government dialogue about TK is often preoccupied with integration of TK data rather than with integration of TK experts into a meaningful resource management process.

Suggestion: Institutions and personnel (beyond BOEM) who manage public trust resources could improve upon commitments to adopt formal co-management strategies with engaged stakeholder communities. This involves a willful government concession to share aspects of decision making authority and to enhance recognition of the local community perspective. It also involves building mutual trust through continual collaboration rather than episodic meetings. In addition, it involves community recognition that once TK affects decision making, it enters the realm of public access and cannot be protected from how others make use of it. Perhaps most importantly, it also involves an effort by all stakeholders to move beyond the rigid perceptions of the past. The successful integration of TK into a transformative science requires unprecedented collaboration.

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New Waves

Late-Breaking News & Information

BOEM North Slope “ShoreZone Project” Teams Up With “Sense Of Place Project” in Kaktovik

The summer of 2012 will mark an important milestone in mapping the marine shoreline habitat for the entire coastline of the North Slope of Alaska. The BOEM Environmental Studies Program is building on previous work by NOAA, USGS, and others to complete the North Slope ShoreZone project to fit into the ongoing statewide Alaska ShoreZone mapping program. The project collects aerial coastal imagery to classify and map shoreline habitats so they may be assessed for sensitivity to disturbance and changes can be monitored over time. The project also involves collection of field data from ground stations to collect intertidal sediment samples for analysis and to verify mapping interpretation. The task of data interpretation provides an exciting opportunity to expand project partnerships and integrate ShoreZone data with traditional knowledge from local communities. Activities planned in Kaktovik provide a prime example.

The new BOEM project is contracted to Nuka Research and Planning Group (Seldovia, AK), which works in partnership with Coastal and Ocean Resources Inc. (Victoria, BC) and Archipelago Marine Research Ltd (Victoria, BC). The research team will be in Kaktovik at the beginning of August for imagery surveys collected by helicopter. An additional day

of field work has been planned to support a collaborative community-based film project known as the “Sense of Place” project. With new funding by the Arctic Slope Community Foundation and others, the project team led by Maeva Gauthier of Coastal and Ocean Resources will conduct a filmmaking workshop that builds on ShoreZone imagery data collection. Team members will fly with members of the community during some flights. Once the shoreline footage is uploaded and geo-referenced, they will review it with elders, community members, and youth, and document the process. Elders will comment on what they see, share stories related to the land, the coast, the animals, the subsistence activities, and their observations of change. Youth will also be able to comment on their vision of the land and how they see the future. An Iñupiat filmmaker will be involved in the filmmaking workshop.

FOR MORE INFORMATION

North Slope ShoreZone Project

www.nukaresearch.com/projects/boemsz/index.html