National Marine Fisheries Service

Arctic Open Water Meeting Report

March 7-8, 2011

Anchorage, Alaska

March 2011

Introduction

This report is a detailed summary of the March 7 & 8, 2011, Arctic Open Water Meeting held in Anchorage, Alaska. Attendees included those from the science community, industry, native organizations, community stakeholders, and state and federal agency representatives.

Presenters provided information on their respective activities, including a summary of 2010 industry activities, data gathering and analysis projects, and monitoring results and an overview of operational and monitoring plans for the 2011 season. This report provides a brief summary of the presentations and a detailed accounting of questions and answers after each presentation. Detailed information in regards to industry activity such as specific vessel activity, species sightings and seismic data shown in tables throughout this document cannot be verified as 100% accurate due to the speed with which presenters moved through their presentations. More accurate, detailed, statistics can be found in individual industry 90-day reports which can be viewed at http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

Careful attempts were made to identify speakers, however there were instances where speakers did not identify themselves fully or began speaking without any identification. Additionally, there were occurrences where speakers identified themselves at the time of their comments but who did not complete the conference sign-in sheet which may result in misspellings of names.

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ACRONYM LIST

ABWC	Alaska Beluga Whale Committee
ACS	Alaska Clean Seas
ADFG	Alaska Department of Fish and Game
AEWC	Alaskan Eskimo Whaling Commission
ANO	Alaska Native Organizations
ASRC	Arctic Slope Regional Corporation
AWBC	Alaska Beluga Whale Committee
BLM	Bureau of Land Management
BOEMRE	Bureau of Ocean Energy Management & Regulation
BOWFEST	Bowhead Feeding and Ecology Study
BWASP	Bowhead Whale Aerial Survey Project
CAA	Conflict Avoidance Agreement
CEQ	Council on Environmental Quality
CHAOZ	Chukchi Sea Acoustics, Oceanography and Zooplankton
COMIDA	Chukchi Sea Offshore Monitoring in Drilling Area
cm	centimeters
dB	Decibel
DASAR	Directional Autonomous Seafloor Acoustic Recorder
DTAGS	Deep-towed Acoustics/Geophysics System
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLIR	Forward Looking Infrared
GAO	Government Accountability Office
GPS	Global Positioning System
IHA	Incidental Harassment Authorization
ISC	Ice Seal Committee
IR	Infrared
ISI	Inter-stimulus Interval
kHz	Kilohertz
km	Kilometers
LACS	Low Level Acoustic Combustion Source
LGL	LGL Environmental Research Associates
LOA	Letters of Authorization
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration
NSB	North Slope Borough
PAM	Passive Acoustic Monitoring
PSO	Protected Species Observers
RMS	Route Mean Square
SSV	Sound Source Verification
TEK	Traditional Ecological Knowledge

UAF	University of Alaska, Fairbanks
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey

Day One – March 7, 2011

Welcoming Remarks

Michael Payne

Division Chief, National Marine Fisheries Service (NMFS), Office of Protected Resources

Unfortunately, Jim Lecky couldn't make the meeting, so I am here instead. I'd like to thank you for taking time to come to the most important annual meeting of our office. The NMFS is tasked to make sure minimal impacts are made. Specifically, we are responsible to set forth requirements for incidental takes and to review and discuss 2011 open water season plans. The workshop has always served as a valuable tool in decision making and monitoring plans. We're pleased that you are here and participating. The front table is larger, and the audience is further away than when the meeting was first established over 20 years ago. The meeting has grown exponentially to its importance. Both NOAA and BOEMRE feel that these meetings are necessary and fill a vital purpose. The information allows the agency to meet its requirements under the MMPA. We will hear about science, traditional knowledge, and industry plans. We hope for candid feedback during these two days. We value the input of stakeholders as we move forward to evaluating permits. Thank you to the presenters for participating. Following the two-day meeting, there will be additional meetings by a panel. I look forward to a productive discussion.

Jim Kendall

Acting Regional Director, Alaska Bureau of Ocean Energy Management, Regulations & Enforcement (BOEMRE)

I'll keep my comments short. My first open water meeting was last year, and I vowed to come back. Now I'm here as Acting Director of the Alaska BOEMRE. This is an incredible information transfer meeting. Thank you to my colleagues for putting this together, and I'm looking forward to it.

Comments:

Michael Payne, NMFS: Special thanks to Candace, who put this together and organizes participants, agenda, and industry to put together a great meeting. Thank you.

Introductions & Housekeeping

Lisa O'Brien & Ron Felde

Lisa O'Brien and Ron Felde welcomed attendees and gave a brief introduction. The agenda was reviewed and an overview of the ground rules provided. Shell was applauded for providing the day's refreshments.

Introduction of Panelists

George Noongwook	Alaska Eskimo Whaling Commission (AEWC)
John Goodwin	Ice Seal Commission
Harry Brower	Alaska Eskimo Whaling Commission (AEWC)
Jessica Lefevre	Alaska Eskimo Whaling Commission (AEWC)
Robert Suydam	North Slope Borough
Craig George	North Slope Borough
Ben Greene	North Slope Borough
Jim Kendall	Bureau of Ocean Energy Management, Regulations & Enforcement
Michael Payne	National Marine Fisheries Service
Candace Nachman	National Marine Fisheries Service
Jolie Harrison	National Marine Fisheries Service
Megan Ferguson	National Marine Fisheries Service
Shane Guan	National Marine Fisheries Service
Catherine Berchok	National Marine Fisheries Service
Robyn Angliss	National Marine Fisheries Service
Dale Funk	LGL Alaska
Pauline Ruddy	Shell
Dave Hannay	JASCO
Michael Macrander	Shell
Jon Childs	United State Geological Survey
Darren Ireland	LGL Alaska
Karin Berentsen	Statoil
Joe Gagliardi	ION
Bernard Coakley	University of Alaska, Fairbanks

Review of Ground Rules

- Honor the agenda (time, topic and process)
- Respect others, valuing professional, individual, and cultural differences
- Communicate from a commitment to develop a shared understanding of the subject, the issues, concerns and ideas
- One person speaks at a time
- When you speak, be concise; allow time for all speakers
- Share knowledge
- Listen with the intent of seeking to understand the content and the underlying context that shapes people's perceptions
- Allow presenters to present; save questions or intentions to discuss for the appropriate time on the agenda
- Be open to new possibilities
- Stay on the subject; park other issues
- No cell phones and be sensitive to the use of computers

Comments:

Harry Brower, Alaska Eskimo Whaling Commission (AEWC): What is missing is a representative from the Walrus Committee. These are good resources and could have impacts from these activities, and we would like them brought to the table. We would like them added to the Open Water meeting.

Michael Payne, NMFS: It was not an oversight in inviting them to the meeting. They were invited, but neither the Walrus Commission nor the USFWS responded to our invitation.

Vera Metcalf, Eskimo Walrus Commission: We were indeed invited, and we did respond; however, because it is NMFS/NOAA related issue, we will be in the audience to respond to questions as needed.

Review of Agenda Parking Lot Process

Lisa explained the parking lot and that any off-topic issues will be captured and then discussed at the end of Day Two.

Candace Nachman, NMFS: Announced that the NMFS Alaska Regional Office is holding a public hearing tonight at 6:30 p.m. in this room on the proposed listing for ringed and bearded seals.

NMFS Incidental Take Program Update

Jolie Harrison, NMFS, Office of Protected Resources

If we are able to make the findings of no unmitigable adverse impacts, we issue MMPA authorizations out of our office, and most of you know that we've been working on developing an EIS to analyze the effects of oil and gas activities that folks are doing up here. On the EIS, with us as cooperating agencies, are BOEMRE and the North Slope Borough, and we've been working towards developing a reasonable range of alternatives that are characterized by the level and type of activities and the mitigation measures associated with them. We are looking at standard mitigation measures as well as an additional range of measures as recommended during scoping, that the public has previously recommended, that we may have considered before, etc. Also, at the advice of some of our cooperators, we are looking at alternatives that are specifically characterized by geographic mitigations, and we're looking at a zero discharge option and alternative technologies that can be used in lieu of seismic, that are quieter and new technologies that can be used to quiet the existing technologies. We have a draft of Chapters 1 and 2 and have received comments from an earlier review, and we are about to send it out to our cooperating agencies and to the ice seal,

bowhead whale, and beluga whale committees and other agencies for additional review. We anticipate having the draft to go out to the public by summer. Overview of where we are with that.

Comments:

Robert Suydam, NSB: You said draft will be out this summer; what is the anticipated time when the EIS is to be finalized?
Jolie Harrison, NMFS: The goal is to finish it up in time to for activities in the summer of 2012.

Joe Gagliardi, ION: You indicated you are reviewing different seismic technologies, both marine and geophysical; who have you sought advice from?
Jolie Harrison, NMFS: BOEMRE and reports out of meetings out of Monterey a couple of summers ago.

Jolie Harrison, NMFS: One thing I want to mention is that in January 2010 in a letter to CEQ, NOAA committed to look at two interrelated workshops on marine mammals in the ocean. We're convening two parallel focus, product-driven, working groups to look at cetacean hot spots in known areas of biological importance and a second group for comprehensive data collection and analysis plan for describing and predicting underwater sound fields. The steering committee convened last October. The goal is to get the hard core data out of these working groups and then have a larger workshop to integrate and analyze these products and how to use them in a management context. The first meeting with the working groups will be next week in Boston and will meet again in October with the plan to have the synthesis workshop where other regulators, NGO folks, and other parties can look at products and think about how to apply them to management decisions.

Bill Streever, BP: Wondered if you can elaborate on discussion about alternatives. A lot of us have been thinking about alternatives to seismic and ways to quiet seismic for a long time. Most of us feel like we've made very little progress. We'd like to hear what you guys have turned up so far.
Jolie Harrison, NMFS: We've looked at current technologies and what we are trying to identify is where they are in terms of being viable for use. We've looked at marine vibroseis, there are some mitigation ones that help attenuate sound from the seismic air gun, and… Jana do you have some information?
Jana Lage, BOEMRE: We looked at the LACS system, which is an acoustic system that was produced in Norway to test in the fjords; the DTAG system, which is a Navy system, a deep water system; the marine vibrator system, of which there are two different systems, a hydraulic and an electric. We looked at some passive acoustic type monitoring and using fiber optics as a tool; and we looked at some mitigation measures like the bubble curtain and also the air gun quieter (something they put on the air gun to dampen the noise).

Jolie Harrison, NMFS: We're looking at when we expect the technology to be viable and then we look at how much, if someone would use them, what is the likelihood this would be used.

We are looking at the pros and cons of use, and some are effective in deep water and others in shallow and this is all being considered in the analysis.

Harry Brower, AEWC: Regarding EIS and wanting to know about compliance, are you going to be writing in any language about what compliance measures are going to be looked at in terms of alternative measures you are looking into?
Jolie Harrison, NMFS: What we're looking at is what the effects will be if we were to replace or people were to use another alternative means. I'm not sure exactly what you're asking.
Harry Brower, AEWC: Compliance monitoring.
Jolie Harrison, NMFS: Oh, what monitoring we would have in terms of those technologies. We'll be looking into that.
Harry Brower, AEWC: I'm just looking back at some of the dilemmas we were faced with before was that there was no means of monitoring effects of radii at 120, etc.
Jolie Harrison, NMFS: I think the EIS will be looking at the same sort of mitigation and monitoring requirements for technologies as we would be for seismic.
Jana Lage, BOEMRE: Another thing we looked at was things that can be used in conjunction with seismic, like controlled source electro-magnetic – those are things that are not likely to replace seismic, but could change how seismic could be done.

Jessica Lefevre, AEWC: Jolie, you talk faster than I can hear. You went through the workshops and didn't catch what the second one was about.
Jolie Harrison, NMFS: In summary, it is developing comprehensive data collection and analysis plan for describing and predicting underwater sound fields; sort of mapping sounds throughout and having some predictive capacities as well based on existing data and modeling. Both of the workshops are intended to be an integrative data compilation effort in addition to having some modeling components. There are some really good habitat models that can be applied to existing data to sort of interpret and get some more realistic thoughts on density. These groups are small and targeted with people that have some time to do some work. It will be an analytical exercise to compile and produce data.

Bill Streever, BP: In what sort of units will you be looking at? RMS mapping?
Jolie Harrison, NMFS: The first live meeting is next week and these are the issues that participants will be talking about next week.

Robert Suydam, NSB: When are these workshops happening? Have participants already been selected? What are the requirements?
Jolie Harrison, NMFS: Yes, they've already been selected. They are small groups of about 14 people working throughout the next year. Then the larger workshop will be early next year and will have a much wider audience. Folks haven't been invited there yet and frankly, it may have a public component. The working group participants have been chosen and are meeting next week in Boston.

Erik Grafe, Earthjustice: How are workshops going to be integrated with the EIS process?

Jolie Harrison, NMFS: We're looking at a wide array of mitigation measures through the analysis of and in the EIS, including geographic mitigation measures raised before. We're starting from a strong point, but the data from the workshops comes out, it will be well before the final EIS comes out and if there are new areas identified or sound issues identified, there will be time to address these between the draft and final EIS.

Erik Grafe, Earthjustice: Can you tell us about the geographic alternatives?
Unidentified: (unable to hear)
Jolie Harrison, NMFS: We have some standard measures already that are associated with protection of subsistence hunts and those are in there as well, but we are also looking at alternatives specifically characterized by geographic mitigations. People have raised these issues before through scoping comments or letters to NFMS. We're looking at mitigation in three ways in the EIS: 1) standard measure that are well established, 2) within each alternative we look at a range of mitigation measures that have been suggested, and 3) an alternative that is specifically characterized by the required inclusion of geographic mitigation. We are really hitting geographic mitigation in a broad way.

Colleen Swan, Kivalina: If there's going to be any affect on wildlife or sea mammals, it is going to affect the native people who rely on it. I'm wondering, what measures will be taken if they are impacted because whatever impacts on wildlife there are it affects native people spiritually, culturally, and it's not just about putting food on the table. Have they been invited to engage as cooperating agencies because they are the experts that can tell you because they rely on the animals and what it does to them?
Jolie Harrison, NMFS: We understand that, and the impacts on the subsistence community are a huge part of this EIS, and we have met with folks to talk about alternative development from the AEWC and ABWC and when we are done with the draft of chapters 1 & 2, we plan to share that with AEWC, ABWC and ISC. The alternative section is one of the most important parts of the EIS, and we plan to specifically ask for those folks input on that. We ask that the reviewers please take a close look, especially at the mitigation section; because that's one of the main things we're looking for input on.

Layla Hughes, World Wildlife Fund: Are any mitigation measures based on trying to contain, control, or prevent cumulative impacts such that only a certain number of activities are allowed each year or over the five year period?
Jolie Harrison, NMFS: We have measures that are aimed at limiting cumulative impacts. That is the target, but we are still fleshing it out.

Layla Hughes, World Wildlife Fund: That sounds like dealing with cumulative impacts within a specific timeframes; what about over time?
Jolie Harrison, NMFS: We'll discuss how we can manage through EIS. I don't know if it is a specific alternative at this time. Our alternatives are characterized by a certain level of activity and inasmuch as something falls under one of the alternatives, it has a level of activity associated with it. We will talk about this in the EIS.

Layla Hughes, World Wildlife Fund: Are any of your geographic measures based on considering the risk of a blowout in certain locations that couldn't be cleaned up on time and the oil potentially causing harm to marine mammals. Are any of them based on blowouts and where they might occur and seasons?
Jolie Harrison, NMFS: All of our mitigation measures are based on areas of importance to marine mammals or subsistence uses; but no, it is not based on where a blowout might occur but is based on protecting marine mammals or subsistence use.

Jessica Lefevre, AEWC: I would encourage that the cumulative impact review include information from Russia and Canada. We have recently been approached by hunters in Russia that are concerned about activity levels on the Russian side of the Chukchi.

Colleen Swan, Kivalina: I should have been specific … NEPA calls for the lead agency to invite tribes as cooperating agencies. I'm wondering if that invitation ever went out?
Candace Nachman, NMFS: We did do government to government consultations with the tribes during the scoping process.

Lisa O'Brien: Parking Lot Update– we've included involvement of Fish &Wildlife in Open Water Meetings. Housekeeping reminders: don't forget to sign in.

Michael Payne, NMFS: Is there a recommendation on the parking lot issue of USFWS?
Robert Suydam, NSB: To clarify, my hope is that we would have an opportunity to talk about ways to get FWS involved or perhaps co-sponsor the open water meeting. I'm not aware of efforts involved thus far in trying to get them involved, but if there are ways the North Slope Borough or some of the co-management agencies can influence FWS participation, I would like to explore the options.

Alaska Eskimo Whaling Commission Subsistence Harvest Updates

Harry Brower Jr., Chairman, AEWC

In regards to our 2010 harvest and our five year block quota, we can take 260 strikes in five years. During the 2010 harvest, 43 whales were landed, and we lost 28 for a total of 71. For the first time in 90 years, Wainwright harvested a fall whale, which was very significant. It has been since commercial whaling days since this has occurred. Plans for 2011 season remain to be seen. We are still going out hunting. Weather and sea ice conditions both play a significant role on how many are landed. For Barrow, we have a quota of 22 that we start with for the spring season. I don't have information for the spring season for the remaining villages. In terms of the fall, what takes place is what is remaining after the spring hunt, and this gives us another opportunity to take whales. Two communities east of Barrow, Kaktovik and Nuiqsut, conduct only fall whaling. Fall is their only opportunity to take whales.

George Noongwook, AEWC Vice Chairman and representing Savoonga/St Lawrence:

We realize the ecosystem we are in is very healthy and productive. However, the access, due to changing patterns in ice and weather, has affected our ability to access resources. The changes aren't all bad, because in 1990 Savoonga and Gambell started harvesting bowheads in the dead of winter. As a consequence, 40% of our harvests are now occurring in winter (November/December timeframe). We have begun to take steps to conduct spring whaling activities earlier so we can adjust to the changes that are now occurring in migration patterns of marine mammals, specifically the bowhead whales.

Harry Brower Jr.

When whaling activities occur for eastern communities, Kaktovik starts around Labor Day weekend and depending on ocean and weather conditions they can take up to two weeks. We don't have any control over ocean and weather conditions at that time, and the fall storms can last two to three days to two weeks. For Nuiqsut, they are fortunate to be going out about the same time as Kaktovik, and they have been doing very good in terms of the fall hunt (100% for Kaktovik and Nuiqsut). For Barrow, in terms of the fall hunt, we start about the end of September through the month of October, again depending on weather variability. Our hunts have been ending right around October 30 depending on ice conditions.

Comments:

Robert Suydam, NSB: You mentioned that Wainwright caught a whale in the fall this last year for the first time in a long time, and you mentioned Kaktovik, Nuiqsut, and Barrow hunting in the fall. Can you comment on the other Chukchi Sea villages that may be hunting in the fall?

Harry Brower, AEWC: We've had attempts from Point Lay and Point Hope. Again icing conditions dictate how long it takes to get out; once the lagoon freezes, access is cut off so they end up sometimes shutting down earlier. Point Hope has attempted but has not harvested.

Robert Suydam, NSB: Can you remind us of the concerns the captains have from oil and gas activities, as well as shipping activities?

Harry Brower, AEWC: Regarding concerns, I come from Barrow (the largest community), the whaling association is very vocal in terms of how things occur during the fall season, and we have lots of observations over time. One fear is the ability for industry to clean up in the event of oil spill. There have been other observations in terms of trials within oil fields of putting out booms and clean up scenarios, and we have not been shown anything that functions properly in ice infested waters. We communicate on different scenarios, and they all have limitations in terms of sea state, weather conditions, and sea ice. They can operate in calm, but when you get into 15-20 mph winds with ice infested waters, they are limited. Another concern is noise and deflection of whales and trying to understand when they come back near shore. That still needs to be answered and has been on the table for many years. This was mentioned at the meetings that occurred in Seattle, and this was something that they were trying to address. When the whales deflect from normal migration routes, when do they return? It hasn't been answered.

Michael Macrander, Shell: Do you have a breakdown of how many were taken in spring and how many were taken in fall of last year?

Harry Brower, AEWC: No.
Michael Macrander, Shell: Can you comment on what occurs in a normal type of year?
Harry Brower, AEWC: I can share information based on observations. Harvest reports shared with NOAA would have the breakdown by community about how many landed and how many were lost. It starts in spring and then focuses on fall whaling. Spring is more complicated because there are more losses than in fall. Barrow had a start of 22 for the spring with a loss of 14 in the spring. Nine were landed in the spring and then we had another transfer of strikes—unused strikes—were transferred to Barrow for the fall whaling. Kaktovik had a quota of three and landed three. Nuiqsut has a quota of four, and four were landed. Barrow, in regards to the request for fall whaling, they used up their quota for spring. Out of the 12, there were nine landed and one lost and some unused strikes.

Robert Suydam, NSB: I wasn't going to provide additional details. Once they are summarized we will make available.
Michael Macrander, Shell: Didn't Point Lay take a whale?
Harry Brower, AEWC: That was two years ago.

Brad Smith, NMFS: Regarding the whaling that occurs in the December/January timeframe, are those hunted using outboards, skin boats or whether you can you give any observations of sensitivities of whales during those months?
George Noongwook, AEWC: We have to use motorized, aluminum boats because it is too cold for skin boats. We conduct winter hunts with motorized, small open skiffs (18' average) and 50 horsepower.
Harry Brower, AEWC: The ice in the fall/winter season is very abrasive for the skin boats and will damage the boat.

Jana Lage, BOEMRE: My question was answered about spring and fall strikes.

Earl Kingik, Point Hope: We've been whaling for thousands of years. In our communities, our houses are built out of whale bones. AEWC, are you working with the tribes on oil and gas development issues? Are you helping the tribes to protect the garden they love the most?
Harry Brower, AEWC: Yes, our authority comes from the ICSC which is a tribal organization. Yes, we are because we have to include all whaling associations along the coastal communities which are a part of the regional tribal organizations. I have to refer to George as to how they are part of the tribal organization as well.
George Noongwook, AEWC: Because the association of the AEWC was founded on tribal government part, our Savoonga whaling captain association has to report annually on all activities, lessons learned and areas needing improvement in terms of efficiency and weather observations and that sort of thing. So we do need to report to our tribal entities on our annual hunts and any other activities regarding how oil and gas activities would affect hunts. We're not directly impacted, but there are indirect impacts from activities, especially manmade noise and possible deflection of migratory routes.
Harry Brower, AEWC: In terms of earlier comments, what concerns me here from the AEWC and from different whaling association – shipping is a concern, fishing industry is another and

encroachment moving north into our hunting areas. These are the other two potential threats that are out there.

Jolie Harrison, NMFS: I want to refer back to the discussion on EIS, in case you didn't notice, we have no general counsel here. Any discussion we have about what may or may not be in EIS … obviously it is not a final agency document yet, and we still have internal review left with our cooperating agencies, and we still have the benefit of learning whatever we do here.

Alaska Beluga Whale Committee Subsistence Harvest Updates

Robert Suydam, NSB/ABWC

Chairman Willie Goodwin, Kotzebue. Thank you for putting on this meeting. Thank you also to NMFS and URS for putting together the map that shows the track lines for ION's proposed seismic survey and UAF's/NSF's track lines for the Chukchi Sea survey. Those maps are the kinds of things we've been asking for just about every year since we've been coming to these things, and we appreciate having them, and they are very helpful.

Today I am going to talk about the Beluga Committee. Unfortunately, the chair, Willie Goodwin, couldn't be here today, and he asked me to stand in for him. He also asked Harry to contribute where he can as well. Harry Brower is the vice chair of the ABWC. The ABWC was formed in the late 1980's and was primarily formed as a way to avoid problems and to collect information and make better decisions as they moved forward. The committee goals are to: maintain healthy populations of beluga in northern and western Alaska waters and provide adequate subsistence harvest of beluga and protect hunting privileges for Alaska subsistence hunters.

The beluga committee is different than many of the other marine mammal co-management organizations. Most of the organizations are comprised of hunters, but the beluga committee decided they wanted to do things a little bit differently, and they wanted the scientists and the managers to actually be on the committee with the hunters. The committee adopted its management plan in 1995, and it was accepted by tribal organizations in 1996/1997, and they eventually signed a co-management agreement with NMFS in 1999.

One of the data gaps identified back in the late 1980's was stock structure, population size, harvest information and other aspects of beluga. The beluga committee put its efforts into these main topics: stock structure, documenting harvest and strike loss on an annual basis; bio-sampling for study (health, natural history, etc), population (size and trend) assessment, and satellite tracking (off shore distribution and migration routes).

There are at least five stocks of beluga in Alaska: Cook Inlet, Bristol Bay, eastern Bering Sea, Kotzebue Sound, and Beaufort Sea.

> [Provided a graphic of Beluga DNA halo type frequencies. Graph indicates that different family groups are evident in the different stocks. Stocks include Cook Inlet, Bristol Bay, Norton Sound, Kotzebue Sound, Point Hope, Kasegaluk Lagoon (Point Lay), MacKenzie and

Kotzebue. Kotzebue and MacKenzie stocks had similarities, as well as Bristol Bay, Norton and Kotzebue belugas.]

The harvest in Alaska is around 300 to 350 belugas a year. The Beaufort Sea stock harvest averages around 25-26 belugas a year. In the eastern Chukchi Seas (Kotzebue Sound, Point Lay and Wainwright) the harvest averages 95 animals per year. The eastern Bering Sea (Norton Sound, Yukon and Kuskokwim Delta harvest averages about 180 per year, and Bristol Bay harvests average approximately 20 per year.

In 2010, the harvest in the Chukchi and Beaufort Seas was decent. Kotzebue harvested one; Point Hope landed more than 15 (in April/May); Point Lay landed 22 with two struck and lost (late June); Wainwright landed 11 (late July); Barrow had three (summer); and Kaktovik landed five (early August).

I mentioned bio-sampling early. We are really trying to better understand health assessment (body condition, exposure to disease, immune function, hearing, and contaminants), age, growth reproduction, diet and genetics.

Chukchi Sea Aerial Surveys: In 2010, 2 belugas were tagged in Point Lay, and they showed up near Barrow in summertime. Megan flew to that location and saw a lot of belugas outside of Barrow; approximately 600-700 in the group. Many of the animals were in the lagoon, and pictures show a lot of detailed information. There were some very small calves in the group and various sizes of other whales as well. Collaboration between scientists and NMFS is a great way to take advantage of opportunities and learn more.

We've been able to tag quite a few belugas in Point Lay over the years, and we've learned they use a huge amount of the ocean. Belugas don't seem to use the shelf in Beaufort Sea, but other areas are very important. In 2007-2008, a Point Lay beluga was tagged, and the tag worked for 18 months. The beluga wintered in St. Lawrence and then moved to King Island in April and May and then moved through the Bering Strait in early May/June and through the Chukchi Sea and hung out until mid-June and then moved back south to Point Lay. We've learned that the animal moved up north and then back down south, which was not what scientists thought. We need to keep this in mind as we think about what is happening in the Chukchi Sea with vessels, drill ships, and seismic in June and July. If there is a bunch of activity out there before Point Lay hunts, there is a potential to disrupt the movement of the belugas.

The beluga committee and villages have expressed various concerns about offshore activity. The Point Lay hunt occurs in late June/early July. They don't want a lot of activity before the hunt occurs. The Wainwright hunt is in late July/early August. There have been a couple instances in the past few years where barges or vessels moving near Wainwright have disrupted the hunt. We don't know a lot about how belugas respond to sound; we don't know if they are more or less sensitive than bowheads. We certainly don't know what the cumulative impacts are. We are looking at health assessments as a way to look at how belugas are responding to changing conditions in the Beaufort and Chukchi Seas.

Comments:

Harry Brower, AEWC: Just a point of clarification about Nuiqsut and Kaktovik takes on beluga: The stock they hunt is probably the MacKenzie Delta stock.
Robert Suydam, NSB: Thanks Harry. We believe the belugas taken in Kaktovik are likely from the eastern Beaufort Sea stock.

