

Arctic Stakeholder Open-Water Workshop

April 6-8, 2009

Anchorage, Alaska



Table of Contents

Agenda	4
Purpose and Objective of the 2009 Workshop.....	8
Welcoming Remarks	8
Review of Ground Rules.....	9
Agenda Review.....	9
Meeting Objectives	9
Monitoring and Mitigation—Purposes and Requirements	11
Subsistence Issues.....	12
Presentation of 2008 Monitoring Results	18
Beaufort Sea Monitoring Results	18
BP Monitoring Results for Liberty Prospect.....	18
BP 2008 Monitoring Results for Northstar	21
Shell Monitoring Results for Beaufort Sea Survey	24
PGS Monitoring Results for Beaufort Sea Survey and Eni Activities	30
Pioneer 2008 Results and Limited 2009 Activity	32
Chukchi Sea Monitoring Results	34
Shell Monitoring Results for Chukchi Sea Survey	34
ConocoPhillips Results for Chukchi Site Clearance Activities	38
2008 Monitoring Results – Facilitated Discussion	41
2009 Proposed Activities and Monitoring	46
Shell 2009 Shallow-hazard Operations and Monitoring Plan (Chukchi Sea)	46
Monitoring for Northstar 2009 and Liberty 2009 Activities (Beaufort Sea)	49
Sound Source Verification Testing	51
Monitoring and Reporting of Dead and Injured Marine Mammals.....	53
2009 Monitoring – Facilitated Discussion.....	56
Subsistence Issues.....	62
Results from other Meetings/Discussions to Inform Monitoring Requirements Discussion	64
Results of February Chukchi Sea Acoustics Workshop	64
BWASP and COMIDA Update – Results from 2008.....	66
Shipboard Observers in Monitoring.....	68

Aerial Monitoring.....	72
Program and Process ... what works?	74
Parking Lot Issues.....	75
Closing Remarks and Adjourn	78
Recommendations	78
Attendees.....	79

Agenda

**Arctic Stakeholder Open-water Workshop
April 6-8, 2009
Anchorage, Alaska**

AGENDA

The sessions each morning will begin promptly at 8:30 am. Participants are encouraged to arrive early so that we can begin on time and keep on schedule. Coffee will be provided each morning.

Purpose and Objective of the 2009 Workshop:

The purpose and objective of the workshop is to meet the National Marine Fisheries Service's (NMFS) statutory and regulatory responsibilities concerning the incidental take of marine mammals and to identify, discuss, and evaluate the monitoring and mitigation program through review of past studies and information input from individual meeting participants¹. This will be accomplished by: (1) providing a forum for the oil and gas industry to present and discuss their 2008 activities, including monitoring results and effects of their activities on the marine environment; (2) affording Alaska Natives and other interested parties the opportunity to comment on the prior year's operations; (3) presenting industry plans for operations, monitoring, and mitigation for the 2009 season; (4) providing a forum for initial comments regarding the 2009 monitoring plans; and (5) initiating discussion with stakeholders regarding the development of a monitoring plan for the future (i.e., 2010 and beyond).

DAY 1 Monday, April 6

8:00 Arrival\Coffee

8:30 – 8:45 Welcoming Remarks (Jim Lecky, Director, NMFS, Office of Protected Resources, and John Goll, Regional Director, Alaska, Minerals Management Service)

8:45 - 9:30 Introductions and Housekeeping Items (Lisa O'Brien and Ron Felde)

- Brief Introduction of Attendees
- Review of Ground Rules
- Review of Agenda

9:30 – 9:45 Review of Meeting Objectives (Lisa O'Brien and Ron Felde)

9:45 - 10:15 Monitoring and Mitigation—Purposes and Requirements (Jim Lecky)

- Monitoring (50 CFR §§ 216.104(a)(13) and 216.108(c))
- (1) Estimate the level of take associated with the activity

¹ NMFS cannot accept any consensus recommendations from the meeting participants concerning any substantive or procedural issue. NMFS will consider recommendations or concerns from individual participants concerning the issues discussed during the workshop.