Michael Payne, NMFS: I have a question regarding industrial noise. I believe the stock that is most exposed is probably Cook Inlet. Has the ABWC taken information through this program and the monitoring done and to see how belugas have responded to industrial noise?
Robert Suydam, NSB: What we're learning is that information is just emerging. Some of the studies associated with the Knik Arm Bridge and the Port expansion have provided a lot of good information. We haven't taken that information and extrapolated it to how Chukchi or Beaufort Sea belugas may respond to sound, and, in part, we haven't done that because there may not be a lot of utility in doing that. The belugas in Cook Inlet are exposed to more ship traffic, and their behavior and their ecology is much different than northern belugas.
Michael Payne, NMFS: What about the MacKenzie area?
Robert Suydam, NSB: There is not a lot of information in the MacKenzie area or if the information exists in the Canadian Beaufort. There is information from Lancaster Sound on how whales responded to ice breakers, and they were swimming away from ice breaker when it was still 40-50 kilometers away. This would be worthwhile to pursue.

George Ahmaogak, Barrow Whaling Captain: I appreciate Robert's report and support Point Lay's statement saying they would like to keep industrial noise away. Do you have any clear evidence from industrial activity thus far that there has been impact or negligible impact?
Robert Suydam, NSB: I have a couple of responses. 1) directly related to question, in last five years with the increased activity in the Chukchi Sea, most of those ships don't move into the sea until mid to late July, so there has been relatively little industrial activity in the Chukchi Sea before the Point Lay beluga hunts in the last five years, so there hasn't been an impact. However, companies often ask to move into the Chukchi before the first of July, and Point Lay hunters say wait until after we're done hunting. The goal is to make sure conflicts are avoided. The other issue I wanted to comment about is that I'm not sure the weight of evidence, in terms of where the impacts might be or not, lies with the hunters and the beluga committee. I'm not sure they have to show there has been an impact in order to avoid future impacts. There is little information on how belugas respond to industrial activities is one of the important data gaps that needs to be filled.

Megan Ferguson, NMFS: I just want to make a comment on that beluga sighting. It was made on July 26, and we estimated that there were about 480 individuals inside the lagoon and 170 outside. We did get an estimate of the number of calves but I'll look that up.
George (unable to hear), Manilliq, Kotzebue: The impact we are seeing is on our spring hunt. The transporters are ramming the ice, and you could see when the belugas were coming. Every time the marine lines are trying to push the ice out of the way, the belugas head back east. We

are feeling it. When we are trying to harvest, they are trying to get to Red Dog early. We try to stop it, and we get a call from Shishmaref saying they are being disturbed.
Robert Suydam, NSB: Thank you for that observation.

(No Name Stated): There was one lost beluga last fall from Kotzebue.

Harry Brower, AEWC: Just a follow up comment - after the hunt in Point Lay there was an incident near Wainwright.
Robert Suydam, NSB: Yes, in 2007 and 2009 there was an Olgoonik barge that came through when the hunt was happening, not an oil and gas barge. I think that was what happened in both of those years.

Inoke Adams Jr., Kivalina: George asked if there was evidence of beluga being affected by noise. I have evidence but it is anecdotal. In 1989, Red Dog became operational. Before the port was built, every summer a beluga was harvested in July. Since 1989, Kivalina has never gotten whales in July since then. I have a question. Are we in the design phase for the various studies that are going to be components of the EIS?
Robert Suydam, NSB: I'll take a shot. Yes, in my mind, we are in the design phase for the monitoring studies for oil and gas. One of the reasons we are here is to provide recommendations to government and companies to improve the monitoring and make sure the science is there to answer questions. I'd like to say your observation is indigenous rather than anecdotal. Your observations are based on a long history. One thing I didn't mention is that I've heard from hunters how belugas respond to human sounds. I've heard over and over that belugas are very sensitive to sounds. I've seen that and they do seem to be very sensitive to sound, we just don't have much western science.
Jolie Harrison, NMFS: We definitely are in the design phase for monitoring plans. Because of how the regulations are set up, we have this peer review requirement for monitoring plans and we've been dealing with that on an annual basis as a response to whatever monitoring plans are submitted with applications. The EIS is an opportunity to comprehensively address a plan for how best to monitor and can be a tool for companies to adopt ways of having a better monitoring plan and for us to prioritize what's most important.

Earl Kingik, Point Hope: We haven't seen a beluga since the port expanded. Do you have any scientific evidence when they did the Firecracker project at the Chukchi? Three or four wells were explored there and before you answer that question, what kind of jurisdiction do you have in your ocean? I remember you only have five miles?
Robert Suydam, NSB: When you say Firecracker, I assume you mean Point Thompson and the testing proposed there? Is that what you are referring to?
Earl Kingik, Point Hope: No, we used to hunt belugas every summer until they built the port side; same thing like Inoke. We wait every summer, July through August. After that, Point Lay will get them next.
Robert Suydam, NSB: No, we don't have a lot of scientific information on how Red Dog has impacted beluga hunting. There is a report out from Steve Braund that documents what Inoke was talking about, that very few belugas have been taken in Kivalina since Red Dog port site was

built. The NSB jurisdiction has ability to influence permits within state waters and lands, and we have the opportunity, and perhaps the responsibility, to influence what is happening offshore as well and make sure subsistence resources are there in the future.

Cumulative Effects Workshop Update

Bill Streever

I'll be talking about the cumulative effects workshop and providing an update as to what it is and what it isn't, the approach, the participants, current status, method and case study, the way forward, and the potential risks to Beaufort Sea bowheads.

What The Project Is And What It Isn't: The project is to develop a method that may be a step forward for cumulative effects assessments involving underwater sounds, but it is not a final method. It is focused only on accumulating underwater sounds, so we're not trying to tag underwater sounds in with toxins or ships strikes. We are not looking at additive/synergistic effects. That's a question that always comes up, and it's a tough thing to get at. What you get out of this approach when you're done, you don't produce a single output metric, it doesn't give you a single number between 0 and 10, with 10 cumulative effects being bad; it doesn't work that way. And lastly, it doesn't make management decisions.

The Approach: What we've done is sort of an expert committee approach, managed through University of California. The contract clearly specifies academic freedom. It started out as four and is now five workshops. The final product as we see it will be a method and case study to be described in peer review paper or papers. It is a research agreement between BP America and University of California, which says the expert committee will be formed to develop two methods, one general and one more detailed, and to suggest future/primary research. There were a total of five meetings, each three to four days in length. Participants included: Erica Fleishman, Chris Clark, Bill Ellison, Roberto Racca, Robyn Angliss, Robert Suydam, Mattias Leu, Samantha Simmons, Len Thomas, Brandon Southall, John Calambokidis, Sandra Warner, Dan Costa, Jessica Lefevre, Barry Noon, Jason Gedamke, Russell Tait, Jennifer Dupont.

Chart of Cumulative Effects Case Study Methodology

1) Set Boundary Conditions for case study, Beaufort Sea 2008, bowheads only, migration season	2) List all activities: all activities that occurred in 2008 in Beaufort Sea	3) Develop acoustic models for all potentially relevant activities. Each activity resulted in a sound model as it moved across the sea	4) Using BWASP data develop AIM model. Then, using AIM output and acoustic models, develop masking metric	5) Output metrics: number of animals (whales) that are exposed to various ELS and SPL levels, degree of deflection when/if data are available and

				certain assumptions made, percent of time/space and number of animals impacted bay masking

The Way Forward: Acoustic modeling through contract with JASCO and AIM modeling, contracted with MAI. The next meeting is scheduled in Barrow next month, with a draft report completed by the end of the year. The committee hopes to share information at additional meetings, modeling and writing with a possible presentation in Tampa at the marine mammal meeting. In the future, we hope to include work by others. This is not the end all to cumulative effects measurement; this is a step along the way. Our inspiration was the talk we hear at these meetings over the years and the need to look at a variety of sound sources, not just a single source.

Comments:

Ben Greene, NSB: The work is important, and I applaud efforts to consider the question that no one has been able to wrap hands around. My concern is that you are looking at a cumulative effects study but then not looking beyond the integrated acoustic study. My concern with what I consider to be selling the important topic of cumulative effects short by referring to this as a cumulative effects study is that it doesn't serve the topic appropriately and leads to the belief that we do know how to study/consider cumulative effects and this is possible. In fact, I think those are wide open questions particularly around multi-species, multi-activities. So, just a word of caution.

Bill Streever, BP: This concern has come up in the committee meetings. The report will say this is a first step, and we have a long way to go to understand cumulative effects. This goes beyond acoustic study. This is the first bite of the apple. Certainly it is not a full-on cumulative effects study.

Harry Brower, AEWC: There was a comment made on the cumulative effects, and it hasn't been answered. The comment was that the ocean is getting louder; the sound in the ocean is getting louder. What about the rate of return after deflection? I still want to learn of this research and how we answer the questions. This is what I want to learn about. It has been asked for years. The question has basically been tabled because there is so much more activity in the ocean now. The sound is getting louder.

Bill Streever, BP: I hope I wasn't unclear. The human made sound, industry sound, is getting louder.

George Ahmaogak, Barrow Whaling Captain: That was a very good report, and I was one of the advocates that said as part of the monitoring programs as part of the Open Water Meetings. We need to look at the size of the gathering of the meeting since I have attended. We have said reports should include cumulative effects, but the reports don't mention cumulative effects of monitoring. We keep demanding it, and they are working on it. I am glad it is being done; we're finally getting something we have been demanding. There is a lot of activity and industry but that section is missing in the report. When they go for monitoring plans, there is nothing on

cumulative effects. Streever, someone should give you a medal. I do see flaws. On the method and case study there is no stakeholder involvement. When you are dealing with BWASP with MMS, you forget the traditional knowledge component. Captains have seen whales deflect more than 30 mile, but a report said only 14 miles of deflection. Using traditional knowledge of whaling captains, we can blend information further than from normal migration. We need to blend this in as a positive component. I think getting JASCO involved is a positive. Stakeholders need to be involved and utilize traditional knowledge. When your monitoring report comes to NMFS, there is no mention of traditional knowledge, but using MMOs that gave you the traditional knowledge information. We need to start accepting traditional knowledge; they know the animals like the back of their hand.

Bill Streever, BP: That's a good point. You mentioned cumulative effects on North Slope. The choice of Beaufort emerged as part of the second meeting, and we haven't thought about traditional knowledge, and we may try to figure out a way to do that moving forward. This is just the beginning of what will be a long road to semi-quantitatively talk about cumulative effects.

2010 Monitoring Results for Northstar & 2011 Operations and Monitoring Plans:

Bill Streever, BP Exploration (Alaska) Inc.

Northstar Background: This is the 12th year of Northstar. Typical activities were completed this year plus rig demobilization and island enhancement. We had pretty typical seal counts. There were some very limited airgun and unknown sounds present. We did have a low bowhead call count.

Northstar is out north of the Barrier Island six miles. First oil was in October 2001 with a peak of about 80,000 barrels per day (bpd) and current production at 18,000 bpd. There is a long history to Northstar. 2010 was pretty much routine monitoring. We did have two peer reviewed publications accepted. Analysis of 2009 data was completed, and a five year review is scheduled with NMFS. One thing to note is that there were lots of sound measurements, and I'll talk later about the acoustic flash cards.

Activities in 2010 included 47 ice helicopter trips; 314.5 ice hovercraft traffic; 88.5 open water-helicopter trips; 34.5 open water hovercraft; 63.5 tug/barge trips; 15 ACS boats ; and 231.5 crew boats. Island enhancement was the reason for increased crew boat traffic. Activities included work on the southeast corner, block removal, vibratory sheet pile driving, gravel hauling, roller compacting, more sheet pile driving, dredging of approaches with a clam bucket from island, and we removed drill rig.

Standard monitoring occurred relative to more recent years (2008, 2009). There are more boat spikes in 2010, which were heard and recorded, in comparison to past years.

Seal Data: Total seals were 185, in 52 observation days. Mean number of seals per day was three with a max observed of 18 and a standard deviation of 4.5. Results of the seal counts suggest high inter-annual variability in number of seals sighted and mean daily sightings.

2010 Acoustics/Whale Calls: In 2010 there were a total of 340. The length of DASAR [Directional Autonomous Seafloor Acoustic Recorder] recordings was 28 with an average number of calls per day of 12. We believe the low number of calls was due to large amounts of ice in the area where we would normally place the array. We were able to place and retrieve acoustic equipment, but the number of calls was low. The number of simple calls and complex calls were different; there were a lot more complex calls than in previous years.

2010 Cross Island Hunt: This year GPS's were put on the boats which resulted in a diagram of boat patterns that shows paths travelled in past years. According to the report, four whales were landed, and the hunt was short and successful.

2011 Monitoring Plans include the five year review for the Northstar petition, requesting the LOA for Northstar, finish island enhancements by 2011, ongoing monitoring, 2011 hunt, publish directionality and first deflection papers, submit seal paper, and submit second deflection paper, as well as cumulative effects work. Standard monitoring includes one location to record Northstar and one location to count calls. One hydrophone each will be used, same as during the 2010 monitoring.

2009 Analytical Results Update: Full array was out in 2009. We became aware of lots of airgun sounds and other mystery sounds, which interfered with our ability to analyze data in 2008. We did try to analyze the 2009 data, and what we found is that results were less consistent than they had been in the past. In the past, we did sensitivity runs. In the past we found that the models were very robust but when added airgun information that was not the case. The results were no longer consistent. Overall, results of the sensitivity analysis are not fully consistent with the primary analysis. Some important details of these results are reported here depend upon assumptions and decisions taken in constructing the analysis.

Acoustics Flashcards Update: Last year we developed acoustic flashcards specific to each sound. What we tried to do with Northstar sounds is to summarize meaningful data on these flashcards. We've done 27 sounds that are characterized on the flashcards, and we invite people to review and provide feedback before finalization. Encourage other companies to summarize and do the same to build up inventory of underwater sounds.

Comments:

Susanna Blackwell, Greeneridge Sciences: I wanted to clarify that there are 27 cards but that there are many sounds underwater in single sounds measured in the air, through ice and water. There are less than 27 sounds.

Bill Streever, BP: I misspoke saying it was 27 different sound sources. Some of those measured were single sounds, measured in the water, through the ice and in the air at the same time.

Jessica Lefevre, AEWC: Thanks for stellar presentation and comments on the work done and how it was presented. Just a thought: You've done an amazing job at Northstar. Those of us who have been involved need to sometimes stop and remind ourselves how much we've learned from the project. Part of what NMFS needs to do is look at mitigation and how it is done. We've learned a lot from Northstar from the very beginning and how the company worked with North Slope whalers and the AEWC to design research to understand impact from seismic work. There was quite a bit of back and forth between traditional knowledge and western science on what went into studies. Over time, as project has mature and changes the company has made in response to concerns, i.e. hovercraft and impacted vessel traffic, I wanted to compliment your company and encourage you to add to the presentations because it really is quite a remarkable history and one worth highlighting for others to learn from the experience.

Bill Streever, BP: Thank you for that. I do want to respond a little bit and say for me a key piece was when the communities brought those concerns, I believe, back in 2000. Very few marine biologists would believe the kinds of sounds that would emanate from a facility such as Northstar would have a measurable deflection effect. They pressured us to work with them, to move forward and they were right.

Robert Suydam, NSB: Congratulations on getting the deflection paper accepted. A couple of questions: monitoring planned for 2011 is standard with one acoustic offshore and one near island. What have you proposed beyond that for 2012 and beyond? Just trying to get an idea of what you are thinking in the future.
Bill Streever, BP: We are planning two locations unless there was evidence there was something going on, in which case we would be open to discussion. My own opinion is to do more with the array we have used. We will be learning the same thing over and over again.

Robert Suydam, NSB: You talked about the 2009 results and how they were less sure than previous work, and, so, my question is about all those other activities going on and about whether your impression of other activities and what you've seen at Northstar from a cumulative effects study standpoint. Before you answer, I wanted to just comment on BP's efforts on cumulative efforts. BP has had issues in the last year that haven't been good but in this case, the work you've started and you've pushed will be helpful in the long run, so thank you.
Bill Streever, BP: It is rare for BP to be complimented, especially in the last year. Did I miss your question?
Robert Suydam, NSB: I was just asking about other activities outside Northstar.
Bill Streever, BP: I'll hold off on that until we finish the cumulative effects discussion.

Jeff Denton, BOEMRE: On the low bowhead call counts, have you had an opportunity to collaborate that data with last year's BWASP to actually see if whales were further offshore or with whaling community to see if that's a consistent thing or a local situation?

Susanna Blackwell, Greeneridge Sciences: This afternoon I will show ice maps that will help explain the low call counts. I'm not sure if 2010 would count as low ice year. We definitely had ice where DASAR was and that will have consequences for where whales are, but DASARs don't monitor the entire migration and based on some of the data I will show this afternoon there were actually quite a few whales that went close to shore in 2010. From my viewpoint, it wasn't that the whales went further away; they basically just seemed to have avoided the ice.
Bill Streever, BP: So, Jeff, your question was "do we know if it is localized or Beaufort sea?" I believe we'll hear it was more localized.

Craig George, NSB: I think BWASP work in past has indeed shown an inverse relationship between sea ice density and whale density. But as she mentioned, those were some very heavy ice years that they have in their data set. This may be a localized situation.
Bill Streever, BP: It could be two totally different things.
Craig George, NSB: Bowheads can break ice up to a meter but heavier ice they can't break through and have to deflect around.
Bill Streever, BP: Do you think they would choose to swim under ice if they had the option to go around it?
Craig George, NSB: On our acoustic arrays around Barrow, we've seen deflections around multi-year flows on both sides which somewhat consistent with what I'm hearing. Somehow they can detect them up to a kilometer away and start moving away from them. Another thing about last year was the feeding behavior of bowheads. In Kaktovik, none of the landed whales were feeding and at Barrow it was similar with not a lot of heavy feeding, so it may be food-related as well.

Harry Brower, AEWC: I have a partial answer. Hunters at Cross Island were able to take whales in short period of time and thought there may be a discrepancy in the report, but the observation of hunters is missing in terms of what they saw during their hunt. Were there a lot of whales? Or just a few whales? That's why we need information from the hunters in term of the discussion. I got a partial answer from what Susanna was saying about how the ice was depicted, where the range of ice was, in terms of where Northstar is and Cross Island and how they make their observations of whales offshore.
Bill Streever, BP: I think the report itself has a lot more information from the hunters themselves and what they saw. I just didn't include it here. I will include more information in the presentation next year.
Harry Brower, AEWC: In terms of asking industry to shut down industry operations after the hunt, where you able to comply with that?
Bill Streever, BP: You are right about that, we curtailed activities that we thought would put sound in the water until after the hunt, but boat traffic was still going on. That was an oversight on BP's part.

George Ahmaogak, Barrow Whaling Captain: In your 2010 monitoring program, I assume you went after a letter of authorization for your operations and monitoring program when you went for federal permit. But earlier you mentioned that Nuiqsut landed all four whales. The point I am making is that I haven't seen your Sears Roebuck catalog of all your data sets. A lot of us

stakeholders don't get that, and I've been requesting copies of that so I can read every line item instead of these so-called scientists getting copies, the stakeholders should get copies also, but in your report is it safe for you to say you met unmitigated adverse impact as required under your impact statement so there was negligible impact? I would say you did since they landed all four whales successfully.

Bill Streever, BP: I believe our report is on the NMFS website and if people want the report, I will be happy to print them out. Our annual Northstar report is the downsized Sears Roebuck report; about 70 pages.

George Ahmaogak, Barrow Whaling Captain: Is it safe to say you met the requirement of meeting negligible impact?

Bill Streever, BP: I will be evasive. This year, the hunters on Cross Island did not report any negative impact with their hunt in regards to BP.

George Ahmaogak, Barrow Whaling Captain: But the mitigation process does work if you change your plans accordingly. Thank you.

Ice Seal Committee Subsistence Harvest Updates

John Goodwin, Chairman, Ice Seal Committee

I am representing the Manillaq Service Area and am the chairman of the Ice Seal Committee (ISC). The ISC is just newly formed so we don't have as much data as we'd like, but we are in the process of starting to collect information by the five regions. The five regions are Northwest Arctic, North Slope Borough, Bethel Area, Kawerak, and BBNA. In the future, we hope to have harvest data. A comment came during a meeting recently about why harvest data of seals is not being conducted. In jest, we've had seal harvest data before – in the 1950's the government required hunters to pay bounty which is a form of harvest data. No incident reports with industry or oil companies were reported to the committee.

Harry Brower, Vice Chair: I don't have too much to add. The committee is still in its infancy. There is an attempt to create more funding to continue harvest monitoring for ice seals, which is still in the works. It is an important issue for the amount of seals being removed for subsistence reason. It covers a large range, just like the bowheads. Ice seals are present all throughout the coastal area of the state. We have a large state to deal with ice seals. The committee is formed into five regions at this time. We are still working to develop monitoring plans and address the issues of impacts on seal hunting. It is not as noticeable as there are more ice seals in number and presence. They also migrate, but not as much as whales, and their movements are constant. They don't know boundaries. Movement is throughout a variety of communities based on some of the research.

John Goodwin: About six to eight years ago we tagged bearded seals, and you can obtain information from www.kotzebueira.org. A couple of years ago we attempted to capture adult bearded seals and were able to tag three. The last report was in January showing the seal in the Bristol Bay area. The satellite tag (two actually) is glued on head and is removed when they molt so it's good for about a year. The other tag is on the flipper. Every three weeks or so, when the seal moves to ice or rock, the flipper tag transmits. The seal moved through the same place as it did in

2009; they go back to the same place. We will attempt to see if they can tag a couple more this spring.

Comments:

Colleen Swann, Kivalina: Each year me and my sisters work with our parents on bearded seal and we have to cut and dry for seven to eight households so our harvest is approximately 10-15 per summer. To my knowledge no one has ever attempted to collect harvest data from us. I'm wondering, how do you collect the information and who does the collection?

John Goodwin, ISC: We are working with the ANOs [Alaska Native Organizations] to establish that process to go into the communities and get data. Manillaq, if we get funding, and the funds went through this year, we hope to go to each coastal village or have a representative in each village—Deering, Buckland, Kivalina, Kotzebue, and Noatak—and have someone verify that information.

Ina Shack, Manillaq: A few years ago I did a survey on seals in Noatak, Deering, Buckland and Kotzebue, which is kind of hard, and I'm working on grant right now to do a follow-up, in-depth study. Health is done by study of the blubber and that is my plan if the grant is approved.

Harry Brower, AEWC: In the North Slope, we have scientists that we work with along with some from the State of Alaska, working through the University of Fairbanks to collect samples from harvested seals, ringed and bearded. We also work with others who are permitted to collect samples from subsistence harvested seals, which help us to identify some of the parasites from animals that were harvested. We've seen that and try to identify why the changes occur. We've had samples collected from Point Hope as well working with researchers along the coast, and when we hear concerns about a sick animal being harvested and trying to get samples from that animal.

Colleen Swann, Kivalina: That's good to know because we have questions about whether it's safe to eat the blubber or whatever. I've been doing this since I was very young, and last summer we noticed that the hunters were catching the younger, bigger ones but there were hardly any medium sized ones. We see changes, and we don't have a good cash economy on Kivalina and rely heavily on tribal resources. We don't have the privilege to have our food animals tested before we eat it; that is why we are so concerned about development and contamination issues. What we eat is wild, and so we need the testing of animals on a constant basis because changes that are occurring are to the point where we are not able to adapt as usual as we used to. We need to have this done continuously because things are changing continually way too quickly. Whaling captains don't bring women and children to the camps because it's unsafe due to weather. When we do these studies, we need to include ocean acidification; it's a huge issue. And we need to have more native people at the table. It's come to a point where we realize while you do your work as scientists and federal agencies, we've been so drawn into your processes that we've forgotten for the most part that we do know what's happening. You have to do your sound studies; our hunters have to be very quiet, especially in Kivalina because of our location. It is hard for our hunters and every hunt counts or we have to go much further out. We need more natives involved in the process—I keep bringing

up when NEPA kicks in, you need to invite the tribes as cooperating agencies. Government to government is where you need to discuss this process, and the native people are experts because the things we can give information on is something that we live. You need to work with the tribes.

Unidentified Male: I was one of the lucky few that worked on Project Chariot. Surveys were done in 1942 and about 2,800 seals were taken. The survey was done for two years at Kivalina, and at Point Hope it was almost 4,000 over two years. I have that book to prove it.

Earl Kingik, Point Hope: Point Hope is having hard time catching seals. There was a little seismic operation that went on in the Arctic a few years back, and our seals haven't come back yet. In the month of November when the ice forms and we have open water out there, we could see thousands and thousands of seals, popping up and down. We don't see that anymore. With the climate change happening, we don't see that. Our seals don't float like they used to; they sink maybe five to six feet down. So you see, there is a big impact. My question to the North Slope Borough and to John is, are you for development in the Arctic in the Chukchi? Are you going to say yes to oil and gas development? The animals depend on the Arctic to survive.

John Goodwin, ISC: I think you've asked me a personal question. Sorry.

USGS 2010 Cruise & Monitoring Results for the Beaufort Sea

Jon Childs, Pacific Coastal and Marine Science Center, USGS

The United States extended the Continental Shelf Program. The purpose of the program between the United States and Canada is to identify areas of extended continental shelf that countries may claim under article 76 of the Law of the Sea. The area shown in gray shows areas that have an interest in the extended continental shelf including Denmark, Norway and Russia, in addition to the United States and Canada. The United States' and Canada's interest overlaps and would extend to the west from Canada and north from the North Slope, United States. The Exclusive Economic Zone (EEZ) of each country would be extended into the Arctic.

Overview of 2010 Bilateral Program (United States and Canada): The program proposed last year included two vessels, polar ice breakers, with the Healy leaving from Dutch Harbor (August 2nd) and St. Louis (August 7th) from Kugluktuk and work together for the next month ending approximately September 5-6th. Tracts were done to establish the framework from the continental shelf into the plane and were going to conduct many seismic surveys to tie into existing data sets. There was a modification to the program, because the program was within the United States EEZ, it was appropriate to request an incidental harassment authorization for activity with the United States EEZ. Other activities outside the EEZ did not apply.

The Healy has a multibeam bathymetric system which operated in all waters. The St. Louis handled the seismic operations. Within the U.S. waters, all regulations applied and adhered to terms in IHA. In international waters, it followed the Canadian equivalent of the IHA.

What was collected was far less ambitious than originally anticipated. Two events were the reason for this; one required Medivac of a crew member off the boat, which 1 ½ days were lost due to this event, and the second was a Medivac further out to sea where the St. Louis had to return to meet the helicopter and then return to meet the Healy. Combined, we lost more than a week's time and it significantly limited time for data acquisition. The darker tracts are the seismic that were acquired. The vessels parted ways September 6th with the Canadians continuing to collect data. The Healy, while the Louis returned, took the opportunity to collect sediment cores. The Healy had to stop in Barrow to pick up replacement crew members and lost two to three days on that stop. Because of the thickness of the boat, the Healy had to escort the Louis partially back on the second Medivac.

Seismic Source and Sound Levels: Airgun array consisted of three small airguns, (1 x 150 in^3 and 2 x 500 in^3) for a total of 1150 in^3. The airgun array was towed 11 meters deep to keep it below the ice. The airgun sled was followed by a streamer, which follows about 100 meters behind the vessel. The distance from airgun to front of vessel was over 100 meters. We had an observation of one seal very close to the source, but in fact it was observed off the front of the vessel and exited the area of the vessel.

Monitoring: MMOs / Protected Species Observers. There were four PSOs aboard the Healy and three Canadian MMOs aboard Louis. 2 MMOs from the Healy will join the three from Louis for tracks in U.S. waters; a USGS liaison aboard Louis for all two-ship operations. For two ship operations, there will be 24 hour VHF communications and continuous observations including periods when no seismic and the U.S. MMOs aboard Louis had full authority for start up, ramp up, power down and shut down in U.S. waters.

When in the U.S. EEZ, a total of five observers were on the Louis. When the ships were working together, there were an additional two MMOs on the Healy. Both crews worked the entire time, not just when seismic was used, so there is a baseline established without the seismic operations. MMOs had full authority to direct shut downs, power downs, etc.

Other Impacts on Natural Environment: Ice breaking alters ice conditions around the vessel. Ice is highly variable at this time of year. It recloses and refreezes. Icebreaking by the Healy was considered as a continuous sound source: 120 threshold zone was calculated. It was calculated in its EA as 120 dB zone around the track line when it was breaking ice. We will show how many animals were affected by ice breaking per se. This map shows where they actually have to break ice at 8/10 or greater ice. When less than that, boats avoided the ice, but at 8/10 we assumed we were breaking ice. Once north, we were in serious ice. As one goes towards Canada to the east, it was a serious ice breaking situation.

Monitoring Results: On the St. Laurent (Louis), the observers worked for 854 kilometers (the entire survey) inside the EEZ. They observed when no seismic was made or 264. The Healy observers worked much less as there was not as much seismic associated with this vessel.

Encountered only ringed or unidentified seals, or polar bears. No beluga or bowheads, walrus were sighted and very few bird sightings. This map shows the general distribution of seals and polar bears. Given the few number of sightings and limited timeline of the survey, we were far beneath limited take observations. This was a joint effort between USGS, NOAA, Canadian Hydrographic Survey, and Canadian Geological Survey.

LGL's estimated density of animals in the polar pack ice was very low, and it wasn't surprising that we observed very few animals. Most animals were observed on the ice during breaking with a smaller amount in open water.

Ancillary Environmental Science: Some ancillary environmental science done aboard these vessels included: Ice observations, piston coring and ocean acidifications. Reporting of ice observations went back to respective monitoring groups with real time observations on both vessels. We had a piston coring device on the Healy. Drilling into the sediment produces a continuous core which can be cut and measured for climate history; we look at the near surface samples for contaminants. It wasn't a comprehensive program but a program of opportunity. There was 100% recovery on the cores; we collected two on the margin and three additional cores outward. The most significant core was either 1P or 2P, which returned within the very bottom the first recovery of gas hydrate ever recovered from the Arctic. We were unprepared for this, and it evaporates when it hits the sea surface. We were not able to capture it, but we did get it on video. There were traces of it in the core as well, and we will be measuring it. Finally, we had an ambitious program to study acidification with a team of geochemists aboard who did continuous measurement of the sea water acidity and various other dissolved materials. This was collected during the entire program, and we developed a pretty comprehensive baseline of water chemistry throughout the arctic and then we also did full water depth stations at eight locations.

22,000 data points—flow through system; pH, DIC, pCO_2, collection every two minutes and eight stations with water samples to 3500 meters. Evidence of decreasing pH may continuously reduce sound in sea water. If the acidity of the ocean continues to change, the transmission of sound through sea water could be up to 70% more efficient.

Comments:

Bob Day, ABR: Decreasing pH is going to increase attenuation so that it… ?
Jon Childs, USGS: It will decrease the attenuation so things will become noisier because of the decrease in pH.
Bob Day, ABR: Have you thought about coordinating with Jeremy Mathis at UAF on acidification?
Jon Childs, USGS: No, I haven't. I'm sorry.

Vicki Cornish, Marine Mammal Commission: Thanks for your presentation. I have a question about observation methods used. You said visual observations were not as high as you might think. Did I miss in the methodology … Did you use other methods to locate marine mammals like passive acoustic monitoring, and what were your conditions like at sea in terms of visibility and how did you monitor during those conditions?

Jon Childs, USGS: Yes, we know we don't see all the animals there. We did not have passive acoustic monitoring available. It would have been difficult if not impossible to tow through ice. We did not have capability. And your other question?
Vicki Cornish, Marine Mammal Commission: Visibility?
Jon Childs, USGS: Regarding visibility, we were operating in complete daylight so there was no issue of darkness. Only issue was with fog, which at times reduced visibility to not less than the safety zone but it did reduce it below two kilometers.
Vicki Cornish, Marine Mammal Commission: Did you correct for animals you might have missed?
Jon Childs, USGS: Only statistically.
Darren Ireland, LGL: The estimated take is in the 90 day report. The data by observers during the project were insufficient to calculate densities from that data so the estimates are based on pre-season estimates of what may have been out there before the project.
Leandra de Sousa, NSB: Jeremy Mathis had one technician on the Healy this summer. When you showed the graph with sightings of marine mammals, the effort was much higher when you operated seismic and for ice breaking. Did you correct for the difference? Just because you did so much more time ice breaking and seismic survey, was this adjusted?
Jon Childs, USGS: I don't believe (unable to hear)
Darren Ireland, LGL: I don't follow.
Leandra de Sousa, NSB: On the graphs showing seismic and ice breaking there were 800 hours of seismic survey and 200 hours of non seismic. If there is a lower effort, then the probability….
Jon Childs, USGS: The observers were on watch and observing the entire time. The graph shows what percentage of the time they were observing while conducting seismic versus non-seismic.

Robert Suydam, NSB: 1) You've shown the track lines in the 90 day report. Is that information available including when seismic is operating so others can look at it and what I'm getting at is there were beluga and bowhead that were satellite tracked that may have been in the area when you were shooting and to see if there were any reactions from tagged animals during the process.
Jon Childs, USGS: All data acquired aboard the Healy is public. Data from the Louis has some restrictions but there were no objections to us releasing the so-called shot files when the airgun system was operating. We can't release the seismic data itself, but pretty much everything else for anyone who wants to pick it up.

Robert Suydam, NSB: The SSV used this year, I think it came from 2009. What was the process for calculating the safety radii? The reason I'm asking is the radii you presented today from the mitigation airgun at least are much, much different than the safety radii that Statoil provided for their 60 cubic inch airgun and their much smaller single airgun had a much higher safety radii than you presented.
Jon Childs, USGS: The methodology used was from 2008 where we measured received levels from air guns on the Healy when it was stationary and the Louis ran a pattern around it. I have been trying to make calibrated measurements for years and years and inter-observational variability, and it is a difficult measurement to make. It depends on depth of hydrophone and local variables, and so I would have to look at parameters in each case.

Robert Suydam, NSB: I think Statoil's and most of industry's SSV comes from bottom founded instruments and so that may be a parking lot issue that we want to deal with, which is the method used for SSV and calculating safety radii. If different methods are used, then there may be problems, and we may be disadvantaged using one method over another.

Robert Suydam, NSB: Another question about calculation of takes and with the seismic, with the air gun shots, that you only calculated exposure of potential takes to 160 dB and seismic guns are impulsive versus ice breaking which is considered continuous sound. The problem with using that approach, and maybe this is a question for NMFS as much as it is for you, is that the best available data suggests that impulsive sounds from seismic airgun arrays affect bowhead at levels lower than 160 and if belugas/bowheads in area, perhaps the estimate on exposures are biased low as they are reacting to lower levels of sound. What is the policy of NMFS on using best information to estimate takes?

Jolie Harrison, NMFS: We acknowledge animals are affected at lower levels, and where we typically brought that in to play quantitatively is when evaluating subsistence use effects because obviously something that may or may not rise to the level of a take under the MMPA can still have a potential to cause an animal can move in a way that may interfere with a subsistence hunt. That's how we've characterized that in the past. I think everyone's aware that we're reevaluating how we address level B harassment responses from animals in the future in terms of criteria. In short, we've still been maintaining that 160 is a level at which we would expect a response that rises to the level of harassment under the MMPA.
Robert Suydam, NSB: The timing of seismic surveys in the U.S. EEZ was in gear when they are hunting bowhead and potential for disturbing whales during hunt or perhaps interfering with the availability of bowheads to hunters certainly would rise to level of disturbance related to the availability of animals so I would contend that using 120 dB is much more appropriate for estimating the takes from this or exposure than sticking to 160 dB. There is room to talk about the appropriate levels but in some of the previous studies, it wasn't just whales that were responding to sounds down to 120 dB, but they were essentially being excluded from an area which seems pretty substantial. My personal recommendation is for this project that takes and exposure be calculated down to 120 dB from the airguns.

Jon Childs, USGS: We did specifically plan the cruise so the portion of the seismic survey was in the very beginning. We tried to time it as early as possible to avoid conflict with the hunt.

Bill Streever, BP: Using PAM towed system to augment and I would question why even use PAM if you are tracking ringed seals. PAM is a useful tool in some circumstances but to throw it over the side on each shoot just doesn't make sense. Would you comment? Also wonder if MMS could comment on when we might see the report from the PAM meeting I think two years ago.
Jon Childs, USGS: I, myself, am not capable of correctly responding to your assessment of PAM. I would have a much more informed opinion in a few months when I have had a chance to work with it myself. There is an upcoming program in Southern Gulf of Alaska using PAM.
Bill Streever, BP: It will probably work well there. We should talk more later.

Jim Kendall, BOEMRE: I'm not sure when it's coming out. It may be in a draft form on the website. I will find out and get back to you by end of tomorrow.

Robert Suydam, NSB: I have a process question for NMFS. This is the last time we are going to talk about the 2010 USGS Cruise at this meeting and presumably it is not going to be talked about at the peer review meeting later this week. There are a lot of other issues and questions that were in the report that folks might want to address or ask questions. What is the process for doing that or getting more information on the report , modifying it, and such?
Candace Nachman, NMFS: The peer review is for 2011, and I'm confused.
Robert Suydam, NSB: There wasn't a peer review for this IHA last year, and we have a report in front of us and because of the potential to impact marine mammals that are important to subsistence that there are questions that would be helpful to have answered so we can learn more from the study, learn more about impacts, learn more about the environment and avoid problems in the future.
Michael Payne, NMFS: That's a good question Robert. Let us chew on it. Perhaps the questions can be incorporated into the development of the EIS process; perhaps we can address off line because this is a new situation.

Shell 2010 Monitoring Results for Beaufort & Chukchi Seas Marine Survey Program

Michael Macrander, Shell

We were asked to present on a couple of things. The first was to report on the 2010 season, and Shell had a reasonably small 2010 program in the offshore in Alaska. Secondarily, we were asked to look at the past four to five years of our monitoring program and hit the highlights of the big themes and findings. And instead of having me give the entire presentation, we've heard in the past that people would like to hear from the scientists themselves, therefore we will have multiple presenters.

In 2010, offshore activities included the following: Shell operated two programs using two vessels. The primary vessels were the Ocean Pioneer which for the most part was engaged in what we call geotechnical activities such as borings, cone penetrometers, things that would measure the ability of the ocean floor to withstand pressure of things like development platforms resting on the bottom. A lot of sonar, sidescan sonar and multibeam sonar, and relatively high frequency sound sources with low volume and intensity. Additionally, Shell had a hazards program on board the Mt. Mitchell. It was a fairly targeted shallow hazards program. There were a lot of challenges in terms of ice, and we'll speak to that and what it meant to the 2010 program and to the bowhead whale migratory patterns.

Field activities included:

- Shallow Hazards: 4 x 10 in^3 airguns, side scan sonar, multibeam sonar, and bubble pulser.
- Geotechnical: Seafloor coring, cone penetrometer

- Two additional vessels were the Arctic Seal (supply/support) and Annika Marie (sturdel scour survey, one day work in multi, single and side beam sonar).

The season was July 17 through October 23 and consisted of development surveys by the Ocean Pioneer, and shallow hazard and ice coverage surveys with the Mt. Mitchell. There were standby/transits, non-seismic surveys and seismic surveys. They were dodging ice in the Beaufort during the entire season, so they were moving around trying to take advantage of open ice. Ice in the Beaufort was an operational challenge. The ice persisted well into August/September.

Mitigations observed: In regards to subsistence, we didn't operate during blackout periods for hunts, communicated with call center, and coordinated through village subsistence advisors. Operationally, there were MMOs on board all vessels, sound source characterization on all equipment, followed ramp up procedures and power downs/shut downs as needed. Mitigation is not just observation programs, but the Shell program is the Alaska Venture Science studies, which consists of three components: monitoring, baseline studies and engineering and technology. Monitoring is permit driven, and threatened and endangered marine mammals done primarily via air.

MMO (Protected Species Observers): there are three pieces to this. 1) There are vessel based MMOs (1,000 of km of observations in both Chukchi and Beaufort); 2) aerial programs in both Chukchi and Beaufort; and 3) acoustics (open water since 2006 and year-round since 2007). 35 recorders in the Beaufort Sea directionally capable to localize on calls.

Visual Program Monitoring Objectives: provide MMOs on vessels, implement mitigation measures, collect data and have MMOs to estimate exposures to animals from seismic and other sounds. Shell uses an ecosystem approach to data gathering in the offshore consisting of several elements.

2010 Vessel-Based & Aerial Monitoring Results: Craig Reiser, LGL

Mr. Reiser highlighted data from monitoring effort, on vessel tracklines and specific number of sightings by species. All data are available in the 2010 Shell 90-day report on the NMFS website. Please see report for detail.

Vessel-Based Monitoring Results: Valuable baseline information was collected during the vessel based monitoring. All monitoring was conducted with MMOs on board. The Chukchi early and mid-seasons were dominated by gray whale sightings. Sightings in the late season were primary bowhead and mysticetes. No polar bears were observed. One marine mammal carcass was observed in the study area. A ringed seal was seen on September 3, 2010, from Ocean Pioneer, west of Point Hope; three unidentified pinnipeds, and one beluga.

Monitoring from the Mt. Mitchell had a small seismic sound source. One MMO was on watch during all daylight and nighttime power ups. Two MMOs were on 30 minutes before and during all full

ramps ups and as much as possible during other survey operations. 2010 Actual Watch status requirement was met plus at least one MMO.

Sound source: 40 in^3 (4 single 10in^3 airgun) and mitigation single 10-in^3 airgun)

In the Beaufort, a total of seven polar bears were observed all on ice and at one-half mile. Estimated number of polar bear figures are available in 90 day report.

No marine mammals were observed within specific threshold safety radii during 2010. There were still two power downs both for seals observed ahead of the vessel. Both seals were observed at 100 meters from the airgun array. It is very unlikely that the seals were exposed to sound levels greater than 190. No marine mammal carcasses were observed in the Beaufort Sea Study Area in 2010.

Aerial Monitoring Survey Results: 28 surveys occurred in Harrison Bay from July. Bowhead whale sightings occurring during August 1-September 24. There was a lot of ice, so no seismic as the Mt. Mitchell was not able to get into the area. The non-seismic sightings occurred on the northern edge of the ice. A storm came through and moved the ice in the late season, and the Mt. Mitchell came in and did work. The bowheads moved slightly south. This suggests that bowhead sightings were driven by ice.

Geotechnical Development & Shallow Hazards Program: Sound Characterization Measurements—Dave Hannay, JASCO

Sound Source Characterizations: Shell's IHA's for the 2010 shallow hazard/geotech required sound source characterization measurements. Sound source measures are generally required for impulsive sound sources and for vessels, with the primary purpose being to confirm distances for marine mammal exclusion and disturbance zones. In 2010, the IHA also required characterization of high frequency sound sources. There was a lot of work done in 2010, and the results are in the 90 Day Report are on NMFS website.

The shallow hazards program included sound source measurements for the Mt. Mitchell, the smaller gun array, and we also looked at the ecotrack single beam sonar and geoacoustic geopulse. Geotechnical development sources included the vessel Ocean Pioneer, Edgetech profiler, cone penetrometer, vibrocore system, multibeam sonar and an AUV that supported some of the other sonars.

Measurements were made throughout Harrison Bay, and a comparison with 2010 measurements were compared with prior year measurements in Honeyguide, Burger, Crackerjack, Camden Bay-Alpha Helix, Camden Bay and Beechey Point.

Shallow Hazards Sonar Source Results: The main point is they were trying to measure high frequency sonars. None of the sonars leaked below the 180 kilohertz (kHz) and would therefore not be heard by marine mammals.

Measurements of vessels in transit mode: The 160 dB level distances are quite small, less than 50 meters. There is some variability between 1100 meters and five kilometers.

Threshold distance for stationary continuous noise sources: Holding position using thrusters was about 10 dB higher. The vibrocore levels were a fair amount higher. That system only operated for about two minutes total.

Two fish side scan sonar operated within the audible dB levels of the mammals. The 160 dB level is about 95 meters and 120 dB gets out to 1.2 kilometers.

Summary: the two airgun configurations produced measurements consistent with previous studies. Sonars frequency at about 180 kHz produced negligible sound energy below 180 kHz.

Joint Studies Chukchi Acoustics—Dave Hannay, JASCO

The purpose of the program is to improve understanding of the temporal/spatial distribution of migrating paths for marine mammals in the Chukchi. It is a joint effort with Shell, Statoil and ConocoPhillips. It is intended to measure natural and manmade noise. It was initiated by ConocoPhillips and Shell in 2006; Statoil joined in 2010 and it also includes fish, benthic and seabirds. Recorders were initially deployed in the summer of 2006, and in 2007 winter deployment was added, which continues today.

In 2010, 44 AMAR recorders were deployed in early August and retrieved in mid October. Four line arrays and three arrays of synchronized recorders were used.

Data analysis approach is to use computer and manual analysis on a fraction of data, automated on all data, and manual on a fraction to ground truth results. This table (projected) shows summer protection species typically seen, which are bowhead and walruses in the summer, and in the winter we get the same species but bearded seals are the most numerous calls in the winter.

[Presentation of results for belugas, bowheads and walruses. Provided sample audio recordings for belugas, daily presence results and call detection index and presence movies. Showed statistics of presence plots of belugas from October 2009-July 2010 on the recorders which shows whether the animals were present or absent on a given day.]

First picked up sounds in early April of 2010. One anomaly is in Barrow around the first of April. In the fall, there is detection in early October when the recorder was deployed. It is a preferred location, but other areas are intermittent. We can only detect if they are vocalizing. Bowhead migration is similar to belugas. They were first seen in Point Lisburne and then moving east . There is a strong migration of bowheads across recorders moving across the study area. See them toward in Cape Lisburne into December depending upon ice conditions.

For walruses there is a 13-month time period. In spring, the first detection is Cape Lisburne during the first week of June and then intermittently except off of Wainwright, a preferred site for feeding, and they stay continuously through summer and into September. They begin to leave the area by the end of September. [Call detection index movies for 2009 for belugas, bowheads, walruses were shown.]

Summary points: distribution of bowheads, belugas and walrus are becoming better understood and are in line with aerial and vessel observations. Acoustic detections of other species have provided valuable information. In September 2010, walrus remained present in most recording stations near Statoil's 3D seismic. More bowheads call detection in late September 2010 likely due to whales feeding in Barrow. Pulse of bowheads detected migrating past Wainwright in late September 2009 was delayed in 2010.

Beaufort Acoustics—Susanna Blackwell, Greeneridge Sciences

I will show a few results from the 2010 DASAR monitoring and some of the main findings. In 2010, ice was a problem in the Beaufort with about one-half of study area having ice up to two weeks after DASARs were deployed. There were five sites where DASARs were deployed, but some were not able to be put in due to ice. This graph shows 2010 call localizations with 287,842 whale calls localized. We tried to use seismic data, but the airgun pulses were so barely detectable at two of the DASARs that they could not be used for time calibration. We did do manual analysis of six complete days in part to train automated algorithms and also to use as a comparison point. We compared 53,619 manual analysis localizations versus 38,971 automated localizations. The number of calls detected by the automated analysis was quite a bit lower than the manual analysis and that may have to do with a seal filter that was probably a little bit too strict as to what was a seal and what was a bowhead.

These are ice maps. We wanted to see what the effect of ice was on the locations of calls. So we split up the deployment season into six ten-day periods and plotted the whale calls for each ten day period and then overlaid an ice map from the middle of that ten day period. Only plotted very high ice coverage (70% and above). The ice areas are transparent so you can see calls underneath. During much of 2010, Site 1 was covered in ice and not surprisingly the number of calls are lower. But, we did get the highest number of walrus calls at Site 1. We suspect the ice and the walrus have something to do with each other. The high number of calls (on the August map) is well delineated by the ice. You can see over the course of the six maps that as the ice melts and moves out, the whales move closer to shore.

[*Provided a graph outlining a multi-year comparison of airgun use in 2007-2010 within the study area.]* Airgun pulses and calling behavior results: 1) nearby airgun use caused a drop in bowhead whale calling rates, and 2) bowhead calling rates dropped when cumulative sound exposure level at the whale over 15 minutes was greater than 116-124 dB re 1uPa^{2}s. This is still being analyzed but that is the threshold where the call detection rate starts dropping.

Between year differences in call distribution slide including BWASP sightings was presented showing 10th, 50th and 90th percentile of the distance from shore. Half of the dots are north of the line and half are south of the line. This shows 2007-2008 with more airgun use in the study area and 2009-2010 with less, or more distant, airgun use. These did not show significant difference in sightings.

We also looked at call numbers. This slide shows the mean daily number of call localizations. You can see that the two orange years, they are the years with more airgun operations and they have sort of a low year and a high year and the same for the two years with more distant airgun operations. This includes all the calls, not just the calls restricted to our racetracks. If we look at mean hourly wind speed, for these four years, you really see a relationship. You notice that the year with the highest mean hourly wind speed had the lowest number of calls; the year with the lowest mean hourly wind speed had the highest number of calls. We know there is a relationship between the wind and the number of calls we can detect, which is precisely why when we do statistics on our data, we restrict our samples to this very narrow racetrack area around the DASARs.

In summary, some of the points I want to make are: ice affects the location of bowheads. Bowheads significantly drop their call rates when subjected to a threshold received level of sound from airgun pulses. There is substantial year-to-year variation in numbers and distribution of calls with or without industry operations. To date, within the area we can monitor with the DASAR array, the acoustic data have not shown changes in the large scale patterns of calls as a result of seismic exploration. What I mean by large scale is when you look over the entire season or the entire study area.

Aerial Surveys in the Beaufort and Chukchi Seas—Dale Funk, LGL

In the Chukchi we flew surveys on the coast. We looked at walrus over the four years of surveys. The big differences we see in walrus distribution are related to ice. In 2007 and 2010, the ice moved out, and the walrus moved into shore haul outs. In years of ice, the walrus occupied smaller pieces of ice, and the walrus didn't move to the shore haul out.

Regarding gray whales, the biggest difference we see over the four year period is in 2006. There was a lot of ice in the study area and therefore there were not a lot of gray whales present. There were more whales in the years without ice (2007, 2008 and 2010). In 2010, there were fewer sightings but that was due to the effort and airplane doing sightings in both the Chukchi and Beaufort Seas

We don't see a lot of bowheads in the spring, but usually pick up a few in the fall around Barrow.

In the Beaufort, there were general survey lines flown and conducted in Harrison and Camden Bays. Behavior of bowheads, in 2007 and 2008, were a lot of feeding whales in Camden Bay. In 2006 and 2010, there tended to be more travelling whales. This map shows Camden Bay sightings of bowheads in the Beaufort in relation to seismic ship. In non-seismic, the location is related to the position of the ship. During seismic, the position of the whale is relative to the last shot point. We

did see a shift of whales in towards shore in 2008 during non-seismic. In 2008, Harrison Bay was similar where there was non-seismic versus seismic. There were more present during non-seismic periods. In 2010, during non-seismic there were a lot of sightings out along the ice edge. When the ice moved out, more sightings occurred.

Regarding sighting rates in 2007-2008 versus sound pressure levels (rms), where there was no detectable seismic = 8.16/1000 km; during seismic 90-150 db = 7.64/1000 km; and during seismic 120-150 dB = 8.83/1000 km. Very little effort was obtained in areas exposed to sound levels 150 dB re 1uPa (rms), so sighting rates could not be calculated.

In summary, there was no significant difference in sighting rates for feeding bowheads when compared to no detectable seismic. We did see small scale avoidance of seismic operations for feeding and traveling bowheads. There was general avoidance of the 160 dB zone but moved through the 120-150 dB zone. Distribution of walrus and gray whales near shore in the Chukchi were primarily related to ice in survey area. We haven't seen any big changes in the general distribution of animals in the near shore area in the Chukchi.

Comments on Agenda:

Michael Payne, NMFS: In retrospect, hindsight is 20-20. We let too many presentations go by without comments, and there is too much data. I started getting lost. My biggest concern right now though is that we've gone a whole day and haven't reviewed the two monitoring plans we have to look at: Statoil and ION. I don't think it's fair to Statoil since we have to get out of here tonight by a time certain because there's something else going on in this room. I would like to take a look at my agenda. My idea is to change things pretty dramatically tomorrow and have Statoil and ION from 8-12 tomorrow so we can have a good comment on their discussion and review the monitoring plans and whatever time it takes today we just deal with Shell and if people have comments and questions that last an hour let's do it today. I'm trying to be fair to the process and to the law. Honestly, this was great stuff but we didn't have to have it this year and maybe we should have had Statoil go first. So, I am open to discussion but I want a good discussion of the two we have to review for 2011. I can make a concrete suggestion, but don't want to anger half the crowd. I'll leave it up to Statoil, but I would like to see them start tomorrow and then follow it with ION with enough time to discuss those two, and if we have to push NSF to the afternoon and forego NMML and forego some of the other stuff, we'll do it but I want a good discussion of those two programs, and I don't think it would be fair to have comments now on Shell's presentation and ask Karin to come up here for 35 minutes and rush through hers.

Lisa O'Brien, Facilitator: Can we have our cookie and eat it too? What if we allow people to ask their questions of Shell and assume that will take the balance of the day? What happens if we start tomorrow at 8:00 a.m. and that gives us 8:00-9:30, which is what was slotted?

(no name given): What we could do too is if there's time left today we could take care of one of the presentations. We are flexible.

Lisa O'Brien, facilitator: The proposal is we start earlier tomorrow and go later.

Robert Suydam, NSB: I have a clarifying question for Mike. In terms of Statoil and ION for tomorrow, you want to talk about the plans for 2011, and so I just wanted to figure out how Statoil's 2010 presentations fit in?
Michael Payne, NMFS: I'm not cutting out 2010. I want them to have the time we allotted them, and if we try to squeeze them in tonight we are going to do them an injustice. I think we are at the point now where we should wrap up after Shell. I think the only way we're going to be able to do it is to do the 2011 monitoring first.

Lisa O'Brien, Facilitator: Let's allocate ten minutes for questions for Shell. Is that enough?

Ron Felde, Facilitator: Start at 8:00, Statoil is on first and they will do 2010 and 2011, followed by ION.

Michael Payne, NMFS: Thank you for being flexible.

Comments on Shell's Presentation:

Harry Brower, AEWC: I have a comment to share with you on my observations in Barrow. In regards to the communication we had for Cross Island hunters from Nuiqsut. There was communication from Shell requesting a five day extension beyond the August 25th shut down date and how did that work for you? My other comment is on the continued communications with Barrow Whaling Association and a Search and Rescue vessel. One of the research vessels wanting to come over and pull out some instruments before whaling. I didn't hear anything about either of those situations. Refresh my memory on those two items.
Michael Macrander, Shell: We requested to be able to extend our season there since we had so many ice problems and that request was granted by the Nuiqsut whalers at Cross Island. In my summary slide, Harry, I elected not to show the first bullet that the communications and observations of shut down periods and the communication lines have absolutely worked for us, and so we very much appreciated that opportunity to extend our season last year. There were a lot of difficulties with ice, etc., and it enabled us to acquire the data that we needed so that we don't have to come back again and try to do it again another year. With respect to the science program, again, I want to stress that the Joint Studies Program jointly funded by ConocoPhillips, Shell and Statoil, in 2010, there was a lot of discussion about do we go pick up the recorders close to Barrow prior to the Barrow hunt or do we wait until after the Barrow hunt and intentionally not be able to retrieve them this year because by a certain time we have to get out of the theater, etc. We talked internally about whether to get them prior to the hunt and came to the decision to catch the peak of the migratory season so we left them in. As I understand it, since Shell was not the operator, we were monitoring in the background, a request was made to get them while the hunt was going on. There was some initial misunderstanding that we had actually gone and picked them up which was not the case. It was discussed and then, as a recall, there was not favorable weather and there was an opportunity to slip in there within a 24 hour period and get them out of there. From my impression, the communications worked as they

were supposed to, and we were able to get the recorders and get the data we had required. From our perspective it didn't impact the hunt and hopefully that is the case.
Harry Brower, AEWC: Thank you. Those communications need to be shared. Others don't really know about it in the presentations. This is an opportunity to share that this type of activity occurs and it is working for both sides.