- (2) Document the effects on marine mammals
- (3) Increase “real-time” knowledge of activity of the species, behavior, and abundance to ensure mitigation, if required, is implemented

Mitigation (50 CFR §§ 216.102(b) and 216.104(c))

- (1) Means of effecting the least practicable adverse impact on species or stocks or its habitat
- (2) To support, as necessary, a finding of negligible impact on affected species and stocks and to ensure that there is no unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses

10:15 – 10:30 BREAK

10:30 – 11:30 Subsistence Issues (Harry Brower and Archie Ahkiviana)

- (1) Discussion of 2008 bowhead harvest, changes in harvest practices within whaling villages, and plans for 2009 whaling season
- (2) Concerns of hunting community with IHA actions
- (3) Role of subsistence hunters in designing mitigation measures

11:30 – 1:00 LUNCH

1:00 – 5:30 Presentation of 2008 Monitoring Results: [NOTE: There is a decrease in the amount of time available for each presentation this year from previous years. Therefore the presentations will focus only on the major points/outcomes from the monitoring programs with a focus on 2008. Each presenter should leave at least 10 minutes for questions. There can be further discussion during the Facilitated Discussion on the morning of Day 2.]

Beaufort Sea Monitoring Results

1:00 – 2:00 BP Monitoring Results for Liberty Prospect (Bill Streever)

2:00 – 3:45 BP 2008 Monitoring Results for Northstar (Bill Streever)

3:45 - 4:00 BREAK

4:00 – 5:30 Shell Monitoring Results for Beaufort Sea Survey (Susan Childs and Michael Macrander)

DAY 2 Tuesday, April 7

8:00 Arrival\Coffee

8:30 – 11:00 Presentation of 2008 Monitoring Results (continued)

Beaufort Sea Monitoring Results (continued)

8:30 – 9:00 PGS Monitoring Results for Beaufort Sea Survey and Eni Activities (Ed Nelson)

9:00 – 9:15 Pioneer 2008 Results and Limited 2009 Activity (Julie Lina and Dale Hoffman)

Chukchi Sea Monitoring Results

9:15 – 10:15 Shell Monitoring Results for Chukchi Sea Survey (Susan Childs and Michael Macrander)

10:15 – 10:30 BREAK

10:30 – 11:00 ConocoPhillips Results for Chukchi Site Clearance Activities (Bruce St. Pierre and Jay Brueggeman)

11:00 – 11:30 2008 Monitoring Results – Facilitated Discussion

- (1) Opportunity for questions and responses of the Presenters
- (2) What do we know/have we learned that needs to be implemented in the future?
- (3) What does not need to be carried forward?

11:30 – 1:00 LUNCH

1:00 – 1:45 2008 Monitoring Results – Facilitated Discussion

- (1) Opportunity for questions and responses of the Presenters
- (2) What do we know/have we learned that needs to be implemented in the future?
- (3) What does not need to be carried forward?

1:45 – 3:45 2009 Proposed Activities and Monitoring

1:45 – 2:15 Shell 2009 Shallow-hazard Operations and Monitoring Plan (Chukchi Sea) (Susan Childs and Michael Macrander)

2:15 – 2:45 Harrison Bay 2009 Open-water Seismic Operations and Monitoring (Beaufort Sea) (Robert Province)

2:45 – 3:00 BREAK

3:00 – 3:45 BP Monitoring for Northstar 2009 and Liberty 2009 Activities (Beaufort Sea) (Bill Streever)

3:45 - 4:30 Sound Source Verification Testing (Shane Guan)

- (1) Present requirements
- (2) Creation of a vessel source database
- (3) When should a specific sound source be re-measured (when there is a change in location, annually, etc.)?