Unidentified Male Speaker: I don't know if the science is there to prove or disprove disorientation by the whales. On the slides that showed the difference between seismic and non-seismic activity, in one instance the whales react northward and in another instance they react southward. In another instance they react westward. It seems simply as if the whales pick the leader to follow that may have been disoriented and where they went, if anybody can determine whether or not these whales were disoriented from the seismic activity, I would sure like to know.
Michael Macrander, Shell: Bear in mind those were plots that were taken from aerial overflights in relation to where the seismic vessel was, so if the seismic vessel was moving around, it wasn't staying in one place and it was plotted relative to that. I'll say that for example in 2008 what was observed during the time we were conducting seismic was likely two things: 1) probably an inshore displacement, meaning movement, towards the shore. I think in the acoustic data and the aerial data show that it is relatively subtle, and 2) there was a feeding concentration somewhat to the southwest of where we were operating that lasted six to ten days while we were conducting seismic. They were outside the 160 zone and within the 120 zone and that's why you tend to see that. Arguably it is not a displacement as a utilization of an area that was sort of previously thought to be vacated.

George Ahmaogak, Barrow Whaling Captain: Michael Macrander from Shell, you did a quick presentation for 2008 through 2010 for Shell, and I take it this was the consortium along with ConocoPhillips and some of the environmental baseline data you briefly mentioned and acknowledged Fairweather and Sheyna Wisdom. Or those of you that don't know, Fairweather is a private company here in Anchorage has joint ventured with the village corporation of Olgoonik which is Wainwright and Kaktovik Native Corporation. This is the first time they went after this basic data gathering that Shell just reported. It was a very good presentation, and I was very impressed that the local context was used as part of the monitoring report. Or the first time very good data is coming out of the monitoring including acoustic and marine mammal migration and so forth and marine mammal observers, and I keep saying traditional knowledge. That is the kicker and the key, I keep saying over and over. Partners like this with local contacts. I'm very impressed with their data gathering. I appreciate the local content and local contractors. You mentioned a little bit about call centers that were situated and the marine mammal observers. Those are also under local contracts as well. I commend ConocoPhillips and Shell for going forward and trying to work with the native corporations near or in the impacted areas. For LGL, on your reports, you came up with the conclusion there was a small scale avoidance during seismic as I understand 160 dB. I appreciate it; I think that's why we have this peer review. I don't necessary agree with that conclusion, and that's why we have this peer review process. I don't know if we have 90% confidence level or the sample size was correct. Was that enough whales to make that determination and that conclusion? That's why we have

the peer review process. I don't agree there was a small scale avoidance, and I hope this issue is taken up seriously.

Michael Macrander, Shell: If I can take just a moment and give credit where credit is due, this Joint Study Program was initially conceptualized and initially operated the first two years by ConocoPhillips, and they deserve a huge amount of recognition for that.

Caryn Rea, ConocoPhillips: Olgoonik Fairweather has had an exceptional agency record for the past three years. They have had no accidents whatsoever, and they operate vessels with people from universities, research institutes, and they operate equipment they are not used to. You should be really proud of this local government; it's performing super and giving us results. You deserve a round of applause for this village cooperation. It's super.

Robert Suydam, NSB: I'll add a bit more to that. I'm glad you mentioned that the Joint Program was a joint program. The data set that you are accumulating is perhaps unprecedented, and it is going to be incredibly valuable as we move forward. I'm a little disappointed that you guys didn't have more time to present the data more in depth and that we're not going to have more time to actually have dialogue about the data and the conclusions. George just made an important statement about does the data support the conclusions, are there enough sightings, etc. We look forward to seeing more in depth analysis and presentation in writing so we can provide some additional review on the report about the data collected in 2009 and 2010. The presentations showed the whale locations relative to the seismic vessel and thanks for doing that. We've been asking for that for years, and it is good to see it. Michael, I thought you had on your list of things you were going to talk about, Dale was going to talk about integrating different data streams, and I don't know that the presentation really covered integrating different data streams, and maybe you can talk a little bit about that.

Michael Macrander, Shell: I did mention early in my talk that certainly we view the monitoring program as being three legs of a stool: aerial, acoustics and vessel based observations. I think that what we have experienced over the last four years is that one of those data streams, and I would add to that as a fourth leg to the stool when it is available, tagging data, and we're not likely to have all four or even the three that I mentioned. A good example of where it is important to have multiple streams of data is if we talk about the acoustics it is a tremendous tool, and the number of calls we get is important but one of the constraints of that program is that whales are not always vocalizing because of environmental factors such as wind or ice or something of that nature, and they are less detectable, and so we need to have another way of knowing where those whales are, which is where the aerial is important.

Robert Suydam, NSB: I think the stool can become even more multi-legged. George's point of traditional knowledge is another important leg in that stool. But using the three legged analogy staying with that for the moment, two of the legs are quite stout: aerial services and acoustic data are the legs that really matter. I have a lot less confidence in the vessel-based surveys for lots of reasons we've talked about now over five years. Integrating the data streams so that we can actually look at the acoustic data and aerial survey data together to help us understand the general distribution and relative abundance of animals is important but also about impacts. We are getting there slowly.

Michael Macrander, Shell: I think most of the people in the room know that although Shell has sort of taken the lead and we've done so with contributions from ConocoPhillips and BP and ION GXT and others over the years, we've generated a comprehensive report that was initially conceived to try to get at as much of the cumulative effects as possible, and what some of these larger data sets are about, we are just beginning to get chapters in on 2010, and we've been talking about how to approach this because the way it's been drafted in the past couple of years has been a section for acoustics, a section on aerial, a section on vessel-based, etc. and a summary chapter and this is a good venue to talk about would it be better to parcel this in some kind of topical sorts of treatments like the topic of deflection and look at all three or four or five data streams kind of simultaneously in an integrated manner to answer specific questions. I'll just throw that out as a possibility.
Robert Suydam, NSB: I'll say that's a great idea and adding an additional chapter on integrating the various data streams would help us better understand deflection. We've talked about, since 2006, that the point of doing these studies is to better understand what impacts are so we can design mitigation measures so we can improve our operations and have less impact on the animals.

Unidentified Male speaker: This question is for Susanna because I picked up on the part of your conversation about calling behavior, and I know you've talked about that before, but it was the first time, I think, that I had seen the SEL metric range in there and usually we are going the other way and asking people not to use rms, and I like SEL metric being in there. I was wondering if you could comment on the range within those blocks were for rms levels and the second question is, is there anything in the data that would give you any insight into whether that is a movement or a cessation of calls.
Susanna Blackwell, Greeneridge Sciences: I gave a range 116 – 124, or whatever. When I talked about this last year I only gave one number, which was 120. The reason there is now a range is that we've re-analyzed all the data from 2007-2009 and run the same analysis that we had done in 2008 on all three years and we got 124 for 2007, and 116 for 2008, so that's where that comes from. When we did this statistical analysis, we had various parameters and SPL (sound pressure level) was one of them. The reason I only mentioned SEL (sound exposure level) is that's what came up in the top model. I had calculated out the radii from the ship; the distance at which the threshold was reached was approximately 50 kilometers. We really can't say anything about movement. From our perspective, it is a cessation of calling. The one thing that we should keep in mind is the fact that we have shown directionality in the calls. Now, that directionality is mainly going to be existent in shallow water and not so much in deeper water. If you imagine that the whale responded by just turning around and going the other way, it's call should drop by the average that we showed in the directionality paper which was something around 3.5 or 4 dB, so it would have actually vanished. The thresholds were actually pretty sharp.

Colleen Swan, Kivalina: Earlier I mentioned about when we work on a rook and last year our hunters caught more agoowok than the bigger ones. The agoowok are small, they are a little too small to work with, but we had to use them. What happened to the medium sized? When you do your observations do you just count the heads that pop up or are you counting by size and there are three general sizes. The other thing is that last August, this was not in the Beluga

Commission's report, two teenagers caught a beluga in Kivalina, and, in September, our people saw bowhead whales right in front of Kivalina, and that is very unusual. It is something that should make me happy because maybe our people can start hunting bowhead whales in the fall, but it also concerns me because I'm wondering if the bowhead whales are not being traumatized. Can anyone look at all the studies that have been done and answer these questions and help us to understand what is happening? Kivalina is a whaling community. We don't have a marine mammal observer and because of the things that are going on, you would think that it would be a good place for someone to observe these things and record them.
Dale Funk, LGL Alaska: I'll respond to that briefly if I can. Regarding what we collect data on from vessels that would be all marine mammals that we see. Any marine mammal detected we collect as much data as possible. In the case of bearded seals, it is typically a head that pops up. It's pretty difficult to go beyond that with a limited look, and the animal dives or sinks or whatnot, and so we just can't say much about the age class of most of the animals. It's a little different with walruses, cow/calf pairs are much more easily distinguished. So we do collect what we can, but it is difficult to take a thorough look at an animal when it just pops its head up. Also, about the MMOs and where they are from. We talked in December at the Marine Mammal Commission meeting about where the MMOs are from and you did make a good point, and we are looking at ways to expand where we recruit MMOs from. LGL works with AES to recruit MMOs, so again we have talked about expanding out where we find these MMOs, and we actually welcome recommendations people have for individuals that they think might be good MMOs.

Earl Kingik, Point Hope: My comment is that I like your presentation there. The migration is going on right now. The migration is making a big move to the north. We are happy to see what you have presented. But next year when we go to the Open Water meeting, although numbers change, would the animals be displaced somewhere else? Are they going to end up in Canada or Russia? What will we end up with? It is good that you showed us this. My question is do you have a permit, an incidental harassment permit? Do you have a conflict avoidance agreement permit from the commissioners we have. We have the AEWC that takes care of the bowhead. We have the Walrus Commission that takes care of the walrus. We've got the polar bear that takes care of the polar bears and we have this Arctic Treaty Council that takes care of the whole north. Do you have any kind of permit to do this kind of operation, to harass our animals that we love the most?
Michael Macrander, Shell: So, in 2010, we did have an IHA. We submitted a description of our activities and an estimated take to the NMFS, and we operated under an incidental harassment authorization. We also participated in the negotiations around conflict avoidance agreement with the AEWC. I will say that Shell signed a version of the CAA. We made some fairly minor modifications to that, signed it, and we also abided by most of the parameters that were in that with respect to communications and observing blackout periods and that sort of thing.

Jessica Lefevre, AEWC: I think that trying to squeeze this program in to two days was incredibly optimistic. It would have been helpful if we could have had a little bit more time because there is a lot of information. I'm going to hit a couple of points. I want to direct most of comments at NMFS and at the information you are being given here. Hopefully as you go through your EIS

process, you're going to keep in mind the need for an integrated approach to looking at these issues and on that I will note that all of the work that has gone in over the years to putting this process in place and providing for the peer review, the requirements and the opportunity for peer review, the reason we're here is to learn about impacts, and I'm going to state this a little differently than Robert did, is so that we can accommodate these industrial activities in the offshore areas where subsistence is taking place. If we are going to be successful at accommodating these apparently incompatible activities, we have to be able to understand the impacts, and sometimes I think we lose focus on why we are here. I want to encourage us to, two things, to look forward to some of the work that's going on that will have us look at masking as a way to try to get a broader view of what's happening in the oceans with the sound sources. We are spending a lot of time in the weeds, and we're not getting a more global picture. I've missed a couple of meetings and maybe this has happened, in which case I can be briefed offline, but based on discussions in the past and what I'm hearing today, it would be very useful to have discussions on how density estimates are arrived at. I'm hearing take estimates based on density, I'm hearing take estimates based on boat based observations. I think we have a broad based consensus amongst many participants that boat based observations are not the good way to estimate density or take because we know from hunters and published literature that active vessels drive whales away. Next year think about giving us a little bit more time.

Bill Streever, BP: My question is for David about detection for belugas and bowheads as they swam through the Chukchi. Do you know anything about detection instances for those two species, and how do you incorporate that into interpretation of these data sets? In other words, it seems like the higher frequency call of the beluga would have a shorter detection rate than a bowhead calling rate.

Unidentified Speaker: Those are good questions. We have some idea of detection ranges from localization studies, especially the work that's been done by Susanna and Greeneridge in the Beaufort Sea. We can look to see the distances of bowheads which can be up to 20 miles in good weather conditions, and, then in poor weather conditions, it can be as little as 5-6 miles, so we do have some idea of how far we can detect these animals. As far as belugas are concerned, they have higher frequency calls, and they don't propagate as far, so we can't detect them from as far away, but we have received some beluga calls on some of our arrays on more than one recorder simultaneously and these recorders are about 80 kilometers or five miles apart so we do know that in good conditions we can get those calls to about five miles and that's probably the best we can do with belugas. Your second question was how can we use that to analyze our data for distributions, and that's a difficult question. When you have these measurements so far apart, it is difficult to know what the animals are doing between the times they go between recorders, but there are some statistical methods we think we can apply to look at least at distributions as a function of distance offshore for example or over a path, and that's the next step of our analysis to try to compile multi-year data sets to look at the statistical distribution in the Chukchi Sea to obtain results similar to some of the distributions patterns that have been identified in the Beaufort Sea.

Robert Suydam, NSB: I'd like to ask NMFS a question again about the 120 rms zone. I think Jolie answered the question earlier saying you were only asking companies to look at exposures or potential impacts within 120 when it relates to subsistence. Did I get that right? Availability of marine mammals to subsistence?

Jolie Harrison, NMFS: I don't know if I would say we're only asking people to think about what they are doing within a 120 when there is subsistence, but for when they are estimating takes with a 120, and actually I wouldn't even call it a take that we're quantitatively looking at within a 120 for subsistence. I think we've had some sort of broader monitoring goals that related to see what's happening when animals are exposed at those levels. I don't want to limit it too much because we are interested in better understanding what is happening within that exposure level.

Robert Suydam, NSB: I'm just trying to understand the position because with the Shell activity in 2010 and the seismic operations in Harrison Bay and Camden Bay in September and October when bowheads are moving through and more or less when hunters are going out and I know that Shell has abided by some of the time/area closures in order to allow for Kaktovik and Nuiqsut to get whales, but it seems like estimating exposures and estimating potential takes in September and October down to the 120 zone based on some of the information we have in hand now is worthwhile to do. The 90 day report does not have that. It estimates exposures down to 160, and it just seems inconsistent with what I thought you were saying earlier so that may be something that could be addressed in the final report from Shell for the 2010 season.

Jolie Harrison, NMFS: In the interest of better understanding, I don't think that's a bad idea to talk about how many animals are likely to be exposed in that level. Again, at this point, in terms of what we're calling an MMPA take, we're still doing it at 160, but I don't disagree with you that that would be a good metric to look at to better understand how many are exposed at that level. I don't have a problem with recommending that.

Robert Suydam, NSB: One quick question for Michael. In the 90 day report and in some of the slides, you talked about the vibracore, and I don't think we talked about that last year, and it may be a non issue. It wasn't identified specifically in the IHA, but if you could talk a little more about the sounds the vibracore makes and how long they last and how frequently it was used, because I was surprised to see that the sounds from the vibracore propagated out 30km before attenuating to 120.

Michael Macrander, Shell: I don't have the IHA with me but I'll need to check that to see if it was identified or not. We were a bit surprised to see this as a significant sound source than we thought it was going to be. Dave did make the comment that again, with a lot of the operational problems that we had, it was not used terribly much this year.

Dave Hannay, JASCO: It's important to point out that when we started that measurement program, there was only a certain set or number of sources we had planned to monitor, but the decision was made early in the season that we would monitor anything we could that made sound underwater so the vibracore measurement was made. The nature of it is that it is a series of very rapid impulses as the vibrator pushes up into the seabed, and I think it generates 20 pulses per second. It's quite well detailed in the report. That piece of equipment never actually operated into the seabed. We put it over the side and it started to be lowered to the sea bed, but as it was lowered, I think the air hose was pinched off, and it stopped working before it got to the sea bed, so at least we got the measurement as it was being lowered.

Harry Brower, AEWC: I had gone through and written down some notes in terms of comparison from part of Susanna's presentation in terms of the ice present and the whale migration and how that may have impacted the whales further offshore, but then there were some whales moving within it. I want to get a better understanding of the conditions. You said 70% ice coverage and 90% ice coverage, and then there is whales moving outside the fringes of the ice. I am having difficulty in terms of how you are recording these vocalizations moving through there, but when they got near the ice the calls shrunk to just a few animals. What happened to the remaining animals? My other comment is in regards to identifying dead animals. Which MMO can identify the animal in terms of the size of the animal? That needs to be considered in the discussions on when you are identifying your MMOs. That's embarrassing in my opinion in terms of people indicating that they know about these animals, and you find an animal that has decayed somewhat, and they are not able to identify it. I think as hunters and users of these animals, we can make better judgment calls on what animals are found.
Susanna Blackwell, Greeneridge Sciences: Before I forget the many points you made, one thing I forgot to mention that you have to keep in mind when you look at these ice maps is the fact that we are showing 10 days worth of calls with one ice map from a day in the middle, and you guys know better than any around here how fast the ice can move in just a day. I think the way I interpreted those maps is basically if they have a choice, the whales will prefer the open water while they are migrating rather than going under 70-100% ice coverage. Now and then you would see groups of dots under a piece of ice, which was usually on the edge, and it is very possible when those calls occurred there was not ice right there. We definitely overlay aerial survey information with acoustic data.
Dale Funk, LGL: If I could comment quickly on the part about identifying carcasses, it is a good point. Ultimately what it comes down to is we try to identify animals based purely on what we can see, not what we can't see, and a large pinniped floating with a brown color that is wretched with rot suggests like we hope it's a walrus, but if we cannot identify diagnostic features to identify the animal we will call it an unidentified pinniped, likely a walrus. I don't think there is an issue with lack of training of observers, I think it is erring on the side of caution and trying not to infer too much from these carcasses.

Craig George, NSB: It's becoming increasingly clear that feeding bowheads and non-feeding bowheads or migrating bowheads react to industrial sound very differently. I was hoping to see a little more clear presentation of the difference between those based on the data collected and presented. I was wondering if I could get a quick summary of your current assessment of the difference in reaction distances between feeding and non-feeding animals.
Bill Koski, LGL: We have very few sightings close enough because of our aerial survey design to define exactly that distance, but it is a very approximation that it does look like traveling whales will avoid seismic by about 10 kilometers or so more than feeding whales will, but that is very much an approximation. Our data are not inconsistent with the earlier data. When we were preparing these maps shown today when you start to split the sightings into feeding and non-feeding, the dots get so far apart it gets hard to see anything.

Jessica Lefevre, AEWC: My comment goes sort of to a summary of the recent comments that have been made here. On the earlier point on taking an integrative approach to some of the

research, what I think we're hearing is that we also need a more integrated approach to the presentation of the data. Some of the slides make it very clear you have an interplay between migratory behavior, ice, feeding behavior, and the presentation is providing those layers, so it makes it difficult to understand exactly what is going on. We heard some comments here on a piece that needs to be added in is sort of on a behavioral component, and that's where the traditional knowledge can also be very important. One thing we've learned in the past is on sighting versus no sighting doesn't necessarily tell us what the whale is doing. Sightings can make it look like the whales are fine, yes, they are in the area, we can see them, but maybe they are feeding or not feeding. They are there, but maybe their behavior is changing in ways that the hunters observe. We encourage you if you are going to go into more comprehensive reports which would be very helpful to us to think about data interpretation and fold traditional knowledge in to it and try to give us distinctions between what the whales are doing, ice presence or no ice presence, etc.

Robyn Angliss, NMFS: Last year after this meeting there was a couple of days of meeting with a smaller group, and that group made some recommendations to Shell about what kinds of things should change in the monitoring plans and analysis, and I'm curious to hear what changes were accommodated and what will be accommodated in the final report.
Michael Macrander, Shell: I will admit that I have not gone back and looked at those recently. I think that the majority of recommendations were in terms of how we go about conducting our marine mammal monitoring program. One that I recall is joint training program between the local participants in the monitoring program. That's been incorporated. One of the main points that was raised was a desire to look at some of these other sound sources, higher frequency sound sources, and so that's why we spent a fair amount of time and effort in trying to address those issues around sound characterization.

Day Two – March 8, 2011

Day 1 Recap & Review Day 2

Lisa O'Brien & Ron Felde, Facilitators

Facilitator Ron Felde opened the second day of the conference by welcoming participants and complimenting yesterday's presenters. The agenda for today was modified and reviewed. Participants were requested to ask questions one or two at a time, rather than clumping together several questions so that presenters can better respond.

Candace provided the meeting website address and indicated that documents for 2009, 2010 and the final report for this meeting, when available, can be found there.

Statoil 2010 Monitoring Results for Chukchi Sea 3D Seismic Survey

Karin Berentsen, Statoil, & Darren Ireland, LGL

Karin welcomed participants and outlined presentations her team will be giving. Statoil is a Norwegian company with headquarters located on the west coast. Norway and Alaska are on similar latitudes, though Norway is much more narrow. For more information on Statoil, see www.statoil.com; for more information on Norway go to www.ssb.no.

Statoil mobilized from Dutch Harbor on August 8, 2010, and demobilized on October 6, 2010. There was a crew change in Nome. The company conducted a 3D survey and asked for permits to do additional lines. However, the data obtained from the initial surveys were good, so the additional lines were not needed. Stakeholder outreach was done in Barrow, Wainwright, Kotzebue, Point Hope, and Point Lay. Statoil has been welcomed to the villages in a positive way, and comments and feedback has been received, which enabled Statoil to improve its program. Last year was a difficult year for all of us, and we are pleased that we can do the seismic survey and appreciate the support from everyone. We were close to not being able to do the survey; but we got some really good seismic data, weather was cooperative, and the ice disappeared so that when the program got started, there weren't any ice problems.

As part of the stakeholder engagement, several meetings started in 2009 with the planning commission and villages. Statoil also participated in the AWEC mini conventions, North Slope Borough planning commission meetings, and met with most of the agencies.

The MV Geo Celtic was the main vessel used. It is four kilometers in length with streamers and a sound source being towed behind. There were two support vessels. The purpose of survey was to obtain seismic reflection data, which enables us to image the subsea geology. The existing seismic data was old, sparse, and of inadequate quality. Modern data is required to understand

complex geology. Acquired data is used to make decisions on further exploration. I'd like to add that there is so much uncertainty these days, and we tend to forget that it is down here that the largest uncertainty is. It is important that the industry is able to identify what is actually there.

The Geo Celtic was our seismic survey vessel, and it had five MMOs on board, including two Inupiat observers. The Tanux was the primary support vessel. It would typically be forward of the Geo Celtic. It supported small boat operations and assisted in monitoring the safety zone. The Norseman I was the primary scouting vessel with four MMOs per crew. Most of the time it zigzagged scouting the area to monitoring the safety zones for whales and walrus. It was a support vessel with 24 hour watches and that was a bit reduced as darkness increased. There were typically 2 Inupiat MMOs per vessel, and 16 were trained for this survey.

A lot of the preparation information is assembled in the Environmental Evaluation document. The survey area was 100 miles offshore, and the main conclusion of this document was that we did not expect to conflict or interfere with the subsistence harvest or the availability of whales, seals, polar bears, or walrus. There was a cumulative effect analysis included in the evaluation document. We issued the document for two reasons: 1) it is good to have preparations for our work and 2) it is an internal Statoil requirement that we do an impact analysis and that we evaluate that. In the U.S., it is the agency's role to do the impact assessment; in Norway it is actually the company's role to do such an impact assessment and present it to the agency, so that's why we do it. The permit applications with preliminary incidental harassment take estimate for the IHA; Darren Ireland will go into more detail on that. We had to have an IHA; the G&G Permit with then MMS, now BOEMRE; and the LOA, letter of authorization, for polar bears and pacific walrus with USFWS.

Shell presented some information on the science program we participated in. There is a Norway expert participating in the program via teleconference. It is a good study with a lot of good data. We have sea bed recorders along the coast. As I mentioned yesterday, it is sponsored by Shell, ConocoPhillips and Statoil and operated last year by Olgoonik Fairweather who has a great agency record with no incidents whatsoever. It is not the scientist's daily responsibility to gather data in this manner, but they are doing a great job.

During three days, we saw a lot of walruses. The survey started August 8, 2010, and demobilized on October 6, 2010.

Statoil 90 Day Report

Darren Ireland, LGL

Sound Source Characterizations: There was a full array of 26-airguns, 3,000 cubic inch, and a mitigation gun, single 60-cubic inch airgun. The measurements location was the southern end of the Statoil survey area, east to west straight lines. The OBH (ocean bottom hydrophone) was moved to where the mitigation gun was fired to collect data. The measurement results included: the different measurements are shown here. Blue = sound exposure levels; green =

sound pressure levels; and red = peak sound pressure levels. It is the result of the 90 percentile to estimate distances of threshold by MMOs.

Full Array Airgun			
Rec'd levels	**Pre season modeling**	**Field season measured radii**	**Final measure radii**
190	700	430	520
180	2500	1600	1600
160	13000	16000	13000
120	70-120,000	130000	13000
Mitigation Airgun			
190	75	13	13
180	200	68	68
160	1800	1500	1500
120	50000	26000	26000

MMOs were used to visually monitor the occurrence and behavior of marine mammals near survey operations and to implement appropriate mitigation measures, as well as to estimate exposures that occur due to operations.

Vessel tracklines and watch efforts included seismic activity, which occurred August 20, 2010, through October 1, 2010. 8,069 km of seismic activity occurred with 5,387 km of full array and 2,681 km of mitigation airgun. MMOs were present on all three vessels and were on watch for 28,080 hours with 3,187 km during darkness, largely from Geo Celtic at night.

One MMO was on duty during seismic operations and during nighttime power ups. Two MMOs were on duty before and during full ramp ups and as much as possible during other survey operations. The requirements for actual watch were met, plus at least one MMO remained on watch during 99% of nighttime seismic activity.

MMOs observed:

Species	**Geo Celtic**	**Monitoring Vessels**	**Total**
Bowhead	0	5	5
Gray	1	4	5
Minke Whale	4	0	4
Unid'd Mysticete	7	9	16
Unid'd Toothed	1	0	1
Unid'd Whale	0	1	1
Total Whales	13	19	32
Estimated # of Individuals Potentially Exposed to Sounds >160			
Exposure level in	**Non-seismic**	**Seismic**	**Exposure/individual**

dB			
>160	28	18	21
170	16	10	1
180	10	7	5
190	8	5	2
SEALS			
Bearded	53	69	122
Ribbon	0	1	1
Ringed	17	16	33
Spotted	1	4	5
Unid'd Pinniped	19	26	45
Unid'd Seal	57	97	154
Total Seals	147	213	360
Estimated # of Individuals Potentially Exposed to Sounds			
160	1206	2180	21
170	686	1240	11
180	451	816	5
190	351	652	2
WALRUS			
Walrus	150	196	346
Estimated # of Individuals Potentially Exposed to Sounds			
160	96	793	21
170	339	451	11
180	223	297	5
190	178	237	2

Number of marine mammals observed within the threshold safety radii in 2010: cetaceans = 0, seals = 10 and pacific walrus = 40. Mitigation measures implemented resulting in power downs were one for cetaceans, nine for seals and 29 for walruses (observed outside the 180 dB zone but heading for it, so power down occurred prior to their entering). There were a couple of shutdowns that occurred as animals were about to enter one of these zones around the mitigation gun. The first one was for a dead walrus carcass observed which happened within the first 16 hours of airgun operation. The airgun was shutdown, USFWS was contacted, photographs were sent to them, and it was determined that the carcass was likely older than the time the survey was going on. Mitigation measures were implemented for shut downs. A total of three shutdowns occurred August 21, August 25, and August 28, 2010. In all, nine carcasses were observed: one mysticete whale, two unidentified whales, three walruses, and one unidentified pinniped, one unidentified seal, and one additional animal.

Comments:

Harry Brower, AEWC: Thank you for your presentation this morning. Again, I have problems with acronyms as I am not a scientist. OBH needs to be spelled out. I try to remember them and see them in the report, but spelling them out would be helpful.

Another concern is what kind of visibility problems did you encounter at night, and how did you do observations at night?
Darren Ireland, LGL: My apologies, the OBH is the ocean bottom hydrophone. During nighttime operations, there was at least one MMO on duty. We provide night vision devices; they aren't terribly useful at night, so observation ability during the dark is quite limited.