4:30 - 5:15 Monitoring and Reporting of Dead and Injured Marine Mammals (Candace Nachman and Cheryl Rosa)

- (1) Presentation of reporting and operational requirements
- (2) Discussion of improved means of monitoring and reporting, necropsy abilities, and industry capabilities and responsibilities

DAY 3 Wednesday, April 8

8:00 Arrival\Coffee

8:30 - 9:30 2009 Monitoring – Facilitated Discussion

Opportunity for comment and response regarding the 2009 proposed activities, monitoring plans, and mitigation measures to reduce effects of activities on marine mammals and recommendations for development of long-term monitoring needs

9:30 – 10:00 Subsistence Issues (Harry Brower and Archie Ahkiviana)

Recommendations to NMFS to meet requirement of no unmitigable adverse impact to availability of marine mammals for subsistence uses, role of native observers, communication centers, other.

10:00 – 10:15 BREAK

10:15 – 11:30 Results from other Meetings/Discussions to Inform Monitoring Requirements Discussion

10:15 – 10:45 Results of February Chukchi Sea Acoustics Workshop (Catherine Berchock)

10:45 – 11:30 BWASP and COMIDA Update – Results from 2008 (Robyn Angliss)

11:30 – 1:00 LUNCH

1:00 – 2:00 Shipboard Observers in Monitoring (Jim Wilder)

- (1) Role and purpose of marine mammal observers (MMOs)
- (2) Problems with MMOs and real-time reporting
- (3) Command center discussion
- (4) Training, certification and proficiency
- (5) Monitoring at night or in low visibility conditions—effectiveness or any new technologies to improve detection and reporting
- (6) What changes are needed for this program? (Facilitated Discussion)

2:00 – 3:00 Aerial Monitoring (Robyn Angliss)

- (1) What is the role of aerial monitoring?
- (2) What is needed to improve protocol for the future?
- (3) Facilitated Discussion

3:00 - 3:15 BREAK

3:15 – 4:30 Parking Lot Issues

4:30 – 5:00 Closing Remarks and Adjourn

Purpose and Objective of the 2009 Workshop

The purpose and objective of the workshop is to meet the National Marine Fisheries Service's (NMFS) statutory and regulatory responsibilities concerning the incidental take of marine mammals and to identify, discuss, and evaluate the monitoring and mitigation program through review of past studies and information input from individual meeting participants (NMFS cannot accept any consensus recommendations from the meeting participants concerning any substantive or procedural issue. NMFS will consider recommendations or concerns from individual participants concerning the issues discussed during the workshop). This will be accomplished by:

- (1) Providing a forum for the oil and gas industry to present and discuss their 2008 activities, including monitoring results and effects of their activities on the marine environment;
- (2) Affording Alaska Natives and other interested parties the opportunity to comment on the prior year's operations;
- (3) Presenting industry plans for operations, monitoring, and mitigation for the 2009 season;
- (4) Providing a forum for initial comments regarding the 2009 monitoring plans; and
- (5) Initiating discussion with stakeholders regarding the development of a monitoring plan for the future (i.e., 2010 and beyond).

Welcoming Remarks

Jim Lecky, Director, NMFS, Office of Protected Resources. Jim thanked attendees for coming and announced Ken Hollingshead has retired. His retirement will be celebrated with an upcoming distinguished career service award for his 41 years of federal service. Ken is working on contract with NMFS to help transition a couple of projects.

Jim spoke to the purpose of meeting, which is to look at proposed monitoring plans and acquire peer review input on the adequacy of the plans in the context of the Marine Mammal Protection Act in general. He provided a broad scope of the MMPA, which establishes a broad moratorium that prohibits the taking of marine mammals but which includes a series of exceptions. The challenge is to take a close look at the plans that are before us and the future and determine whether there is adequate monitoring and mitigation programs to ensure mammals for the taking of subsistence.

Jeffery Loman, Deputy Director, Minerals Management Service Alaska. Jeff thanked attendees for coming and indicated that MMS Director John Goll had a family emergency and was unable to attend. MMS has been in business for 34 years and understands that whaling is a self-defining practice that is essentially important to every aspect of those Alaska Natives that practice subsistence activities.