Harry Brower, AEWC: Another question to either NMFS or the permitting agency, what is the allowable take when the permits are provided in terms of for each of the marine mammals. We don't deal with numbers; they just report the takes, but what is allowable?
Jolie Harrison, NMFS: In the IHA we do list the number that are allowable based on calculations based on density and miles they plan to run their survey.

Harry Brower, AEWC: I don't understand what the numbers are. I've asked in the past. Is it the whole or, part of the population? Or somewhere in between? In large groups of animals, like the walruses, what is allowable?
Shane Guan, NMFS: The basic number for takes depends on the population and the ensonified area. We review and analyze these numbers and do a comparison with the whole population. If it's under … because it has to be a small take or small number criteria of the MMPA, we do a determination of where that level and number of take is to meet the negligible impact definition. If you want to look at specific numbers, what we analyzed for Statoil, it was published on the Federal Register notice for the issuance of the IHA. I don't remember the number off the top of my head, but I can get it.
Harry Brower, AEWC: I can look at the Federal Register and get the information. I understand the calculation.
Shane Guan, NMFS: I want to clarify that you asked what is defined as a take. Basically it is if an animal is exposed in the 160 dB received level, we consider the animal is taken even though the animal is exposed but may or may not affect its behavior but it was exposed to that level. Based on density of animals in the area and ensonified zone size, we can calculate the approximate number of animals exposed to this received level and extrapolate the take number which is compared to the entire population of stock in that area to see how much of the population could be affected.

Harry Brower, AEWC: I have seen depictions in the presentation of the dB radii that you have shown. What equipment was used to get that measurement? Is it an estimate within a range that you are looking at, or is it equipment on board that gives you that distance measurement? It's hard for me to comprehend the level of take or what constitutes a shut down in the different radii. I'm having difficulty understanding what equipment is used to get those measurements.
Darren Ireland, LGL: It's the measurement of distance of animal to the vessel. One tool is binoculars, which have markings that when you line them up with the horizon, you can count the number of radicals, the little dashes, and then use gradient to triangulate the distance based on the number of dashes. For closer sightings, you can use a clinometer to

measure the depression angle you are looking at. We've tried to use laser range finders, which typically don't work very well.

Robert Suydam, NSB: Karin, thanks for the presentations. To follow up on Harry's question for NMFS, what would be useful is to have a list of takes authorized in a year, not by company but as a total, to help people understand what takes are. Karin, a question for you is about the availability of information from Statoil that we have often asked folks for is information about the specific tracks of seismic and monitoring vessels and understanding when the airguns were operating. We'd be very interested in that information, and we'd also be interested to get datasets for everything, for all the environmental data. Of course we don't want your seismic data and results from that, but we'd be very interested in getting the other information.
Karin Berentsen, Statoil: As we discussed, we will make it available but have to agree on the practicality of the format.
Robert Suydam, NSB: Thanks, I appreciate the openness and willingness to share that information. A question for Darren is, in the 90 day report, you don't provide sightability curves for marine mammals and given that some of the safety radii are relatively large, it would be helpful to know how well the observers are able to observe the safety radii. It would be great as a standard practice to include sightability curves in the reports to help us understand and in some cases I know there aren't a lot of data for a single season but combining data across seasons would be helpful.
Darren Ireland, LGL: This has been included in the comprehensive report.
Robert Suydam, NSB: Another question about the 90 day report. It talks about the number of cetaceans in relation to the source vessel, and I'm surprised that the monitoring vessels saw fewer cetaceans than the source vessel while the airguns were operating or when their tracks were occurring out in the survey area. Understanding why the monitoring vessel saw fewer cetaceans than the source vessel is important. (see page 5-5 and 5-7 of the 90 day report). One final question, you talk about exposure categories on page 5-7 and you talk about marine mammals that have been exposed to sound levels greater than 160, between 160 and 120, and then less than 120. If you can explain why you use those categories; to me, including less than 120 doesn't seem right given the way sound travels.
Darren Ireland, LGL: The 3 categories, greater than 160, 160-120, and less than 120, are essentially a breakdown of some of the distances we talk about frequently in these meetings. It's also how we've been able to pool enough data into categories. We'd like to look at 10 dB all the way down to see if we can see a sighting gradient, but we don't have enough data in each bin, so we decided to pool into the three bins you see on the table. The efforts associated with the bins are based on the sound characterization results and distance.

Chris (no last name provided): I think I saw earlier in the presentation that there were a number of animals exposed above the threshold for Level A take, and I just wanted to follow up with NMFS and ask whether that's allowed under the IHA.

Jolie Harrison, NMFS: I think in looking at those slides, what Darren was doing was a density calculation for what would likely be within those dB ranges and that doesn't take into consideration mitigation or central avoidance at those distances.
Chris (no last name provided): Just to clarify, there were no individuals sighted within the mitigation zone?
Darren Ireland, LGL: For cetaceans, that is correct. For seals and walruses, there were sightings, and power downs were called for. There were a couple of seals, in the final analysis of the 190 zone at 520 meters there were sightings … it gets a little messy. The 430 meter zone at 190 dB that was implemented by MMOs during the season, any sighting within that, a power down was instituted.
Chris (no last name provided): Is there any authorized allowable level of animals sighted within the 180 or 190.
Jolie Harrison, NMFS: So, 180 is used as a level at which we estimate injury could potentially occur. We did not have any authorized Level A takes and generally in the pre-exercise calculation and estimation we think because of the density of animals and the unlikelihood of them being within that distance because injuries are not likely to occur. We still have the mitigation measure that says if you do see one within that distance, you should shut down. So there is a recognition that that could happen momentarily but if you look at the way we talk about … so for injury we look at PTS (permanent threshold) as where an injury could occur and the 180 is related to above that level, but if you look at our analysis in the document we think the likelihood of PTS occurring would actually happen at a higher level than that and would necessitate a longer exposure to that sound than what we think would probably occur with these five or whatever moments that occur before the animal is seen and the gun is shutdown. So we do not authorize Level A takes in the IHAs we currently issue, but we also don't think they are occurring based on pre-exercise estimates.
Shane Guan, NMFS: Exposure at 180 is a Level B take, not Level A.

2010 Statoil Seismic Survey – Infrared Camera for MMO in Chukchi

Karin Berentsen

We managed to have some internal research funding for testing out infrared camera. We had on board a PhD who worked as a scientific MMO, and he has helped to put together this presentation. The infrared camera measures temperature differences and this top part that is rotating on the camera. It was positioned on the starboard side of the boat. It has a computer inside. It is important to understand that this is very early research, and this is a tool that has been developed for other purposes. It was actually developed for military purposes. Although it seems to be a promising instrument to monitor marine mammals, it is in the very early phases.

It was mounted more than 20 meters above sea level. There is no equipment in the water. It was in operation from August 12, 2010, through October 4, 2010, and was manned four to five hour per night. It was mounted 24.5 meters above sea level and took five pictures per second. It only

monitors the surface; no below water monitoring. You can see a usable view of 280 degrees. Observations made for whales showed that the blows of big whales were visible up to 2,000 meters and blows of smaller whales (porpoise) up to 500 meters. For walrus, we gained new knowledge that walrus have an infrared signature when swimming on the surface, visible up to 1,500 meters. The weather hampered how much could be seen (fog, bad visibility and sea state).

It is limited resolution for long distances, and final results are going to be published later this year and will include more details about the initiative. Conclusions are that it is an early phase initiative; it is weather dependent, manual adjustments are needed, and the software can be unstable software. It is our conclusion that the infrared camera is not ready for inclusion in any mitigation requirements as yet, but tests continue worldwide, and it will be interesting to follow this as a possible tool. Many thanks to the team who helped with this project.

Comments:

Craig George, NSB: Thank you – it's interesting. Years ago, we did an infrared flight with Bill Koski, and we got on a group of feeding bowheads, and the technician was surprised that they were invisible to infrared. Did you see bowheads on the survey or not?
Karin Berentsen, Statoil: I don't know the answer to that and will have to wait for results.
Craig George, NSB: It was interesting because eiders showed up like streetlights on the surface, but bowheads were invisible. The other thing is how does wind affect the infrared signal, whether in fact that would cool the animal and that sort of thing?
Karin Berentsen, Statoil: We need to have a temperature difference to actually see with the infrared camera.
Craig George, NSB: But like a blow, would that be…
Darren Ireland, LGL: One of the things they noticed as well as when the wind came up, some of the software for the system is not designed to automatically detect blows as part of the image process. As the wind came up, and we got whitecaps, we started to get a lot of false positives. We saw limits to its effectiveness based on sea state.

Jolie Harrison, NMFS: You showed a 280 degree view. I'm assuming that's when you rotated. I'm wondering what is the field of view is when you're looking in one direction?
Karin Berentsen, Statoil: It's actually a camera that rotates and takes pictures, and, in that way, this camera can also be fine tuned to see a certain type of signal, it could help MMOs to detect because it automatically rotates to see 280 degrees.

Passive Acoustic Monitoring (PAM) – Bruce Martin (JASCO, Canada)

The passive acoustic monitoring program ran from late September to early October 2010. The objectives were to investigate whether directional towed array could detect localized marine mammals using PAM and answer a couple of fairly important questions. 1) We wanted to know how does noise impact the ability to detect marine mammals? There were a lot of questions about things like the 120 dB SEL number that Susanna presented and how that affects their abilities. 2) We wanted to know what factors are driving noise (ship noise, the towed array noise, and

environmental noise). We want to make some comments on what conditions PAM can provide additional capabilities to the MMOs in. What additional technological developments are required to deliver effective arctic PAM? PAM has done quite well detecting click type mammals, i.e. sperm whales, dolphins, etc., where the frequency of interest is far above where the noise from the seismic and tow ship is. But in the arctic, there are very few of those types of calls present. There are a lot more low frequency calls from bowhead whales, walrus, and belugas. Bowheads migrate through the Chukchi in fall, and we don't expect to see high numbers until late September. The walrus hangout around Wainwright north 40 and Hannah Shoal, and then they migrate out of the area in the fall. The bearded seals and spotted seals are year round residents, and we have occasional beluga presence as well. All of the frequencies that they call at overlap with the seismic.

The towed array used had a 400-meter cable that runs from the tow ship with a first forward acoustic module, then a neutral section in the middle, followed by another acoustic module. We were running PAMGUARD software to try to detect, as well as our software to do the recording and as backup analysis capability. The actual analysis was done primarily with PAMGUARD.

There are issues about whether presence of seismic or survey vessel will shut down, especially bowheads, from calling. The trial design had the tow ship running through the Statoil area where there was a fixed array of seven recorders we could get localizations on. So if we had bowheads present on the Statoil array and they weren't present on our towed array, we could try to get some idea of where they were and if they stopped calling. Up until the first of October, the Norseman was conducting MMO operations for the Geo Celtic, so we were not towing during the daytime, we were only towing at night. On the third of October, they left us out there running transect lines 24 hours. We had 113 hours total in the water of which 90 were recorded, some of them were just ramp up times, and there were software issues where we lost a little bit of data. For the PAM, we analyzed it by hand, found out where all the marine mammal calls were, and we used those times to do our localizations. For the localizations we needed a good strong SNR in order for PAMGUARD to give us the information on the time delays or phase delays. There were some serious issues there with what PAMGUARD provides. We did validate our processing, both with the existing TDA (time delay arrival) processing that is in PAMGUARD, as well as with our own phase detector. On the fixed arrays, we identified thousands of calls with over 6,000 bowhead calls. We do have the ability to time align the sensors and provide accurate localizations with the fixed array recorders.

[*Provided a graph of some results.]* The weather conditions were fair to poor. Bowhead, walrus, bearded seals, and beluga were detected September 27 – 30, 2010, with an array towed at night. The ship conducted at 10 knots. October 1-3, 2010, the array was towed 24 hours. There were no concurrent MMO and PAM detections. MMO and PAM operations overlapped one-third of the time. With the fixed array, most detections were east of the study area and only showed bowhead directions in these plots.

I want to mention the tagging project. [*Showed slide with tagging results.]* The tagged whales were approaching or at Barrow at that time from September 20 through October 4, 2010, but afterward they had a main push to the east after October 4. We didn't have bowheads detected in that period but the main push happened after the 4th. [*Showed slides of daily detections.]*

I want to go through some of what we learned and what it means. [*Showed chart with 2009 data*.] With the 2009 data, we actually localized a number of bowhead calls, then did range predictions or propagation losses based on the seismic profile and location and said, okay, here is, at that time of year, for the Chukchi bowheads, here's what the envelope of their calling source levels are, and we have an average source level of 145 dB, a max of 164, and a min of 129.7 dB. We took the numbers and measured the noise from the Norseman 1 that's showing up on our two sensors (forward and aft). You would expect the towed array as you pull further back, from 200 meters between the modules to 400 meters between the modules, that the noise would be reduced and be better for detection. If you look hard at these numbers you'll have a pretty hard time convincing yourself that that is true, but if you look a little further into what you see, these little s's that appear over on the right hand side, that set of measurements at 400 meters spacing were all made when seismic activity was ongoing, so I can't say conclusively that this is really a fair comparison. The other interesting thing is that as a ship speeds up, you expect there to be more noise, but what we're seeing is a slightly different affect. The sea state is driving up the ship's noise as the ship pushes through the waves. [*Showed table with results.*]

System improvement s for array that we learned is that we have to isolate our sensors from the hose walls (evidence that sensor mounting can have up to a 3 dB affect on noise levels); the further back we go, I think we're still going to see that results, and we need to get better isolation for our tow and make it longer to make it smoother. We want to bring the frequency resonance of our sensors down, make it flatter; and, PAMGUARD software needs to get better.

We didn't get enough detection on both on the array and the fixed sensors to make any comments on the bowheads being quiet. There is more work that needs to be done; it's not ready for primetime yet. When can you use PAM? It depends on the mammal type, the frequency and source level of their calls, how often are they going to call and then choose the right array and software to match. If you go for the 180 dB range, it works well. If you are trying to clear the 180 zone and you're doing a ramp up before you actually start transmitting on your seismic spread, you can probably make that work, but it hasn't been demonstrated yet. If you want to monitor 160 dB zone for cetaceans, that is a challenge.

Comments:

Harry Brower, AEWC: I have a question for the federal agency. How can this information be used for permitting and subsistence resources. This is a new subject. How do you interpret it in terms of the permitting process?

Bruce Martin, JASCO: There are not many low frequencies arrays out there that are not, say, military grade, and this one is definitely not ready for a real time mitigation program.

Harry Brower, AEWC: I was posing this question for the federal agency to better understand why we are getting into this discussion. I thought I would hear more presentations that would be appropriate to the process and the peer review.

Jolie Harrison, NMFS: We are very interested in incorporating PAM into both monitoring and potentially mitigation in authorizations, but I guess it depends on how well different systems work. I think this information and understanding more about how different systems work is

informative and probably can help us with our process. But, we are just hearing this for the first time, so saying exactly how it would be worked in is challenging.
Candace Nachman, NMFS: What Statoil has just talked about, the PAM and the FLIR, were recommendations from the peer review panel last year, and they were trying them out based on recommendations from last year, and, as Jolie said, we need to take this information now and process it and see what it means for the future.

John (could not hear last name/two people talking simultaneously): I would like to take opportunity to thank the stakeholders to planning that allowed us to design a spread that was environmentally friendly. When it comes to PAM, Statoil is participating in the EIP on mammals, and the recommendation from EIP to industry is PAM as a mitigation tool. As Bruce said, this works reasonably well in Gulf of Mexico and with higher frequency content, but not in the arctic waters, so this was an attempt to try it out and have the ability to compare it to static PAM systems on the seabed and be able to verify how each functions. I was disappointed that there were not a long of simultaneous recordings between the static and towed systems. The technology is not sufficient at this stage to use in the arctic to add to the MMOs observations. I hope the geophysical industry will incorporate and let us use those data to identify and localize the mammals for PAM.

Robert Suydam, NSB: Thanks for attempting to use PAM. It was a recommendation last year and in other workshops as well. I didn't follow all the presentation, but John's description helped with my understanding of what was attempted. I'm disappointed it didn't work better and in particular for these offshore areas or seismic in dark times, there needs to be an observation system, and, if company's aren't flying, there needs to be another technique and PAM has the potential but obviously, as Bruce said, it's not ready for prime time so hopefully this will improve remarkably in the near future.
Bruce Martin, JASCO: There is only so much you can do with the type of technology that is being used for PAM right now. We can have discussions on what are the technologies and a secondary discussion on what it means.

Betsy Beardsley, Alaska Wilderness League: My question is related to Robert's. It was about the hours of daylight you were operating in. You said that you were operating 24 hours a day in October. If you could just explain how many hours of daylight and maybe a little bit about what the weather was like.
Bruce Martin, JASCO: I think there was about 12 hour of daylight at that time; I'd have to ask Darren. Less? There was about 36 hours that were daylight where we had MMOs on duty and could actually see something, and we were towing. Total 113 hours in the water, 36 had MMOs on.

Candace Nachman, NMFS: The North Slope Borough and the AEWC have requested a map showing all activities. Thank you to URS for making the map that displays these activities. The NSF survey was 2D, not 3D.
Robert Suydam, NSB: Thanks for putting together the map. Alaska Ocean Observing System has done something similar but not with regard to oil and gas activities. It has more to do with

science surveys. So there are a couple of maps out there talking about activities in the arctic that are very helpful.

Statoil 2011 Chukchi Site Survey and Soil Investigation and Monitoring Plans

April Parsons, Statoil

I've been working our Chukchi Sea acreage, and I would like to show you our 2011 program which consists of site survey and soil sampling program and the monitoring program. This shows our 3D seismic processing. There really is no substitute for 3D, and we really must have that as a risk mitigation tool. The early analysis of this data is what I'm working on and because of the positive indications that we have seen as a result of this data, we are going to move forward and drill an exploration well in the Chukchi Sea, and that is the reason we are moving forward with the 2011 program. Statoil is involved with 66 leases in the Chukchi, with 16 operating. On 14 of those, we have ENI as a 40% partner, and last year we went into 15 leases in partnership with ConocoPhillips, which they operate. Our activities this summer will include work in both areas. The work we are conducting is in order to file an exploration plan, and this work is required by a host of federal regulations and is primarily for safety. We need to know that we will have a good, safe location that can support a drilling rig on the sea floor and also that in the shallow, subsurface there aren't any unsafe conditions such as shallow gas channels or things that could cause problems in the drilling.

The requirements tell us that we have to conduct various types of data, and our survey is designed to gather these data. The major ones are: seafloor imagery, high resolution bathometry, high resolution seismic data, water column anomaly detection, side scan sonar, magnetometer, archeological survey, accurate navigation, and shallow core data to see what the sediments consist of to support structures.

These slides show where site surveys will occur. Amundsen and Augustine are the primary prospect areas where work will occur. We have also identified some preliminary drill locations, which is where we will collect the core data. We also are going to collect some core data on the ConocoPhillips acreage, and these are potential drill locations shown here in green. In addition, the development in the Chukchi we feel will have to be a cooperated effort between all of the operators here and because of that they will have to be connected by subsea pipelines back to a common facility for transport back to shore. So we are also looking at doing some potential pipeline routes that will either tie back to Burger or Devil Paws. Our area is quite offshore. We are over 100 km out from Wainwright and 150 km from Barrow, and so we don't expect to impact these communities. We will only occasionally go into Wainwright if necessary, but our operations will primarily be far offshore, and we'll do crew changes when necessary back through Nome. It will be very similar to the way we operated our seismic survey last year. The program will consist of two basic activities: 1) sea floor survey and shallow seismic and 2) coring accomplished by separate vessels and separate contractors. The shallow seismic will only be done over our two prospect areas, the Amundsen and Augustine. As far as the coring, that will be done on the potential well locations with about three to

four cores at each site varying between 10-50 meters in depth. If there is time, there may be a few extra data points taken to get better understanding of the regional Chukchi area. We've contracted with the CGG Veritas Gardline to do the shallow survey portion, and they will provide the Duke as the vessel. The vessel was built in 1983 in Norway and retrofitted in 2007. It's also ice-strengthened. Hopefully we won't have to deal with any ice. It is a large vessel and has plenty of cabin space for MMOs. The equipment on the vessel will be very similar to what we heard Shell mention yesterday from their shallow water activities. The primary airguns will be a small 10 cu in mini-airgun that will be our mitigation gun, and the main one will consist of a cluster of four 10 cu in airguns, and, in addition, we may look at adding a camera that we can tow behind the vessel to take pictures every 15 minutes to give us images of the seafloor and give us an idea of the benthic habitat. More than likely we will add a box coring device as well, which can sample the seabed and give us a look at the geochemistry, etc. and will be used to age date the ice algae.

The soil investigation and coring vessel contractor is Fugro, using the vessel Synergy, a large ship built in 2008, also from Norway and ice-strengthened. It is a really large ship, 340 feet in length with a moon pool and automated drilling with space for 70 people. If additional time and funding is available, we would like to collect data around ice gouge, collecting cores for the most part, up to 40 cores up to 10 meters deep. This would strictly be for seafloor mapping looking at the ice gouge distribution with no air guns. All the work would pretty much be localized around lease holds.

We expect to mobilize ships out of Dutch Harbor approximately July 15, arriving on location on August 1 in the Chukchi. We will start sight survey activities first, and then the coring vessel would arrive August 15 to start soil samples. We anticipate finishing by October 1 but could continue through mid-November if we weren't able to get everything accomplished. All crew changes would be run through Nome, and, if an emergency occurs, those would occur through Wainwright.

2011 Survey Preparations include getting the permits, here discussing the IHA, and working with BOEMRE on the Ancillary Activities Notice, the LOA from USFWS, and the USACE National Permits #6 from Corps of Engineers.

The mitigation program will be the same as last year's program. We will have call centers through Wainwright, five MMOs on seismic and three MMOs on coring vessel. There will be one Inupiat MMO on each vessel to communicate back through Wainwright. We have calculated the estimated radius for various sound sources to be implemented prior to the sound source characterization testing. They vary from 50 to 250 meters from the source, and the results will be provided in the 90 day report after program completion. Estimated distance of harassment thresholds are shown here. 10 inch airgun is .0715 km, 4 x 10 cubic inch main array is 2.25 km. Coring activities distance is 7.5 km below 120 dB level. The guns are 160 dB.

Estimated takes for various activities and whales and seals are broken down by activity presented. A plan of cooperation has begun with visits with communities starting last October. Additional meetings will occur, and we will start working on the plan of cooperation shortly.

Comments:

Megan Ferguson, NMFS: I have a couple of comments that I found are common on a lot of these IHA applications. The first one relates to estimates of take. I'm intrigued by the data and details selected for inclusion in IHA applications. One example from the Statoil application is they note for belugas in 2008-2009 there were only sightings including two offshore. If you dig a little deeper, one was on July 12, 2009, just off Wainwright in no ice, and it was a sighting of 275 individuals. A detail like that is really important to include in an application because if it helps the permitting agencies have an idea of what is the range of what could be expected, and it lets someone like me know that you really have done your homework in looking at the data. A second example is there is a strong reliance on older data, at the exclusion of some of the more recent data, and in the Statoil application there was a strong reliance on a paper from Sue Moore put out in 2000, and it was an excellent paper relies on data from 1982 to 1991, and a lot has changed in the arctic since 1991. The COMIDA surveys have been flying since 2008. We produce annual reports every year, we presented a paper at the 2010 International Whaling Commission scientific committee meetings, and that information is available online. So I think there needs to be a push to use more relevant and recent scientific data. One concern on this application is on page 23, they were talking about looking at bowhead distribution in the Chukchi in the summertime, and it said the more recent COMIDA data were not used as NMML has not released a report summarizing the data, so they are not considered final. I thought it intriguing that COMIDA 2009 was sighted for the bowhead fall distribution, the beluga summer distribution, the beluga fall distribution, the summer gray whale distribution, and the gray whale fall distribution, and what's intriguing about the bowhead summer data was that we had some feeding aggregations right off Wainwright. One of the solutions to this is that BWASP and COMIDA should take some responsibility and send our annual reports to representatives of the industry or to LGL so that information gets out, but I also think that the industry should also take some responsibility to come to the data providers.

Darren Ireland, LGL: I appreciate the offer to speak with you about the data. The references to COMIDA data were included based on comments from NMML. I apologize for not including references more specifically, and I get different feedback based on whom I speak to. I think this is a good discussion.

Megan Ferguson, NMFS: The crux of the concern, too, is there has been a lot of skepticism of the data from the vessel based MMOs, and, often, the take estimates that go in your application are fed back in the 90 day report as your estimate of actual takes. If you are basing those estimates on old data, data from the 1980's and 1990's, I would think that this is not the best available science, and I agree that we need to open it up for discussion.

Ben Greene, NSB: I appreciate the presentation and have a simple question. How do you age ice gouges? The larger follow-up question is if you can ascertain a particularly deep gouge happened 300 or 500 years ago, is that a good predictor for what would happen next year? These events will become more frequent and less predictable.

April Parsons, Statoil: I would have to admit, I don't know. I'm not an expert in this, and we're working to design a program. You need to collect a large, undisturbed core to do this, and, some of it, I believe, could be based on benthic fauna and also isotopic age dating, but I suspect both of those may not give you recent information so dating for the last 50 or 100 years might really not even be possible, but it would be helpful to know the depth.

Bernard Coakley, UAF: There are a number of radio isotopes systems that give you access to different periods of time and the physical thickness of the fill gives you a way to relatively date sets of gouges. If you see gouges that have a certain number of flares and a second population with a similar number of flares, then the population dates from an earlier time.
April Parsons, Statoil: It will be a challenge in the Chukchi because there is so little recent sedimentation, and it's something that people have been trying to do and really have been unsuccessful. We can at least gather some sample material and start looking at ways we might approach it.

Jessica Lefevre, AEWC: I have a question for Karin and April and then a question for NFMS. You determine your offshore activities won't affect coastal hunting. How did you make that determination?
Karin Berentsen, Statoil: I will make a humble response to that. Of course we have done evaluation before our survey last year and our attempt is to manage and mitigate in a good way, so we will avoid any such thing. That is the preparation for this survey, as with any survey.
Jessica Lefevre, AEWC: I appreciate that, but I'm not sure what the circumstances are of your operations in Norway or other areas, or how you interact with other users in the ecosystem, but, in Alaska, you are moving into an area where people are very heavily dependent on the ecosystem. I read the literature, I come to meetings, and I speak with people. It is my impression that we actually have no idea how your activities are altering the ecosystem and therefore no basis for determining if your activities will affect the ecosystem. They may not, but there is no data to support this conclusion that I know of. Based on our current knowledge, you are asking communities in these coastal areas to take on a significant amount of risk. I should say asking, you are forcing them by your activities to take on risk, not just this year but in the future. The AEWC has developed the open water season conflict agreement which provides a process where communities can define the risk they are taking on. Words get changed to mitigation, or other adjectives, but bottom line, it allows people who are taking on risk to have some say in the process. That has important physical implications. Whalers have the most knowledge of how your activities affect things. There are also important psychological implications. We need to encourage operators about the value of that kind of engagement with the people whose lives you are affecting. I appreciate that you are going to the communities, holding meetings, and developing plans of cooperation. There is a process for you to engage with the communities with the outcome being a document between industry, people, and agencies of how risk will be managed together and that is a more productive approach than simply going in and telling people what will be done to them.
Karin Berentsen, Statoil: You have a good point, and this is our intention. We will go in and communicate both ways, and we look forward to doing that. In the same way, we have appreciated the opportunity to discuss and to talk with the different communities and yourself, and this will be an ongoing process. We don't have the answers. We want to do as much as possible regarding baseline data. There could be more. We are looking forward to working with you.
Jessica Lefevre, AEWC: Thank you, Karin. You have phone numbers and emails. We are available 24/7, so I encourage to make use of your opportunity for contacts. Now I have a question for NMFS. (unable to hear … recording was not working) …. You're not going to go

out and collect the data; you're not going to be on site; you don't live in the communities; you don't know what it feels like to have this kind of industrial activity moving into waters that feed your children. So, I would ask you to think about that. Thank you.

George Ahmaogak, Barrow Whaling Captain: I have a question to NMFS and Statoil. Last year we went into the parking lot, and I was very articulate about this issue concerning the conflict avoidance agreement that NMFS doesn't recognize, nor Minerals Management Service, recognize the need for CAA. We talked about this and put it in the parking lot as an outstanding issue because there were complications that were created because the federal agencies did not recognize or adhere to the CAA that we pushed really hard to put under the MMPA to protect the bowhead whale hunt. The MMS and NMFS doesn't recognize the need for CAA and still doesn't today. Now with 2011 proposed activities you will go back to Washington D.C. and give permits while CAAs aren't agreed to. You have no say or don't give a darn whether these agreements are signed. Statoil, I appreciate the plan of cooperation. When you lay out your plans of cooperation you are telling us what your proposed plans of operations are for 2011. If there is a conflict, we will let it out when you come to our community meetings. You didn't make it clear why you didn't mention CAA as part of your presentation; you only talked about plan of cooperation, and then I assume you aren't signing a CAA. The Barrow whaling captains were very critical of the CAA. We went line item by line item of what we wanted to see in the CAA. In the event there is no CAA, then the whaling captains will want to sit there with oil and gas industry to protect our whaling. So, Statoil, do you have a CAA, or are you proposing to sign it or not? Be honest with us.

Karin Berentsen, Statoil: The conflict avoidance agreement for Statoil has been thoroughly reviewed. We believe the intention of the agreement is very good, and last year during seismic survey we did live by the intention of the agreement. We are negotiating still with the AEWC, and we wish to see the content of the agreement. There are some clauses in this agreement that we, as a company, have a challenge with and that has been communicated, and we're still going to discuss those issues. Even though we didn't sign it last year, we lived by the intention, and it was included in the permit that we were given that we obey by the intention of the agreement. As a company, we would like to cooperate with all of you. We don't want to see any conflicts with you; that would be terrible for us. We want to negotiate in good faith continuously with you.

Jolie Harrison, NMFS: George, I do want to say that we acknowledge the importance of the CAA, and, through the years, the content of the CAA has influenced a lot of what we put in the mitigation and monitoring measures. The one thing we don't do is include it in total as a requirement of the IHA but pieces of measures that have developed throughout the years and that informed process we absolutely consider critical to our development of measures to meet no unmitigable adverse impact.

Chris (Last Name Not Stated): As we look toward 2011, I have a question about public participation opportunities for the local communities. I wanted to provide an example from last year. The public notice for USGS survey closed on August 9, 2010, and the surveys were scheduled to start, in the notice, on August 7, 2010. So the seismic activity was actually scheduled to start before the close of the public comment period, and the IHA was issued for August 11, 2010. There is a real concern that if the activities start before the close of public

comments and ships are mobilized, that this is all in place and finalized before public comments come in. There are other examples of prior years. Is there a way to provide the community a more meaningfully way to provide feedback to incorporate information into instruction and training before mobilizing and then where the agency has more than two days to respond to public comments?

Jolie Harrison, NMFS: One thing that hinders us is the 120 day issuance timeline and often times with research surveys we have the amount of time that we need at a minimum to do that. I think that is the whole purpose of this meeting; a chance for people to think about what's going on, and to have it presented and provide input here. I think sometimes our time is cut down. Obviously we would not issue an IHA before the comment period is up, and so we had less time there than we would have ideally liked, but I think we felt like we were still able to incorporate comments received.

Karin Berentsen, Statoil: There were two comment periods; NMFS for the IHA and then a new public comment period for the G&G permit. There's two different comment periods. And, of course, as a company, we would not like to have such surprises.

Harry Brower, AEWC: My question is for Statoil and NMFS on the plan of cooperation. It is my understanding that it is a requirement for you and for industry to communicate on what's being proposed on the upcoming season. It brings information to the villages to help understand what is being proposed by industry. It is something that concerns me because in the process that applies to permitting. Permitting indicates that the POC meeting has occurred in the villages and there has been communication between industry and villages, but how much feedback do we get from industry and agency wanting to conduct activities? It is a one-day community meeting. We don't have time to digest information for the level of activity that is proposed. They hold up a list of participants, attendees, at the meetings that indicates we had all these people that came to the meeting from the villages, but, the sad thing is, they don't identify that there are these door prizes that were presented to the community for attendees to be able to come to the meeting. I would like to understand how that process and the significance of the number of people that attend the meeting in terms of how much of that information is digested by the participants and how you make your determination that the process has been checked off. The box is checked off; is that all that is required for your permits? That this information was disseminated even if there was no feedback of concerns or interactions by the affected/impacted communities from exploration? It is an oversight issue that doesn't get addressed. It's very unfair for people to come to a meeting brought on with door prizes. They are more interested in door prizes than in what is happening offshore. I'm not sure of the feedback of what they bring to you.

Jolie Harrison, NMFS: I hear what you are saying, and it is a good point. I think that we, as an agency, would be very open to hearing suggestions if you have a recommendation for a framework or suggestions on how we could plan the meetings to go better. We would absolutely be open to that. That isn't the only requirement, but continuing communication is part of it. We're open to define how the meetings would be structured and what people are expected to do. If you could make a specific recommendation, we'd be open to that.

Harry Brower, AEWC: My immediate response, within the Barrow Whaling Association, is that we sit down and make recommendations when and where an impact can occur. Through the

CAA is one process. A signed CAA is a very strong message that we, as a community, send to you as an agency and to the operators, that there has been these communications and a means of identifying mitigation measures that is meaningful to the community.
Karin Berentsen, Statoil: This has been a concern, and we are discussing how to improve on plan of cooperation meetings, and this next meeting we are going together to the villages with ConocoPhillips, our partner, so we don't go double up on the number of meetings the villages have to attend, and we are discussing how to improve on these plans of cooperation so we would definitely like to discuss this with you. Last year, when we presented seismic survey, I was impressed by the questions received from the different communities. They are very knowledgeable, and I was really impressed by their competence on these issues.

George Ahmaogak, Barrow Whaling Captain: I think we addressed this and came up with recommendations before, but no one paid any heed to them. One of the recommendations I made last year on the plan of cooperation, along when the industry makes their visit in the villages, we ask that NMFS, the permitting agency, send a representative to go along or attend some of these meetings, so then you will see for yourself what type of meetings are really taking place to see if we still have real plans of cooperation and avoiding conflicts. Bottom line is the people at the local villages want unmitigable adverse impact relative to subsistence and that is the key magic word I keep saying over and over. The other problem that is there but the agency recommendation is that someone, somewhere, sometime has got to start sending NMFS to attend these plans of cooperation meetings into the villages and listen yourself. The second recommendation is the company needs to schedule meetings for the plan of cooperation because I am meeting'd out. I've gone through so many of these environmental impact statements, scoping sessions, bottom line is that people are meeting'd out, and then you are asking them to read large documents to come up with mitigation measures. Plans of cooperation should have unmitigable adverse impact relative to subsistence and to try to make the mitigation effort work.

Colleen Swan, Kivalina: I don't know if anyone noticed yesterday when there was a map of Alaska and the person making the presentation listed the villages, they jumped over Kivalina to Kotzebue, and I said yesterday, Kivalina is a whaling community. We are the only whaling community in the Northwest Arctic Borough, and, yet, we are continually ignored by the oil companies, and I don't know why. It is difficult for us because of our location. I want to thank Jessica and Harry and George for what they said about the CAA, but I have to disagree with George. The people in the Northwest Arctic Borough, they may be meeting'd out, but we're not. We would love to have a meeting in Kivalina. I want to know why we are continuing to be ignored as if we don't exist.
Karin Berentsen, Statoil: We did discuss this internally and would love to talk with you more. Let's continue to discuss this.

ION Geophysical Corporation 2011 Operations and Monitoring Plans for Beaufort Sea Seismic Survey and Ice Breaking Activities

Joe Gagliardi, ION Geophysical Corporation

ION is arctic focused company. We have been working in the arctic since 2006. The first program we acquired in Alaska was in the summer of 2006 in the Chukchi Sea. We spent a lot of time in the Canadian Beaufort in 2007, 2008, and 2010. The map I'm showing here shows the tracklines for those various surveys. During that time, the operations we conducted are considered near ice operations. We tried to get as close to the ice edge as we possibly could but with the seismic equipment that we had, we never could actually enter it. We did gain a lot of experience in operating in harsh environments, operating in and around very critical habitats, and experience in ice forecasting and where to operate in the ice. We had planned a program in 2007 in the Chukchi and then pulled permit because of concern around operations competing spatially with the local community hunts at the same time we wanted to conduct our seismic operation, so we left Alaska in 2007 but continued to work in Canada. During that time, we spent a lot of effort developing technology that would allow us to collect data we wanted to get but to do it in a timeline that would not compete with whaling activities. To do that, we reinvented how we acquire marine seismic data. We do it now, we have the ability to do it now, by acquiring data in the ice rather than in the open water timeframe.

The vessel in front is an ice breaker escorting the seismic vessel which is behind. This is the type of environment we expect to operate in this season. The 2011 survey vessel is the Boss Atlantic; the Polar Prince is the ice breaker. We propose to do surveys from beginning October to mid/late November with proposed 6,811 km or 4,232 tract miles. The geologic intent of the program is to help us finalize trying to get an understanding of how the Canadian Basin opened 65 million years ago. With any operations we conduct in the arctic, one of the prime exercises we go through is known as trafficability. We need to take a look at the ice conditions that we expect to operate in against the type of equipment being brought in to make sure we have suitable equipment to survive the conditions we want to operate in. The way it works is by using a statistical analysis where you define the types of ice conditions that you expect to operate in so the parameters we use in the spring are any ice concentrations, regardless of stage, as long as the ice condition is less than 3/10 ice. In the fall, we are looking for ice that is less than 8/10 ice and less than 30 cm in thickness. If you look at the last 15 years of ice conditions, the thick bar in this graph represents where you would find thick ice conditions sufficient for the type of equipment we intend to bring, and then the graph on the right looks at a probability analysis where it asks the question what is the probability that based on these last 15 years of ice conditions you would actually find ice conditions that meet your design. We actually do expect that with the equipment we have, we'll be able to operate very safely.

As part of the permit process we have gone through a stakeholder outreach program. It started in 2010. We intended to acquire this program last open water season, and we were unsuccessful due

to mechanical failure on the boat, but we list the stakeholder outreach at the time because it is part of the awareness process we went through. It included meetings with NSB, AEWC, NMFS open water, and additional meetings. We did have several meeting with leadership in various communities, and we are looking at the same process again this year. We talked at the Annual Captains mini-convention in February 2011. We've held public meetings in Barrow, Nuiqsut, and Kaktovik. We had a weather issue with Kaktovik, and we are planning to re-do those meetings in April. Regarding the CAA, as it stands right now, we do not intend to sign a CAA, but we are working on plan of cooperation including sharing data, we are establishing an ION communication center to be operated 24 hours per day during the survey, we will have community liaisons and establish Inupiat communicators on each vessels will have the right to initiate communications with their liaisons as required.

Marine Mammal Monitoring – Darren Ireland, LGL

The objectives of the program are to minimize impacts and document marine mammal behavior near seismic and collect baseline data on marine mammal occurrence in study area. Primary mitigation is timing the survey when fewer animals are in the area and avoiding subsistence activities and hunts in the fall. We will start the survey to the east of U.S. Beaufort and work east to west in early October to avoid the October bowhead hunt in Barrow. The sound source verification will be collected at the start of survey. There is a desire to get some sounds of the vessels operating in ice conditions. These will be conducted prior to or early in the survey and safety radii will be revised as needed for implementation by MMOs during the survey.

Three MMOs will be out front on the ice breaker and two on source vessel. They will be on watch for all daylight seismic activities, most daylight non-seismic operations and 30 minutes before and during ramp ups to ensure safety radii are clear of marine mammals for 30 minutes prior to and during those ramp ups. We will continually monitor safety zones during daylight airgun activity and appropriate safety distances, and shut downs and power downs will be conducted accordingly. Additional mitigation measures that might be required by NMFS and USFWS as part of the authorizations will be implemented. We plan to have big eye binoculars on the ice breaker. We will also install an infrared camera on the ice breaker in order to look at the ability of infrared camera to detect animals in front of the operating vessel and night vision for monitoring in darkness. Intent for observers to collect data using both types of equipment as the peer review had requested information on the infrared. We will collect ice breaking sounds using hydrophone streamer hourly through the survey.

The 90-day report will be produced at the conclusion of activities and will include observations, sound source data and other information we typically include in these types of reports. This table shows estimated takes in the survey areas. We expect there will still be bowheads in the Beaufort in October and November; but with numbers steadily decreasing as migration moves towards the Chukchi, so we expect the numbers to decrease in November. The same is true for seals. We estimate impacts to pinnipeds are greater for ringed seals because they stay around in the winter.

Comments:

Leandra de Sousa, NSB: From October to November, when you mentioned the number of marine mammals was low during that period, based on what data and what kind of marine mammals?

Darren Ireland, LGL: The expectation is that animals are starting to migrate out of the Beaufort during that time. There are various sources of data: aerial and acoustics and tagging suggest those species are moving out.

Leandra de Sousa, NSB: It is a bit misleading and would be helpful given that there are so many different marine mammals that the communities depend on to maybe have a baseline saying these are the population estimate for these areas for these species and then saying these are the species that migrate out. The ringed seals may be a factor; they are all year round, so depending on the population estimates for these different species , it is misleading to group them all together. Just a suggestion.

George Ahmagoak, Barrow Whaling Captain: Thanks for being straight up about not signing a CAA. However, I'm representing Barrow Whaling Captains. Our schedule for whaling starts possibly October 5, and we have fears from the captains because we went through continuous debate on the CAA line item by line item when we had our mini-convention. They were trying to alleviate no conflict during that subsistence hunt. That was the motivating reason why the Barrow Whaling Captains got really involved because they don't want their subsistence hunt messed up. October 5 we will probably be in the water, and you stated in your presentation that you are working east to west to stay away from Barrow whaling captains. The bowheads are migrating east going west, and it is traditional knowledge. I've see it in the past when IHAs and letters of authorization were issued by the NMFS, there were seismic surveys going on in the past. Traditional knowledge shows bowheads deflect 30 miles further from normal migration patterns. The point is there is activity on the east side, and it concerns me that with no CAA, if we start seeing skittish whales and deflecting whales but with no CAA and only a plan of cooperation, the Barrow whaling captains stated that in the event there is no CAA they want to be able to work with the operators to work out something. The CAA is the only thing to work out issues of the hunts. That is why they are so critical. There are six more operators who probably won't sign the CAA, and this is what we have to deal with. We are only trying to protect our hunt. Meeting the whales head on from the Canadian waters, we hope they don't deflect from the migratory path.

Layla Hughes, World Wildlife Fund: If there is shutdown during night or in low visibility, which is common in October and November, how do you propose to clear the safety zone before start up, and how do you ensure that MMOs are not under undue pressure to not spot the marine mammal. By operating at night and times of bad weather, there is a high risk that if required to shutdown the company will lose a lot of money and time, and this seems like a lot of pressure on MMOs.

Darren Ireland, LGL: The agreement is that if a shutdown occurs at night or in low visibility then the array won't restart until the MMOs feel confident that they can see the full 180 dB zone. So that would mean if shutdown occurred in the middle of the night, they would be waiting until

there is enough light the next day to allow the 180 dB zone to be visible for the 30 minutes before ramp up and restart. As far as pressure on MMOs to not report sightings, it's been my experience that I've not heard that type of comment from the field that seismic operations putting a lot of pressure on them during the season to not report sightings.
Joe Gagliardi, ION: That is correct. To go further, the Inupiats on board have a free right of communication to the communities without restriction from ION.

Jessica Lefevre, AEWC: I'm reading from a December 19 letter signed by Ed Nelson addressed to Johnny Aiken, Executive Director from AEWC. In the body of the letter, it states as per my conversation with Earl Comstock, AEWC legal counsel, my colleague, on a conversation on December 9, 2010 … we believe the best way to address the timing of our proposed seismic program is to write a separate title within the CAA. The letter goes on, ION is eager to enter a CAA with the AEWC that addresses our survey timing and scope. Subsequent to Johnny Aiken receiving this letter and sending it out to Earl Comstock and myself, my colleague Earl Comstock spent his Christmas holiday writing a separate section of the CAA specifically for your company. During the CAA meeting when the discussions were held, to our knowledge there was no objection from your company to what was written. Earl was open and available to discuss issues. During the CAA meeting, where discussion was going to be held on this, and let me note that CAA meetings are expensive. During the meeting, AEWC Chairman Harry Brower was given a draft letter from your company addressed to him that had been written prior to the CAA meeting saying that ION wouldn't sign the CAA. I'll just say the word that comes to mind is disingenuous.
Joe Gagliardi, ION: When we attempted to permit this program last year, we had submitted a draft to the AEWC that we were prepared to sign. (unable to hear) During the year, there was no communication from AEWC regarding the document. What we got back was not anything like what we submitted. (unable to hear) I would be happy to take this off line after the next meeting.
Jessica Lefevre, AEWC: Thank you for your comments Joe. If there are communication issues between ION and AEWC, we would definitely appreciate the opportunity to explore the issues with you. The letter was handed to Harry Brower; he did not ask for it. I want to thank George Ahmaogak for his comments.

Harry Brower, AEWC: Again, I want to echo the concerns of AEWC, and it's not something we want to have fade away overnight. George's concern regarding Barrow and what it went through; I'm part of that too. It's the communication we want to continue and trying to keep industry participating within operations in the arctic to continue with CAA process. We did make strides to make adjustments to the language but, in my view, that seemed to be ignored. It's very difficult as to the reason, and trying to express that reason, that your company is not looking to sign the CAA. I look to NMFS. What recommendations will come from them in terms of your level of operations? We will start our hunt at the end of September or beginning of October and your operations will start in the east going west, right along with migration. How are resource managers or permittees looking to address this issue? The whales move along the coast line right where your operations will be. Will that push the whales to move faster along the migration pattern? Will the health state of the whales is being subjected here to being

pushed forward? To minimize the conflict of impacting the hunt, we observe whales being skittish, and it is very dangerous to approach a whale. It can make any type of movement, and an incident could occur. It is happening to the east of us, yet we are trying to minimize an incident occurring. We are in small skiffs that a whale can tip and mangle a person easily. When that occurs, we start looking back to who's at fault. I don't think ION wants to be in that state. People need to understand what we are being subjected to. We try to communicate to best address and keep the incident from occurring. It is not pushed in a federal sense.

Megan Ferguson, NMFS: I am looking at a section where you derived your bowhead whale density estimates, and it said that you used data from both BWASP surveys and from industry surveys in October, and I thought I wonder what will happen if I computed an estimate using just the BWASP data. And you gave the years you used as 1997-2004, so I tried to come up with a BWASP estimate, but I didn't know if it was all of October or just the early part of October. So the comment here is that I think that your documentation on how you get the numbers is lacking sufficient detail for people to really interpret what you've done, and I think that is going to be very important to get those details in, especially when we start talking about doing an integrated analysis with multiple sources of data because in my mind, what it means to integrate passive acoustic data, aerial survey data, satellite tracking data, is your kind of entering the realm of maybe a hierarchical Baysean model, which has lots of details, lots of assumptions, lots of places to hide things. If I'm going to be evaluating an analysis like that, I need to see all of the details written out so that everything is transparent. The result of my little analysis looking at the BWASP database for the years you used were, if I used the BWASP sightings for all of October, and I use your estimate of F0, G0, and group size, my density estimate based only on the BWASP data was 30% higher than the estimate you derived using both BWASP and industry data. When I computed the estimate using all of your parameters and the BWASP data for just the first two weeks of October because you said you were trying to derive an estimate for early October, my density estimate was 20% higher than the density estimate that you derived from industry data. So a second concern that I have is that there seems to be a discrepancy between the data that are coming out of the industry aerial surveys and the BWASP aerial surveys, and this could have an ecological component to it because I know that the industry aerial surveys don't cross the entire Alaskan Beaufort like BWASP does. It was kind of a surprising result to me. I used your group size estimate. We know the BWASP estimates are likely to be larger than industry ones just because we do tend to circle and try to count the number of animals in a sighting, but the argument I've heard for you wanting to not circle is that if you do circle then you're going to lose encounters further down the line, but the results of my analysis tells me that your encounter rates are actually lower than the BWASP encounter rates. So this is not something we are going to solve here, but I think it is an underlying concern that should be noted and brought to the attention of the permitting agency that there are obvious discrepancies here and maybe when you are computing density estimates like this to be sure to be very specific about what data you used and also maybe think twice about what data are the most appropriate to be using.

Darren Ireland, LGL: I appreciate the input, and I do think we have some good communication going on and the regulators, regarding what they expect and what they want in the permit

application on density estimates, as far as data availability, peer review, things like that, I think there is a good conversation to be had.

Chris Clark, Cornell University: We seem to be dealing a lot with process, and this is not just about a process to allow the process to move forward. There are real and unanswered questions relative to the Arctic Ocean and ecosystems, both natural and human. I would respectfully submit that the process that has evolved and presently applied is presumably about industry impacts, say for example with bowheads, is presently myopic because it is focused on acute exposures and does not deal … See, everything we've talked about is small scale, small term, right around the boat, and doesn't deal with large scale long term health of the arctic ecosystem on which many people depend. My question is whose responsibility is it to deal with this issue of getting caught up in swirl of small scale versus the big picture of the entire ecosystem, and it's happening fast, and we had better be careful with what we're doing here?
Jolie Harrison, NMFS: To some extent, the MMPA is written somewhat myopically, but the work on the EIS takes a more comprehensive, multi-year, multi-activity, cumulative effect approach. There is a ton of room for people like you to give input and how to deal with impacts long term. The way we deal with the MMPA isn't always the broadest.
Michael Payne, NMFS: I don't have a good answer for you, but I'm going to give a plug to the undersecretary of NOAA. For the past year and one-half, with review of these small scale projects, she has focused on the big picture and questions like how do we know what we authorize today won't affect us ten years from now, etc. We don't have the answers. We are required to come up with a determination on the effects. You have been in conversation with NOAA and in her evaluation of these types of activities; she's looking at the big picture. I don't know how soon it will happen; if it will happen under her administration. Taking into account what we have to do and the recommendation of the oil spill commission and different documents and reviews that have been conducted and trying to put them under one umbrella is a nearly impossible task. I don't know how to do it. I honestly think she's looking to people like this group to come up with an answer. It's the question of the millennium.
Jim Kendall, BOEMRE: The Secretary of the Interior is extremely concerned about the arctic. He has said he is taking a cautious approach to oil and gas operations. He authorized, requested or ordered, so to speak, the USGS to pull together all of the scientific information available and specifically looking at what is and is not available in terms of oil and gas decisions, and the report is due in April. One of the nine national ocean priorities is changing conditions in the arctic. So what Mike said is absolutely true. It is almost an impossible task, but there are things going on right now with what NOAA is doing and USGS is doing, what all the interagency groups are doing in terms of national priority and trying to move in that direction. Hopefully we will see some advances in this in the next six to eight to twelve months.

Brandon Southall, SEA Inc.: I want to fully agree with Chris. We've worked on some of these things together. We've gotten some metrics in place to help deal with some of these things. Bill Streever talked about the cumulative effects group that we're trying to work with, etc. I really encourage the EIS process to look carefully at the cumulative effects working group going forward. My comment goes back to the discreet effects: the multi-dimensional nature of disturbance. This is a different activity because of the ice breaking component and animals on

the ice which may be disturbed and perhaps enter the water because of the ice breaking and therefore be exposed to seismic. It's a different type of disturbance that is typically the case with ice or seismic activities. There are a lot of questions that go along with that. How do you determine take in this kind of environment? For the animals on this ice, this is a different context. How do you deal with that? How do you predict takes in that multi-dimensional disturbance context? I don't see anything different in the process. It basically focuses on the underwater thresholds. Is there any kind of official consideration for that, or is it just the reaction of the animals to ice breaker and seismic sounds? Has that been considered in a systematic way?

Darren Ireland, LGL: In terms of looking at the synergistic effect between ice breaking and the seismic effects in the water - there hasn't been an attempt to pull it together in the application itself. If NMFS could give us direction on how to do this, I'd be happy to.

Shane Guan, NMFS: Where we would be requiring a series on ice, if its within the underwater take zone, we'd consider it as a take.

Robert Suydam, NSB: The answers Chris got on the big picture, the end result will be interesting at some point, but the EIS process won't be completed for a year. I'm optimistic that efforts are happening, but it doesn't really help us with the ION project. This project is really difficult to deal with because it is new, and what ION has proposed I think has some merit to consider. Trying to avoid the subsistence hunts and trying to avoid a time when we think more whales and seals and such are in the Beaufort Sea, I think is really worthwhile to think about and has merit. But I really struggle with this because I don't think there are data for late October. I don't think there are any data for November about what marine mammals are out there, and so evaluating the risk from this survey is incredibly difficult to do. More specifically I struggle to understand how monitoring is going to occur. Having MMOs on an ice breaker and having MMOs on a source vessel and having possibly IR monitoring… I don't see how MMOs will be able to monitor the entire 180 or 190 safety radii. By early November there is virtually no daylight, and ice is out there and that complicates the MMOs ability to monitor the safety radii. How are you going to monitor the full 180 zone, much less the 160 zone? I don't see how you are going to clear the safety radii before starting the array.

Darren Ireland, LGL: I think you are right – it's a new beast and a difficult challenge. What we're struggling with is doing it at a different time of year, and the ability to monitor is reduced. The monitoring during the program is limited to time periods when MMOs can see the zone which applies at that time. It would be when they can see the zones during daylight, which is when operations can restart if there is a stoppage of airguns prior to that.

Jolie Harrison, NMFS: We're still early in the process of figuring out how to do this. We can't see under the ice, so we are contemplating the potential for Level A harassment as well. We don't really know if pinnipeds are going to jump off the ice only to be ensonified at a level that we consider to be a potential for injury? It's early in this process, but we are aware of differences between this and regular seismic operations, and we're trying to figure out how to work through that.

Robert Suydam, NSB: To me it seems like we are quite a way into the process. An IHA was issued last year to ION and I know … oh, it wasn't? Okay, so it was pulled … I was looking for it and the application on the website and it looked like it was pulled off at some point.

Jolie Harrison, NMFS: There was not a proposed authorization published.
Ben Greene, NSB: Chris and Robert articulated my concerns as well. I will take what they said and turn them back to NMFS and ask a question of implementation of NEPA on this project. In March 2010, the GAO issued a report that was targeted at the agency once known as MMS and looking at their implementation of NEPA specifically on significant thresholds or lack thereof of having defined thresholds. I would direct you to some comments from NSB to BOEMRE when they published their notice of intent in the federal register to authorize the G&G permit to ION through an EA/FONSI. We submitted some comments, and I'm not sure if NMFS was directly copied on letter or not, but we'll make sure you get a copy of that, where we note our concerns with regards to thresholds and whether or not a finding of no significant impact can be assigned or justified when there are so few data that are truly relevant to ION's proposed project.
Jolie Harrison, NMFS: In every case working through EIS is determining if there are environmental impacts. Appreciate concerns and will reference comments.

Craig George, NSB: I would propose use of our satellite telemetry data and acoustic data from bottom founded buoys that overwinter, some near Barrow and possibly the Beaufort, to estimate bowhead of October through November densities.
Darren Ireland, LGL: The estimation of number of animals present from acoustic data is a challenge that is out there. Does anyone have input there and how to estimate data from acoustic data?
Craig George, NSB: It might be a presence/absence calculation, but there is information from spring. Correlation between number of calls and number seen may be helpful.

Candace Nachman, **NMFS**: When you mentioned the IR camera, is it different from the Statoil used last year?
Darren Ireland, LGL: I failed to specify it would be a different type of camera.

Layla Hughes, World Wildlife Fund: I appreciate Chris' comments. From my perspective there isn't anything from the MMPA to prevent looking at these questions. MMPA prohibits taking of marine mammals, and then there is an exception: as long as there is no more than a negligible impact that requires (unable to hear). There is nothing that requires the agency to look at anything else besides the IHA when (unable to hear). I want to understand better from NMFS what exactly in the MMPA requires you to look at impacts only on an IHA to IHA basis within the year you are issuing that IHA for.
Jolie Harrison, NMFS: The MMPA doesn't preclude us from ever including anything else. It is a more focused and less broad tool than NEPA and some other approaches we can take. We can consider other things that are going on. It's just a less broad tool than other statutes.

National Science Foundation 2011 Chukchi Sea Seismic Survey & Monitoring Plans

Bernard Coakley, University of Alaska Fairbanks

I've worked exclusively in the Arctic Ocean since 1993, partly because the Arctic Ocean affords us a very rare privilege and opportunity to see things that we can be completely surprised by. Part of the motivation for this cruise is to be completely surprised. I will walk you through the motivation for the cruise from a scientific point of view. We are explorationists when we are funded by NSF, but we are exploring for ideas, testing hypotheses and develop a deeper understanding of the earth. Through this overview, I will attempt to layout the rationale, equipment, techniques and mitigation steps for this cruise.

The project isn't a 3D survey; it is a 2D survey. It is hypothesis driven research. What we're doing essentially is a type of remote sensing. We are using sound at different frequencies to illuminate the seabed and to illuminate the sediments below the seabed. It is NSF funded and supports a PhD student. After the cruise is over, I will have two years of data exclusivity after which the data goes to national archives.

The positioning of the survey grid is absolutely critical because what we're trying to do is connect the data that has been collected, particularly the well data that were drilled by Shell in the late 1980's, with the interior of the Arctic Ocean.

The idea here is to image the southern edge structure of this big block of continental crust and try to understand how it is connected to the Chukchi shelf. We want to test the models for the opening of the Canada basin. We believe this is an oceanic basin, and oceanic basins are young in terms of earth's history, and so it formed at some time, but this big chunk that stands up so high, it has to be a piece of continent. The other thing we want to do is develop age controls on Arctic Ocean stratigraphy.

Geology 101: Continents are permanent, oceans are temporary. Every point on the surface of the earth is in motion. Layered rocks record the history of the earth, and this is what we're trying to do – image these layered rocks. We can study earth history by imaging stratigraphy with seismic reflection data. Continents were chock-a-block; they all fit together. The point is there are mountain ranges in North America. Over the last 60 years, the way we've understood the continents is by understanding the oceans. Mountain ranges are created by continents colliding together. One thing that restricts us from understanding the arctic is you can't bring continents together. To piece that history together is the purpose of this cruise. Chukchi Borderland is the main objective for the cruise. The first hypothesis for the Canada Basin is the Windshield Wiper theory in the 1940s. If you want to believe northern Alaska separated from Northern Canada. The Chukchi Borderland stands up really high, and you can see it is has been dissected and pulled apart. The place to go look and test these models is not out in the basin; the place to go is right here because there should be structures in this area that explain how that terrain, how that block of continental crust formed over time and help us understand the relationship between the shelf and this other chunk of continental crust.

Mendeleev Ridge Stratigraphy: This is a very cryptic feature in the Arctic Ocean. Nobody really knows what it is and it's been honored with every possible explanation. The problem with

interpretation is we don't know the age of the various layers and because of this we can't expand the information into history. By sailing across the wells drilled in the late 1980's we can relate this information and bring age control into the central arctic and begin to tell a story.

Cruise planning: We set sail out of Dutch Harbor on September 5 and return October 9, 2011. The Langseth is not ice reinforced. We did an imaging of the ice concentration from September 2009, and it predicted that the area covered in the survey area should be relatively ice free. This says we have to be clever about how the cruise is planned. The number of tracks is 30% more than can actually be done within the timeframe of the cruise. We expect some won't be done. The ice will come in from the west, and we'll start running tracks east to west, ending up working in the west first before the ice returns and then work our way south.

Geophysical Equipment: Using sound primarily using a bathymetric sonar, a sub bottom profiler, an acoustic doppler current profiler and a gravimeter, towed magnetometer and passive sonobuoys.

Multichannel Seismic Reflection Gear: The Langseth is the primary vessel in the research fleet. It is equipped for multi-channel seismic reflection data acquisition and geophysics. Capable of 3D seismic, but the survey is 2D. 1830 cubic inch total volume over 10 independent airgun will be used. We will have a mitigation gun of 40 cubic inch, and it is approximately one-third of the volume of a typical oil industry gun array and one-quarter of the volume able to tow. We will tow a two kilometer streamer. This slide illustrates the 10-gun array formation designed to have a compact signature. Source signature–has a compact source signature to get nice crisp data from survey.

Model Array Sound Levels

Water Depth	**190 dB**	**180 dB**	**170 dB**	**160dB**
Deep	12	40	120	385
Intermittent	18	60	180	578
Shallow	150	296	500	1050
Deep	130	425	3180	14070

IHA and community outreach: We visited Barrow and AEWC on February 17, 2011. The primary concern focused on real time communications to and from the ship. A plan of cooperation has been developed and draft request for IHA has been submitted to NMFS.

Conflicts: The closest approach to Barrow is 270 km WNW of Barrow. The closest to any community, while active, is 100 nautical miles NW of Point Lay. I anticipate little or no conflict with community activities during the cruise. While active, we should be mostly north of known bowhead migration routes. We cross perhaps twice; once before migration is fully underway and again when it first starts.

Mitigation Plan: We will have five to six MMOs on board with visual monitoring from 21 meters above the waterline using bionics, towing PAM program, ramp up and ramp down procedures and power down procedures as typical within the 180-190 range.

Results: To develop a better understanding of the history of the Arctic Ocean and a better understanding of continent formation. By collecting these data and being able to date the sediments, we may be able to bring the International Ocean Drilling Project into the arctic. They've drilled every other ocean basin except for the Arctic, and, by doing this, they've recovered absolutely essential records that are the basis for a lot of our understanding of climate change, and we have a big gap in the Arctic Ocean.

Comments:

Robert Suydam, NSB: Thanks for the presentation and briefing on Geology 101. I have a question about marine mammal monitoring. You mentioned there will be sonobouys out for seismic data and you mentioned there will be PAM as well. Is either being used to look for marine mammals?

Bernard Coakley, UAF: The only reason for the PAM is to look for marine mammals. The sonobouys, you know we record the data digitally, and we don't have a simple way to give it to the PSOs, but we certainly could make the digital data available for those interested.

Robert Suydam, NSB: And given what Bruce said about the difficulties with a towed PAM setup on Statoil vessels last year, what is your vision on your PAM might work?

Bernard Coakley, UAF: I lack a vision on how it might work. We get information from sonobouys on line of sight up to 20-25 km and looking at data post hoc when the ship goes away may be helpful.

(no name provided): From what we know about the towed arrays with PAM, we don't know that they are tremendously effective, but we are doing our best. NSF isn't really in a position to use sonobouys or other acoustic devices, so this is the best mitigation measure available to us at this time.

Robert Suydam, NSB: I have a question for NMFS but before I go there, just to let you know Kate Stafford had instruments at base of the Chukchi Borderlands and definitely picked up marine mammals there. My question for NMFS is this IHA is not being peered reviewed and if you could articulate why this isn't being peered reviewed, especially given the timing of the cruise (from early September to early October when the bowhead hunting is occurring and even though it's quite a ways offshore, it seems like it's not far enough offshore. It seems like the sound would propagate into areas where hunting may occur. If you could comment on that, I would appreciate it.

Jolie Harrison, NMFS: The trigger for peer review is where the proposed activity may affect the availability of a species for taking for subsistence purposes. Because of the distance, we made a decision that it didn't meet the trigger for peer review. Not that the sound can't reach the animals and there may not be an impact, but that it did not meet the trigger for review.

Colleen Swan, Kivalina: You mentioned that when the ships are moving you won't be interfering with the migration of the bowhead. They won't be migrating fully yet when you cross the route?

Bernard Coakley, UAF: To the best of my knowledge

Colleen Swan, Kivalina: This is what I learned from my elders and they advised their young hunters not to hunt the leaders of the migrating sea mammal or land animals otherwise you will

alter the migration route, so that is what I wanted to mentioned. You probably should be talking more closely with the hunters.

Michael Payne, NMFS: Robert, in addition to the business, we thought about this carefully. The migration of bowhead should be considerably east moving west. Their activity is west of where the likelihood of hunting would occur quite a bit. How would this affect availability to hunters if the activities are quite a bit west of where they would be taken?
Robert Suydam, NSB: Because of Point Lay and Wainwright, if they hunt in the fall, it is in September before the lagoon freezes up, and so if there is a seismic operation 100 miles offshore and the sound is propagating into the hunting area, the potential for bowhead to become skittish or more difficult to capture is where the question comes from. In terms of monitoring protocols, it seems like it is appropriate to think about what those protocols are and whether the peer review group could provide recommendations that would help with estimating the takes and perhaps mitigate the taking of animals.

Ben Greene, NSB: I like the geological questions you are asking; they are fascinating. Nevertheless, this meeting is about harassment to marine mammals. So, focusing on the marine mammal issue, you gave a nice map that shows your lines with previous seismic shoots over the last decade of time, but my question is the acquisition of the new data truly necessary or are you not able to analyze old data to answer your questions. NSB is concerned about the ever expanding seismic shoots and repeat shoots for the same area, which may not be necessary.
Bernard Coakley, UAF: There is a gap in the coverage. There are a couple of isolated lines that touch on the same area but by collecting the data we could get there, we could connect up those lines and make them more useful. Existing data won't answer the questions, particularly for the connection from the mid shelf to the Arctic Ocean itself.

Harry Brower, AEWC: Thanks for the presentation. I want to reiterate comments on AEWC and NSF research. It is true we need communication if animals are being skittish, even up in Barrow. We work with this CAA between industry and communities. Yours is further offshore but sounds could still travel in the water and impact animals and I have that concern. If you make that observation at the start of the hunt, we need to communicate with you on how to minimize that impact.
Bernard Coakley, UAF: I have spoken with the ship leaders to make sure we have the contact information.
Harry Brower, AEWC: We have put out shut down dates in the Beaufort Sea for operations to minimize the impact so we can conduct our hunt. The regulatory agency that issues IHA doesn't see any need or reason for shutting down until the hunt occurs.
Bernard Coakley, UAF: It is certainly my hope that the cruise has no effect on your hunt.

Shell Camden Bay and Chukchi Seas Program Update 2011 & 2012

Pauline Ruddy, Shell

I am the new regulatory affairs team lead for Shell, and I started exactly one week ago. Before that I worked for Arctic Slope Regional Corporation, AES, on the Shell project. So I've been working on the Shell project for four years but am a new Shell employee. I've been in Alaska for about eighteen years, and I worked across the state doing various jobs during that time. My husband was born in Juneau, and his family still lives here in the state.

2011 Program: As most of you know, in February of 2011 Shell announced that it was going to postpone our 2011 drill season and because of that delay we also decided to reduce our overall program in 2011. We will not be doing any 3D seismic, and we don't have any other geophysical programs proposed for 2011. We will be doing strictly science activities this year. We will continue acoustic monitoring in the Beaufort and Chukchi, we will be doing ecological science gathering in the Chukchi Sea and that is through a third party, Olgoonik-Fairweather. We will be doing some Shell operated onshore ecological characterizations in the Beaufort and Chukchi Seas and limited ice monitoring with limited overflights. Some of these studies are going to be funded through third parties. We committed to AEWC at the mini convention that we will sign this year's CAA as presented in Barrow. There are several joint studies and programs and onshore ecological assessments.

2012-2013 Programs: We are developing plans to drill up to four wells in the Chukchi using the Discoverer during open water season and two wells in the Beaufort using the Kulluk. We will continue Shell's long term ecological studies and marine mammal monitoring program as well. In the Chukchi, we will be drilling on the Burger prospect; the closest village is Wainwright. In Beaufort, we will be drilling on the Sivulliq prospect and on the Torpedo prospect; Kaktovik is our closest village, about 50 miles away.

Mitigation Measures: We fully intend, in 2012, to enter into a good faith CAA negotiation with the AEWC, just as we've done this year and in years past. We will have a communication plan for avoiding conflict with subsistence users. We will honor the Beaufort Sea shutdown period and remove the drill rig by August 25. We have committed to zero discharge in the Beaufort Sea. We will have collaboration and communication with whaling associations, walrus, Nanuq and seal commissions, round-the-clock oil spill response assets with each drill ship, and arctic capping and containment. For the Kulluk, we've committed to the North Slope Borough to modify it to ensure and reduce the air emissions as outlined in the air permit. We will continue with our subsistence advisor program with advisors in each potentially impacted village, MMOs on all vessels, real time ice/weather forecasting, and shore bases in Barrow, Deadhorse, and Wainwright. No transiting without communication and relief rig capabilities.

We are talking to the communities of Barrow, Kaktovik, Nuiqsut, Wainwright, Point Lay, Point Hope, Kivalina, Kotzebue, Gambell/Savoonga, and Shishmaref to present and talk about our plans.

Monitoring for 2012 Program - Michael Macrander

The monitoring that we anticipate for the 2012 drilling program there will be MMOs on all vessels, there will be an aerial program, the acoustics program as is usual, the joint studies program, and

drilling monitoring. All monitoring will be conducted during drilling. Joint studies include acoustic recorders, ice and metocean buoys, upward looking sonar, benthic studies, current meter, bird observations, mammal observations, fisheries sampling, zooplankton, physical oceanography. Drilling monitoring includes water chemistry/plume, sediment chemistry and local acoustics. We will continue to have ice measuring and monitoring capabilities. I want to draw attention to the drill monitoring program that will be put in place (pre, during and post monitoring) anticipating that this will concentrate on the fore mentioned categories. Both are to understand the sound signature around the drilling program, and we hope to develop a thorough catalog of sounds associated with drilling.

Comments:

Ken (Last Name Not Given): As far as either of the programs, will they have resolutions to deal with localized deflection calling rates around the rig? Or will you have to modify the array?
Michael Macrander, Shell: Yes. The last three years in the Chukchi, if you recall some of the graphics, we've had clusters on Devil Paws and Burger prospects and this year a cluster on the Statoil prospect. So those have been in place with localizing capability. So we have three years data around that and although probably this year those clusters will be dropped from our program, we anticipate if drilling on Burger in 2012/2013, they will be back in place with that capability. We designed the five arrays in the Beaufort Sea back in 2007 specifically to localize in anticipation that we would be drilling between lines three and four, so we have that capability, but our intent is to enhance that by adding two additional recorders associated with line four to enhance capability. We also have a specially designed acoustics program being developed associated with drilling that will do all of those things and will roll out in more detail next year.

Leandra de Sousa, NSB: You said zero discharge in Beaufort. What about the Chukchi?
Pauline Ruddy, Shell: At this time we are not planning to have zero discharge in the Chukchi.
Leandra de Sousa, NSB: Why?
Michael Macrander, Shell: There have been ongoing discussion including EPA and a lot of studies have been done on discharges. At this point, Shell has committed primarily to the North Slope Borough and to AEWC to not discharge in the Beaufort Sea, which is perceived as the main stream of the migratory path of bowheads. We are not ready to make that commitment in the Chukchi and could stand more on the science around drilling discharges.
Leandra de Sousa, NSB: Have you considered, besides marine mammal acoustics, doing acoustics for fish or zooplankton while doing surveys in 2011 and 2012?
Michael Macrander, Shell: We're considering, yes.

Robert Suydam, NSB: Michael and Pauline, thanks for providing information so early as we think about cumulative effects; understanding ahead of time helps with that. Thanks for continuing baseline studies as well. The zero discharge in the Beaufort is great. I haven't completely understood in the past when you say you aren't discharging cuttings when the hole gets down to 20 inches or smaller. How much does that reduce the cuttings?
Pauline Ruddy, Shell I don't have that number with me.
Robert Suydam, NSB: If you could get back to me with that number, it would be appreciated.

Michael Macrander, Shell: Let me clarify, if I can. Once the 20 inch diameter riser is in place, the only thing discharged would be the initial portion. Once the riser is in place, everything else goes to the surface and is not discharged; it gets kept. The initial mudline seller, roughly 30 feet in diameter and 40 feet deep is the volume; it's not brought to the surface, it is just cut and there. Relative to the amount of total stuff that comes out of the earth it is extremely minimal and doesn't include anything in oil related extraction.
Robert Suydam, NSB: Thanks, I got my question backwards. Thanks to Shell for allowing me the opportunity to go out and see the Kulluk last week. It seems like a lot of work needs to be done on the Kulluk in the next year and one-half to get it ready to go out in drill to get the air emissions, equipment, and everything else. As you think about monitoring of discharge in 2012, think about it from the perspective of cooling water and the discharge of a large amount of cooling water and the biocides and what the impacts might be to marine mammals. Hunters say the whales are sensitive to things put in the water that aren't typically there and the potential for marine mammals deflected away from those discharges. Getting more scientific information about that would be helpful.
Michael Macrander, Shell: Water chemistry is shorthand for precisely that; a detailed, quantitative forensic examination of the water and concentrating on any plume in the currents are part of the program. It will be integrated into the observation of whale movement acoustically and aerially and cross referenced to tagged studies. We'll consider the data streams in interpreting this.

Robert Thompson, Kaktovik: Are you having a person on board that is not with Shell to monitor conditions of permits.
Pauline Ruddy, Shell We will have compliance monitoring on the ships. Those will likely be contractors.
Robert Thompson, Kaktovik: Separate from Shell?
Jim Kendall: The BOEMRE will have folks on the vessel 24/7 during the drilling.
Robert Thompson, Kaktovik: I have a concern about the relief well drilling. We know of two other spills where it took three months to put in a relief well and if there is a spill at the end of the drilling season, can a relief well be put in within that time?
Pauline Ruddy, Shell: Yes, if the Discoverer had an issue and we pulled the Kulluk from the Beaufort to go to the Chukchi, it is a three to four day transit. Wells are about 30 days, so a relief well would be expected to be less than 30 days.
Robert Thompson, Kaktovik: It has been done on the gulf and so on?
Pauline Ruddy, Shell: Our wells are not as deep as the wells, specifically the Macondo well.
Robert Thompson, Kaktovik: Can you deal with ice conditions if it happened at the end of the season?
Pauline Ruddy, Shell: Yes.
Michael Macrander, Shell: All of our rigs are ice capable drill rigs with ice management vessels. These vessels could operate into late November or December if needed.

Dan Fitzgerald, NSB: Can you let us know the current status on construction of the capping/containment system and when and where testing will occur?

Pauline Ruddy, Shell: We are working on the design, and as we have more information we'll make that available.

Mike Levine, Oceana Juneau: As far as development, does Shell envision these drilling programs as new programs with new exploration plans and C Plans?
Pauline Ruddy, Shell: We are currently going to base our exploration plans off the exploration plans we've already submitted in 2010. As to whether we call them revised or new, I can't answer that right now. As far as C Plans, we will be revising our currently approved C Plans to match our exploration plans.
Mike Levine, Oceana: The plans show four wells in the Chukchi and two in the Beaufort. Do you imagine that being each year?
Pauline Ruddy, Shell: We are going to try to get four wells each season in the Chukchi and try for two in the Beaufort each season.

Ben Greene, NSB: With regards to your monitoring, we submitted several comments with regards to EPA related to the NOI on Arctic NPDES permit and specifically the cooling water discharge and large volumes of plume water to be discharged. You mentioned that you looked carefully at the plume, and I sense you are talking more chemically. Will that be temperature as well, to monitor assumptions built into your application.
Michael Macrander, Shell: Yes, it is a part of the program. This time last year we hoped we would drill in 2011, and we had the added monitoring program already scoped out. We will certainly take another run at it, and there will be opportunities to review and comment. I would anticipate it will include both chemical and physical characteristics as well.

George Ahmagoak, Barrow Whaling Captain: I appreciate your monitoring reports way ahead of time and appreciate the information on proposed plans. My question is if your monitoring program detects some kind of a conflict, and although you have a CAA, in real time as part of your monitoring program, if your data set tells you you have a conflict, will you change your plan of operations if there is a potential conflict during activities? Not after the monitoring report is done, but in real time, as part of the mitigation? My second question is there are lots of monitoring programs and a lot of studies. Are you augmenting the programs you are conducting because you signed an agreement with the North Slope Borough on baseline studies and will this compliment those studies?
Pauline Ruddy, Shell: Like in years past, there will be MMOs and advisors and Inupiat representatives in case that situation arises so we can respond in real time if there is an issue with subsistence use. We will follow the communication plan and outline we have with AEWC.
Michael Macrander, Shell: A lot of the components of the monitoring program are designed around agreements made to be real time. Some aspects are real time and some are analyzed after the fact. It is our intent to act upon information current and relevant to modify our program, even up to shut down. It is there. As far as baseline studies, there are a number of components to the program in place. We're pursing avenues to collect information out there. Baseline data can be used or misused a lot of ways. We're collecting data through a lot of avenues to understand the ecosystem in general in the Chukchi and Beaufort, as well as precisely in areas we operate. The recent agreement with North Slope Borough is a baseline or

cooperative agreement. I invite Robert and others to step in on that. The studies program is to be guided by a steering committee comprised of representatives of the six coastal villages within the North Slope Borough and representatives of the North Slope Borough government and Shell representatives along with external scientists. I can't tell you what it will contain per se, but can answer questions relative to those in these communities.
George Ahmagoak, Barrow Whaling Captain: With your monitoring program, a suggestion, a way to gauge your mitigation and the CAA you have as a way to measure how well you're doing in the agreements. I don't know if NMFS is picking it up, but it is a model with your monitoring to be a way to gauge how well your monitoring and mitigation agreements with CAA are and how effective you were with your monitoring program.

Robert Suydam, NSB: This agreement between North Slope Borough and Shell for baseline studies that trying to collect information pertinent to understand and mitigate potential impacts to resources to subsistence users which is why we have the steering committee that is in large part dominated by the communities. We hope for it to continue over multiple years, and hopefully we can draw others into the agreement.

Harry Brower, AEWC: Mike and Pauline, thank you for the presentation and I acknowledge Shell for looking to sign the CAA for the 2011-2012 activities. This is something we've been looking for in terms of communication. We had a timeline to work things out and follow up and for getting a signed CAA. It's not easy getting input and minimizing impacts. Thanks to those who indicate they are willing to sign to a CAA for 2011. I would like to indicate that we have a cooperative agreement with ION and Statoil as well. It's not an easy task, and it takes a lot of communication between organizations to understand the work of the CAA. We learn as things go on; I don't know everything. Thanks for the opportunity to say thank you to Shell. Travelling down to Dutch Harbor was a sight tour; a, white glove test, but the equipment wasn't there yet. Thank you for the trip down, and I look forward to a trip when all the equipment is on board.

Layla Hughes, World Wildlife Fund: Regarding the four wells in the Chukchi, it sounds like you intend to drill into the end of October and possibly November as well.
Pauline Ruddy, Shell: Only during open water season; we will be out by October 31.
Layla Hughes, World Wildlife Fund: Even drilling to the end of October, if you add the four days of the relief well rig getting there plus the 30 days, even though you are drilling shallower then it doesn't mean you will be able to drill a relief well in 30 days. If we count just the 30 days plus the four days, that is already December. Our first concern is the response gap, the days where no response is possible (we saw with the BP blowout in Gulf of Mexico with winds where they couldn't respond). We know the weather in the Chukchi is worse in the winter, so the response gap, those days when there is just not response at all that is possible, that's our first concern. The second concern is the efficacy of cleanup techniques when you can at least try to respond but you're not very successful. We saw with this cargo ship accident in Norway a very realistic, a live explanation, of what the challenges are with current response technology, and I would like to know what you learned from observing that experience and what you are going to do to assess and close the response gap.

Michael Macrander, Shell: My first reaction is that I think you know there is a discussion around spill response is really sort of another venue. We have a C-plan out there, and you can review and comment on it. I point to the fact that it has been recognized as the best available technology and that the Shell program has been recognized as being the best available approach of this kind. I anticipate a full discussion and debate on spill response capabilities as we go forward. The rigs that we are employing here are ice capable and can operate in theater in December. Kulluk has operated into December in the past. As we've said, the wells are relatively shallow in shallow water and not complex, and so we have a high degree of confidence the well can be drilled in timely manner. I am reticent to focusing solely on spill response. Certainly spill response is hyper critical, and we don't want to give it short shift, but our first focus is on spill prevention and following appropriate measures. We didn't bring our drilling experts or spill response experts here today, so I would say beyond cursory treatment here, it's for another dialogue.

Enok Adams Senior, Manilluq: On your monitoring, are you thinking about checking on the crab, shrimp, walrus and beluga? Are you monitoring the bottom fish that the marine mammals live on?
Michael Macrander, Shell: Yes, the cooperative studies take a very detailed look within the immediate proximity within the drilling operations. We refer to integrated ecosystem studies: physical, chemistry of water, temp bin, stratogication of water column, benthic organism, animals in mud, and on the mud, zoo plankton and phytoplankton, both plant and animal. All this is integrated with marine mammals, birds and fish. We have at least three years of data at Chukchi and two years at Beaufort. If we don't have it now, we will have at least two years at all of our Beaufort Sea leases. We anticipate as part of the drilling specific and ongoing studies there will be carried right on through additional seasons.

Enoch Adams Jr, Kivalina: I've been to several of Shell's presentations since this issue began and today this is the first time saw Kivalina's name up there. When was it added?
Pauline Ruddy, Shell: We have been to Kivalina in the past, in 2009 and 2010. We made a commitment this year to go to these additional villages, and we're working on figuring out a time.

Robyn Angliss, NMFS: I have been receiving the reports for integrated ecosystems studies and they serve as a jumping off point for industry to continue monitoring those spots for some time to come. Now that there are a couple of years under your belt, have you thought about a comprehensive review of studies to make sure you are monitoring the right stuff in those areas? There may be some tweaks that need to be done to make those studies more helpful in the long term.
Michael Macrander, Shell: I think there are several things that need to happen in the near future. Getting peer review on the process and what we're doing is among those. As the program was conceived and participated in, it was anticipated as a three year program and there was a built-in pause after the third year to synthesize what we've learned and figure out if we need to tweak the program. We have certainly tweaked the program several times over the past few years; we added the fisheries program in 2009, we tweaked the fisheries program in

2010 and there will probably be additional tweaks this year. Another critical thing is mention of the USGS report coming out and once you start digging into information out there, there is a lot of information on the seas over the last decades. There is data out there, but what does it all mean? There is a need for synthesis of data that is out there and we're looking for the right federal partners to make it relevant.
Robyn Angliss, NMFS: Will there be a peer review?
Michael Macrander, Shell: We're preparing reports for peer review literature, and we anticipate a process overall as well.

Erik Grafe, Earth Justice: In the Chukchi are you focusing only on Burger?
Pauline Ruddy, Shell: For 2012 and 2013 we're looking only at Burger.
Erik Grafe, Earth Justice: For both seas, will those operations be supported by ice breakers and how many for each?
Pauline Ruddy, Shell: We will have a dedicated ice management vessel for each drill rig and also an anchor handler which can do some light ice duty management.

Rachel Naninaaq Edwardson, Owner of Uncivilized Films, Barrow: I've been taking pictures with the hope of launching a film on offshore drilling in the arctic. www.uncivilizedfilms.com If you have questions or comments, I would love to put you in front of the camera. I will be here until Friday. Email: racheledwardson@gmail.com

NMFS National Marine Mammal Laboratory Updates: Aerial Surveys for Marine Mammals in the Beaufort and Chukchi Seas

Megan Ferguson & Catherine Berchok, NMFS, National Marine Mammal Laboratory

BWASP and COMIDA – Megan Ferguson

I'll be talking about the aerial surveys for marine mammals in the Beaufort and Chukchi Seas, known as BWASP and COMIDA. These are surveys that are funded by BOEMRE and conducted by the National Marine Mammal Lab (NMML). BWASP (Bowhead Whale Aerial Survey Project) has been conducted annually from 1979 through 2010 with surveys being done in the summer and autumn (September and October) and the primarily goal is to monitor the bowhead migration but we also record data on other marine mammals that we see. We are looking at the spatial temporal distribution of bowheads, relative abundance, their activities and habitat with the particular interest of looking at the effects of oil and gas activity on the migration. These are broad scale studies. The survey area encompasses 150,000 square kilometers of the Alaska Beaufort and one of our priorities is to provide real time access to data so we post daily reports of our sighting efforts to the web at www.afsc.noaa.govnmml/ceteacean/bwasp within 24-48 hours of completing a survey.

This slide is a summary of the BWASP surveys conducted since 2007 and what it is showing is black dots are bowhead whale sightings, the orange dots are beluga sightings, and the shading refers to where the encounter rates for each species are the highest, so the light blue shading shows that the

bowhead whale encounter rates in the Eastern Beaufort Sea were highest in the 20-50 meter range and in the Western Beaufort Sea the encounter rates for bowheads was highest in the 0-20 meter range and for belugas the encounter rates were highest in the 200-2,000 meter depth zone and that is consistent with what the BWASP data told us from 1982-2006, so we're seeing a consistent separation of habitat between the early and later survey periods. There were some quirks with the data. Each dot represents a sighting, but the database also has group size information associated with it, so it can be misleading to just plot the dots and say that gives you an estimate of relative density. An example is the 1982-2006 data for bowheads shows most dots in the Eastern Beaufort in the 0-20 meter range, but if you look at group size information it turns out that the density is higher in the outer isobaths. Second, these dotes represent belugas lined over Barrow Canyon and in 2009 the greatest number of beluga sightings that BWASP saw were in Barrow Canyon so it's not in the basin, it's pretty close to Barrow right in the canyon. For the time period 2007-2010, the greatest number of beluga was seen in October.

Some highlights from these four years from BWASP include: 1) Feeding bowheads were identified every year both north and east of Barrow and scattered across the Alaska Beaufort Sea. The black symbols shown here are the feeding and milling whales from 1982-2009; the blue symbols are the feeding and milling bowhead whales from 2010, so we do sight these animals across the Beaufort Sea. 2) The database likely under represents the feeding going on. It is hard to definitively say that a whale is feeding when you're flying at 110 knots and 1,500 feet altitude. 3) We conducted survey flights in blocks 8 and 9 in the far northeastern corner for the first time since the 1980's. We think that's an important thing to do especially with the changes that we think are occurring in the arctic ecosystem. 4) We sighted clusters of bowhead whale calf sightings in 2008 between Prudhoe and Camden bay close to areas of oil and gas interest. 5) This shows all bowhead whale sightings since 1982 and we are seeing a notable absence of bowheads north of Prudhoe Bay and in shallow waters of Camden and Harrison Bays. It is not from lack of survey efforts; it is a lack of bowhead whales. My comment earlier today about there being differences between the density estimates derived using industry data in addition to the BWASP data I think may trace back to where those industry surveys were conducted. I think those industry surveys might be conducted in areas that are generally lower-density areas for bowheads. The reason for that we don't really know but it is an issue that needs to be investigated further. One difference from previous years is that there we've seen a lot more coastal polar bear sightings. We pass all those on to the USGS and USFWS to supplement the information they're using to monitor and manage.

COMIDA operated in the Chukchi Offshore Monitoring in Drilling Area. It is a large area of approximately 125 square kilometers, and the furthest that we fly is 170 nautical miles offshore from Point Barrow to the U.S. Russian border in the west and from 68 degrees north up to 72 degrees north. The COMIDA goals and objectives are similar to BWASP. Daily updates are posted to the web. Survey efforts from 2008-2010 indicate good coverage of the survey area throughout those three years. We based all operations last year out of Barrow. October operations in 2008 and 2009 were out of Kotzebue. One thing I would like to note is the gray whale sightings are shown here in blue and we sighted in total over those three years 13 gray whales in the far northeast corner in October. So there are still gray whales around in October. The feeding bowhead in the summer of 2009 were spotted in here, here and here on this slide and they hung out there for about

11 days from end of June to early July and then we had another feeding bowhead in September just southwest of Barrow in 2009. We are also seeing some new entries in the Chukchi: we sighted one fin whale was spotted in 2008, a humpback whale that was actually pretty close to some feeding bowheads, and then some unidentified whales. Beluga sightings were seen in every month except September during that three year period. Walruses are another big thing for COMIDA. We've tried our best to coordinate with USGS and USFWS because we're an aerial platform covering a lot of ground and we're getting a lot of data on walrus distribution and numbers and we're passing those directly on. What this map shows is all walrus sightings for the three year period from June to October and then each subsequent map is a different month of the summer. Here's the walrus sightings for June, July, August, September and October and one of the new events we're seeing with the walrus distribution in 2009 and 2010 we've had these huge haul outs around Point Lay (between Point Lay and Wainwright) in August and September and it is likely due to the fact that the sea ice just isn't around and so they're coming up on land. We also do get polar bear sightings and we make sure those are passed on to USFWS. Unidentified pinnipeds are pretty much everywhere. Here are bearded seal sightings by month and we also report any marine mammal carcasses to the Borough and to the Alaska Regional Office. We take photos if we can to document what it looked like and we will fill out reports on those.

Highlights for COMIDA include that bowhead and gray whales were sighted every month but November but we don't have much survey effort in November. Beluga was sighted in every month but September. Bearded seals were identified during good weather conditions with the highest number observed in August. 13 cetacean, eight walrus and nine unidentified pinniped carcasses were seen. Some differences from the 1982-1991 period are the feeding bowheads between Point Franklin and Barrow in 2009, the fin whale sightings in 2008 and 2009, the large haul outs of walruses onshore in 2009 and 2010, and we saw a lot of polar bears also in all years with the most number in August of 2008. Another thing we really value are collaborations with other institutions and within NOAA. Some of the collaborations are with ADFG, USFWS, USGS, NOAA, and NSB.

2011 Plans for COMIDA are pretty much the same. We will start in mid-June and run until mid-October in the same study area and with the same survey design as 2010 but with a new random point for our transects. BWASP plans to start August 1 and run until mid-October in the same study area and with the same survey design as 2010.

Comments:

Harry Brower, AEWC: Thank you for your presentation. Regarding the lack of sightings in the Beaufort Sea area, there has been activity out of Cape Simpson shuttling equipment back and forth in the past three years. Could that be part of the deflection of whales caused by that activity? Not sure of the timing and the three arrows. I know Shell hasn't worked in Harrison Bay. Is there any correlation with that activity for the three arrows identified.

Megan Ferguson, NMFS: I was jealous when Bill was talking about the cumulative effects analysis. One of the stumbling blocks to figuring out what is causing deflection is a lack of human activities in the database. Efforts, to date, to get good records on what activities have been going on and exactly where have been pretty fruitless. We have good information on what bowheads were where and when, if someone could mine some data somewhere on the human

activities we might be able to do a correlation but we haven't been able to do that so far. A recommendation last year's peer review is that agencies should request from industry to provide a complete set of data on their activities including tract line, GPS coordinates, what equipment is doing at what times, etc. I think that's the level of detail we would need to really address the question. These holes here could be some ecological thing. It could just be that's not where the prey hang out.

Harry Brower, AEWC: I did make my own observations when hunting in Barrow in fall. There were whales near shore in small groups. One afternoon we were in pursuit of a whale but it kept leading us further north, after about an hour, about 15 miles further when we first sighted the whale and we started making sighting of more whales and the GPS said we were 45 miles off shore. We were being told only to hunt 10-15 miles out, but we were very far out. Last fall was very different. Some were near shore but the majority were off shore. Sighting of whales in late June and early July near Franklin Point. I was in that area and sighted those whales as well in 2009 because I was involved in another project tagging walrus and we had just completed tagging walrus further southwest and we came around this very large ice mass and when we came around one side of it we could see about 7-9 whales in the group.

Megan Ferguson, NMFS: There was also four sighting of bowheads feeding between Point Franklin and Point Barrow in 1983, so it's definitely not something we think is a regular feeding area but at least in some years it is an important area for some bowheads.

Leandra De Sousa, NSB: Have you seen any distinct spatial segregation between gray whales and bowheads?

Megan Ferguson, NMFS: In the past we saw a more distinct segregation between the two. In recent years we haven't seen grays in Hannah Shoal. There seems to be a shift over the past three years in distribution of gray whales and I am curious to see what 2011 says. We've started to see the highest encounter rates in bowhead and gray overlap in the 50-200 meter range off Point Hope and another area. There is a convergent of habitat in the north not previously seen.

Leandra De Sousa, NSB: Do you have recommend hot spots for eco studies?

Megan Ferguson, NMFS: From COMIDA perspective, if you are talking gray whales … this area down here further away from planning area for sure, off Point Hope, is definitely a hot spot. That area has been supported by other cruises; they always see gray whales down here. From what I've heard, there are even more gray whales on the Russian side of the Chukchi over there. We also consistently see gray whales here between Barrow and Point Franklin. The bowheads are much more scattered; it's more of a fan shape distribution and are sort of hit or miss.

George Ahmagoak, Barrow Whaling Captain: One of the questions that I have is the need to collect industrial activities data to collaborate with COMIDAs data set. The burning question on bowhead whales, once a whale deflects, how long will it take to get back to normal route of migration? Although you don't have industrial information, this is a crucial question we raise. Once we get seismic data, no one would present the answer to us. Is it all the way from Barrow to Prudhoe? 250 miles? Once activity starts and the whale migrates off, with the data set you could document this if you had the industrial activity and seismic data. Haven't seen one professional paper to answer this, but you are still collecting the data.

Megan Ferguson, NMFS: This is a good question to address with a multiple sources. For example you could use the BWASP to get the background context of what the general migration

path is for a given time period or a given year and then you could maybe overlay that with some satellite tracking data to watch a single animal and you could see how that would deviate from the main path. We could do it, but it is difficult to address.

Unidentified Speaker: When Harry was talking about BWASP data and the data gap, I had that vision in my mind from Susanna's presentation where you have this completely black map of bowhead whales and I was wondering do the DASAR arrays overlap with these BWASP gaps? Do you see whale calls in these areas where they see gaps with the BWASP data?
Susanna Blackwell, Greeneridge Sciences: The one gap that I can say something about is north of Prudhoe Bay. There is a DASAR both to the east and west and we don' get a lot of calls in that area. The acoustics support what is seen with the aerial surveys.

Robert Suydam, NSB: The BWASP data is one of the valuable long term data sets for the Alaska arctic, and I hope it continues into the coming years. Related to impacts, what do you think about the density of sightings in the Chukchi from the COMIDA surveys and how useful they would be in understanding impacts and biology of species?
Megan Ferguson, NMFS: The power of the COMIDA data would be in conjunction with other sources of data. It helps put some acoustic information or tagging data into broader context. Tag data is great because you can follow an individual continuously. One of the problems is tagging has a small sample size. Each discipline is doing the best it can just looking at its own data. Where we need to go now is moving into integrated models. The real power is combining the data sets.

Craig George, NSB: Glad to hear about the August 1 start up. The bowhead migration is far more complex than formerly thought in the Beaufort. We were leaning on MMS to start the surveys earlier. You should look carefully at the preliminary data because it looks like a lot of them are off shore.
Megan Ferguson, NMFS: BWASP surveys 2006-2008, BWASP 2009 and COMIDA 2009-2010 are being mailed in the next week or so and if any other villages want a CD, I will be happy to do so. If you'd like an advance copy of the report, let me know.

PASSIVE ACOUSTIC PROGRAMS – Catherine Berchok

This map shows our current field projects in the Bering, Beaufort and Chukchi Seas as well as in Cook Inlet. I will focus on the CHAOZ (Chukchi Sea Acoustics, Oceanography and Zooplankton) study in the Chukchi Sea and the COMIDA study in the Beaufort. The CHAOZ is an integrated study. The first field season was in 2010. We worked five main lines in the Chukchi, Point Hope, Cape Lisburne, Point Lay, Icy Cape and Wainwright. Along these lines we had ten biophysical sampling stations for a total of 50 biophysical sampling stations. Along the Icy Cape line we had three passive acoustic arrays of five recorders and in the center of each of these there were two to three biophysical moorings doing oceanography, ice depth and that sort of stuff. In addition to the sampling stations and the moorings, we conducted passive acoustic and visual surveys along the cruise tract including 102 sonobouys deployed. The main species detected were fin, bowheads, walrus and airguns. 1,500 miles were visually surveyed with 200 sightings, mostly pinnipeds. 139 sightings of 12 confirmed species and 96 unidentified. There were fin whale detections off Point Hope and Cape Lisburne. A

lot of bowheads and gray whales were seen off of Barrow. North of the Bering Strait we did have a lot of gray whales sighted. The majority of these symbols are triangles, which means pinnipeds. There wasn't much survey effort off the Point Hope line and what was surveyed, there weren't any sightings. This shows our sonobouy detections. Every symbol shown on this map is where we put a sonobouy in the water and what species we detected on those sonobouys. The majority of bowheads and gray whales were heard off of Barrow, not surprisingly. There is quite a bit of activity north of the Bering Strait. There were lots of walrus in the Chukchi, mostly off of Icy Cape and Wainwright, and also lots of airguns in the Chukchi Sea. One thing of interest is fin whale detections. We had a lot off of Point Hope and Cape Lisburne. We did have a fin whale detection pretty far north off the Icy Cape line. Humpback whales north of the Bering Strait and also as far north as the Point Hope line.

As mentioned, the CHAOZ project is an integrated project. This slide shows a slice of a water column off of Point Hope, 52 degrees Fahrenheit , with more salinity in the outer shore and less inshore. One thing to note is that there is a colder area of water offshore getting warmer as you move inshore. This slide shows high concentrations of zooplankton near the surface but you do also have high concentrations sort of mid-transect line in an area where we had colder, more salty water. Tying that back down to the sonobouy acoustic detections, where we had a lot of the humpbacks and fin whales was on the offshore part of this line. Another thing to note about the zooplankton bio volume is that each of these transect lines was different but all had zooplankton at depth and at the surface and not much in the middle of the water column. We are hoping to put this in a broader context by looking at things such as the sea surface temperature map.

BOWFEST (Bowhead Feeding Ecology Study): This is an integrated study that's been going on since 2007 off of Barrow. Although CHAOZ is a study that is integrated and everybody is on the same vessel, BOWFEST is a study where everybody is conducting things concurrently but on different platforms. There is an aerial component, an on water component and so on. I am going to be talking only about the passive acoustics results today. There are two types of passive acoustic moorings off of Barrow: 1) long term, yearlong moorings along the 100 meter line and 2) we also have them deployed short term (2 weeks to one month) along the 20 meter line. The reason we don't leave those out year round is they are oftentimes taken away by the ice. Since last year a Barrow whaler has taken over deployment of our short term moorings. There are four major areas where recorders are deployed. The data are analyzed in three hour periods per week. The most you can get per week is 56 three hour periods. One thing to point out about the bowheads from 2007 to 2008 is it looks like they stop calling in March of 2008 and that was just a software glitch in our recorders. Another interesting thing is as you look from east to west, you can see the most calls recorded more frequently in Barrow than in Cape Halkett. In 2008-2009 the recorders were in place for the entire season so we captured both the spring and the fall migrations through the area but there was an array of three instruments in this area and we still don't have them back. One is completely lost and two are in the mud we're having a hard picking them up. We hope to get the two back to include that data in the analysis. For belugas you can see both a fall and spring migration through Barrow. Bearded seals are interesting; there were seals in October and November off Barrow. There was a really sharp drop off in calls on both instruments and found

using a plot of ice coverage that the drop off of calls corresponds to a decrease in the mean sea ice coverage.

2011 plans include a proposed cruise tract which is basically the same as 2010 with a line added off of Barrow. We will also include deployment of our BOWFEST moorings as part of CHOAZ project. We are planning on leaving Nome on August 10 and returning August 31, 2011. The vessel has yet to be determined. Cornell is on tap to work on a similar cumulative noise effect model as they are doing in the north Atlantic right now. In 2012 season we hope they will deploy a near real time auto detection buoy. There was a pilot project done last year giving hydrophone recorders for hunters to make recordings of marine mammals and to give us some traditional knowledge with good notes on what animals are around. There are a lot of sounds we get from long term moorings that we have absolutely no idea what species is making the noise. We are hoping to get more information on the types of behaviors the whales and marine mammals are making and tie that in with the sounds we're picking up. Kits were deployed in Gambell, Savoonga and Little Diomede. This year hopefully the kits make their way up to Barrow. In the future we are hoping to get funding to supply kits to all villages along the north shore. Thank you to BOEMRE for financing the project and to the Navy for providing sonobuoys.

Comments:

Colleen Swan, Kivalina: In September I saw bowheads near Kivalina, which is unusual. I have never heard of it happening before. It makes me wonder if anything is happening up north to change their habits. Can anyone tell me or give a good guess as to what is happening or caused that to happen? I have a lot of concern about the ship traffic because my dad said because of the village location we hunt the strays. I start wondering with the ship traffic out there, if the ship traffic is toward the shore, is it going to become even harder for us if they are between the migration route and the shore. Will we be able to hunt for bowhead in the spring? Are they going to change migration? Maybe we will start hunting bowhead in the fall. With all the tech and researchers out there, can anyone help us make that determination? With the development being planned we have to prepare for the impacts to our lives. We rely on what is in the ocean. A survey a few years ago showed 79% of diet came from the ocean, so we need to know what is going on out there. This is why I keep bringing this up, the NEPA process kicks in the federal government has a responsibility to all native people, and there is a provision that says the lead agency can invite the tribes to engage. We were denied because the lead agency said we didn't have special expertise or on a reservation so CEQ says we can. You hear these concerns about these activities but the federal government has an obligation, a trust responsibility.

Craig George, NSB: Thanks Colleen. In response to your observation about a bowhead off Kivalina, I think we can expect more and more sightings as stock recovers back to pre-commercial whaling period and more and more sightings of summer and early fall in the Chukchi and Bering Sea. If you look at old records, they caught bowheads throughout the area all summer. A number of other things may be affecting it as well; I don't know.

Jolie Harrison, NMFS: I do want to say we understand that it is critical to get hunters input into the formation of EIS and interest of getting that, we are actively pursuing in terms of looking at drafts, scoping meetings in community, talking to folks. I want to acknowledge the fact that we can't write an EIS without input from these folks.

Jim Kendall, BOEMRE: Your views are extremely valuable, and we need to make an effort to come to your communities. You are right on the money.
Colleen Swan, Kivalina: You all have to do your studies when looking at development and that marine mammals or animals aren't affected. You are looking to see what potential future impacts will be. What is there a spill? We won't be able to hunt – we have to prepare just the same as everyone else. It is obvious listening to comments from hunters that we are seriously ignoring the concern. My dealings with the government – I know what works and what can work for us and having that info will help the process. It's not an effort to stop development, it is an effort for you and us to plan better but we have to be at the table.

Parking Lot

Lisa O'Brien & Ron Felde, Facilitators

Two issues and one request were parked.

Data Sharing (Robert Suydam, NSB): Megan pointed out that last year's peer review suggested that data needs to be made available from ship locations, equipment operation, ship tracks, when equipment was operating, and that sort of thing and that this information needs to become more readily available for current and future analysis of cumulative impacts. I noticed that in Statoil's IHA last year, one of the last points of the seismic vessel monitoring program was to make all data available in the report or electronically for integration with data from other companies. It isn't clear on where the data will reside and who it is for. How can we go about sharing data on human activities and sharing environmental and biological data that are collected? How the information is archived and then made available for others to analyze. A couple systems in place that are archiving data include Alaska Ocean Observing Systems (AOOS), is archiving primarily science information but that data archive system may be expanded to include human activities; and the UAF has a geographical information network for Alaska that is also a data archive and there may be other ones. I just want to figure out ways to archive the data, make sure it is available and be more transparent with our information and builds toward trust, understanding and improving the way we do business.
Caryn Rea, ConocoPhillips: ConocoPhillips environmental data collected in the Chukchi Sea and onshore studies is organized on a central server and ready for export to other databases. Currently we are partnering on Statoil and Shell on the Chukchi program and can't comment for them, but ConocoPhillips is working on data sharing agreements and are working with stakeholders on onshore data. The next step is working with Shell and Statoil on methodology for sharing data with others. AOOS has been discussed as well as the GENA program (UAF), we just haven't arrived at what that platform will look like.
Robert Suydam, NSB: I know one of the issues is the information on where a seismic vessel has gone and when it has operated. GTX has provided data in the past. Karin has provided data as well and we're in a better place; people are committing to share information. If we can get over the hurdle to agree to share, it is a huge step forward.
Caryn Rea, ConocoPhillips: Information sharing during the time of the seismic shot in 2006 was in preparation for the lease sale and companies were in competition and that's why information wasn't

shared. We're past the lease sale and now can talk about where the seismic vessels were at that time. Partnership discussions must occur, but I'm moving forward trying to get those permissions.
Michael Macrander, Shell: In respect to environment data, it's a relatively easy push. Vessel tracts for seismic and shallow hazard, but that will be much more difficult to push because of the partnership. I am told that if you give too much information about vessel tracts and that becomes publicly available that it is a clear competitive advantage and not where our companies will likely be willing to go. We'll continue to work on that and continue the dialogue.

Unidentified Speaker: I'd be happy to provide track information from our survey. (unable to hear)

George Ahmagoak, Barrow Whaling Captain: Last year we had the CAA in parking lot. It didn't need to pass forward, and I'm still stuck on that. We still have that dilemma. I keep hounding NMFS and MMS to recognize the need for the CAA, that's why we put it in the parking lot, but we didn't get a path forward on it. I am trying to offer a path forward. There is a lot of environmental data and information that is collected by industry that is spread all over and it can't be accessed. The North Slope Borough signed into an agreement with the National Science Initiative to disseminate information to a central location so everyone can access. I would like to research the information on baseline studies and it needs to come together; for a path forward we need to agree to and the National Science Initiative and we all need to agree and donate money to it to make it work. The borough is part of that as well as the BLM, federal agencies and the state of Alaska.

Sound Source Verification Method Recommendation presented by Robert Suydam (NSB)
In reading various applications, reports, etc., the sound source verifications occur, but the results are apples and oranges depending on the technique used. An example: most of the ones that have happened for industry in the last few years in the Beaufort and Chukchi have been with OBHs and yet Jon Childs mentioned that the UGSG sound source verification was done with sonobouy and a dipping hydrophone. This seems like it has potential not to provide the best information. My recommendation would be that NMFS get a group of people together and provide guidance on best practices for SSV to characterize sounds and propagation of industrial sounds and measure of potential impacts to whales and appropriate safety radii.
Jolie Harrison, NMFS: That makes sense, and we are committed to work on it at the speed that we can.

Take Recommendation presented by Robert Suydam (NSB)
Again, reading the 90 day reports, sometimes it gets a little confusing that sometimes there are estimates of how many marine mammals were exposed or may have been taken that are calculated from MMO data, some are calculated from aerial survey data, some calculate the estimated exposures or take from old data and so it is not clear what the best approach is and sometimes the data seem to be confusing and contradictory. My recommendation would be for NMFS to get a small group together to provide some explicit guidance for how to go about, in the preseason, calculating what the takes might be. What is the number in the IHA request? It seems like there isn't a consistent way of doing it and having some step for the right approach to estimate animals taken and exposed would be helpful. The second part of that is for NMFS to provide guidance on how to estimate how many animals were actually taken. It seems pretty circular in that we estimate

how many animals might be exposed using old data and we weren't able to collect new data to figure out how many we take so we expose the amount of animals we ask for so there is no real new information. There is no real way to validate how many animals were exposed. If NMFS could provide guidance on what data is needed for calculating how many whales or seals might have been exposed and then providing guidance on how to calculate the estimate of animals taken, taking into consideration movement of marine mammals, vessels, etc. More guidance is needed to make things clear.

Jolie Harrison, NMFS: I agree with all those things. Preseason density estimates have been done on a case-by-case basis, but you could create a more standard way of doing this. In post season calculations, we could also have a method. I will say that I think sometimes there are not going to be enough observations to do some of the things necessary to have the detectability function method. I think we could move towards what the ideal could be and then work to deal with when there is not enough information as that comes up. Thanks for those recommendations.

Bernard Coakley, UAF: I realize this might complicate working these data in a regulatory context, but given the highly variable levels of uncertainty it seems surprising that these numbers don't (unable to hear)

Robert Suydam, NSB: We have talked about that in the past as well. Definitely that is needed, and we know it wasn't 324 ringed seals were exposed but having an error estimate around the point estimate would be valuable.

Lisa's Recommendations: The timing seems right to have a scientific pre-meeting. I don't mean a peer review meeting. My vision is that you've accumulated enough results, the timing is right to integrate some of what you're finding. If you did this, I think there might be a bit more validity to it. I would suggest you might think about a visual overlay of a map. You each seem to bring your piece of data and put it up, but the big picture is lacking.

I strongly recommend to the agency, that we have a coordination pre-meeting with the presenters and you ask for how many people will be presenting and what is the estimate of time, and then you put out your final agenda. I think what happened this year was a best guesstimate, but it pushes everyone to really analyze that. Perhaps it's time to put the peer review meeting first and the public second. I think it may corral some of the redundancy that occurred. And lastly, the way you acknowledge each other now is remarkable.

Wrap-up

Lisa O'Brien & Ron Felde, Facilitators

Jim Kendall, BOEMRE: I want to thank NOAA/ NMFS for hosting the meeting. It is invaluable. Thank you to the participants and presenters. It was an excellent exchange of information for communities, academics, industry and federal agencies. I had a flashback yesterday. During the last two weeks in February I joined my BOEMRE colleagues and went to the North Slope and visiting a number of villages. Wherever we went we had good discussions and in those rooms up on the walls were these beautiful banners for respect for culture, self, elders; there was a lot of respect there. I

also saw a lot of respect here. Some of the discussions were contentious where we differed, but that's healthy. But I saw that respect with everybody in this room.

Michael Payne, NMFS: I would like to say the meeting was positive overall. The thing I liked the most was the early presentations on what happened in the 2010 whaling season. It went smoothly, and it seems you had successful year and that was positive. This meeting is one that I always attend in Alaska, and the information relayed in this meeting is as good as it can get anywhere and gets better each year. The science is getting to the point where you can debate issues. It was good to hear familiar voices, ones we hear each year, but there were also new voices, especially those from Kivalina, and I appreciate your attendance, and we won't forget you in the future. There were, again, concerns around communication through the CAA or lack thereof or better plans of cooperation. I heard that the federal agency need to be present at the plan of cooperation meetings, and we are going to try to see what we can do. There was discussion about understanding NMFS in relation to trust responsibility and resources and what the obligation means to our subsistence user and its resources. That is why we're here.

We need to look into the timing of this meeting as is it at the beginning of our analyses for our IHAs. We really haven't gotten far in that process but after presentation of what goes on, it would be nice for someone to stand up after that and do a cumulative 'this is the number of takes we authorized last year, this is the number of exposures based on the reports and this is what we think it means' and give us a cumulative picture of what happened last year from the regulatory perspective. I always feel like at the end of this meeting, with the information that we've gathered, our work is just beginning. Now we have the rest of 2011 and looking forward to what was presented for 2012. With the remainder of this year we'll take a look at the two applications we have before us. There are a lot of new challenges in those applications, new and different technologies and things we need to consider.

The process that is going slower than anticipated is the EIS. It is not an overwhelming task, but it is much larger than I think I anticipated and it keeps getting bigger as we go along. The open water meeting helps that process along. As a result of that process, we mentioned earlier that we, and URS, our contractors, are targeting to have a draft by early summer. It will open up another opportunity to go back to all the communities and have discussions at the borough, tribal and government levels over the next year. In the late fall/early winter we start getting applications for 2012. The next year for us will be a lot of work, and we need your information and appreciate your input and attendance. Thanks to Lisa and Ron; you are a big help. Thank you to the presenters, support, food and participation, but thank you and have safe travels home. If you have questions, you know how to find us.

Harry Brower, AEWC: Thanks for providing opportunity to participate in review process. I learn something new each time. Thanks to the agency representatives and keeping AEWC in the loop. We voice our concern that our food is in the ocean and the ocean is our garden and we are here to protect it. Thanks for keeping us at the table and communicating with us on these issues.

Robert Suydam, NSB: I add my thanks to everyone for making this meeting possible. It seems like the tone is improving as relationships improve. As we think about next year, it may be worthwhile to have a no host bar at least on one evening where we can visit with one another personally!

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