Jeff indicated that there has been much more exploration conducted in past years but that we may be coming to a point in time where the focus could shift, especially with a new administration. Next week the Secretary of Interior will be in Alaska holding a series of listening meetings to hear what people have to say about the Outer Continental Shelf (OCS). MMS is working very hard to improve its relationship with NMFS and other colleagues as well as with the people of Alaska. MMS is seeking local solutions to the problems that they are working on. MMS understands that it is not any one event, but an aggregate of many small events, that help us to achieve the goal of moving forward with expeditious oil and gas

development in a safe and environmentally sound way and this includes the unfettered continued practice of subsistence whaling and other activities while exploration and development occurs.

Review of Ground Rules

Facilitator Ron Felde reviewed the meeting 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 to 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 subject, park other issues
- Be present
- Turn cell phones off
- Be sensitive to others while using computers

Agenda Review

Facilitator Lisa O'Brien reviewed the agenda.

Questions/Answers/Comments:

Q: Robert Suydam, NSB: I am wondering what the thought process was regarding the note at the foot of the agenda that NMFS cannot accept consensus recommendations?

A: Jim Lecky, NMFS: The statute asks that peer review be sought but it doesn't exempt NMFS from the Federal Advisory Committee Act that indicates you cannot convene folks for consensus recommendations. This process is not exempted from that and so the purpose of the meeting then must be to seek input.

Meeting Objectives

Facilitator Ron Felde discussed the meeting objectives. There are three primary objective areas: monitoring, mitigation and stakeholder input.

1. Monitoring
 - a. To satisfy regulatory requirement for proposed monitoring plans to be independently peer-reviewed, specifically "at its discretion, NMFS will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan."
 - b. To facilitate development of the most effective monitoring plan considering both
 - i. The regulatory process of monitoring; and

- ii. The monitoring goals specific to these actions as outlined by NMFS and further discussed and refined at this workshop.
2. Mitigation
 - a. To solicit information and analysis that will assist NMFS in meeting the regulatory requirement to set forth mitigation measures that “effect the least practicable adverse impact on:
 - i. The species or stock of marine mammal and its habitat; and
 - ii. The availability of the species or stock of marine mammal for subsistence uses.”

Discussion of individual mitigation measures in the specific context described in 2(1) should address the following factors relative to one another:

- the manner in which, and the degree to which, the measure is intended to minimize adverse impacts to marine mammals and/or subsistence use of marine mammals;
 - The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
 - The practicability of the measure for application implementation.
- b. To solicit information and analysis that will assist NMFS in ensuring (potentially through mitigation requirements) that the total takings of marine mammals by these activities, if authorized, will:
 - have a negligible impact on the species or stock of marine mammal(s); and
 - will not have an unmitigable adverse impact on the availability of those species or stocks for subsistence uses
3. Stakeholder Input
 - a. To invite focused input from the affected stakeholders on the issues outlined in 1 and 2 above.

Questions/Answers/Comments:

Q: Robert Suydam, NSB: The three primary objectives for the workshop don't quite match with the agenda. Certainly the monitoring fits and stakeholder input, but mitigation isn't addressed within the agenda. I actually agree with this. The topic of mitigation should be between NMFS, industry and subsistence hunters. Can we clarify whether or not we will be talking about mitigation to any extent within these three days?

A: Jim Lecky, NMFS: The requirement of the peer review is on the monitoring program, so that's the focus of the three days.

Q: Michael Macrander, Shell: This meeting has gone by a number of titles in the past. Does the title reflect the change in focus to evolve from a peer review workshop to a stakeholder workshop? Are those two and the same, or is a peer review needed subsequent to this meeting?

A: Mike Payne, NMFS: There has been some discussion within NMFS as to whether this meeting meets the peer review requirement. It does meet the regulatory requirement. There will be a discussion later in this meeting as to whether this type of workshop should focus on stakeholders and that the peer review process be developed into a different meeting or workshop. There is discussion within NMFS on transitioning the meeting in the future but a process has not yet been fully developed. There is space on the agenda for this meeting later in the workshop to discuss this topic.

C: Caryn Rea, Conoco Philips: Looking at Day 3 of the agenda it does seem the process is expanding and changing. I originally thought it was set up for IHA applicants to talk about their work and upcoming plans. Day 3 appears to be on some topics that aren't IHA-applicant work related.

C: Mike Payne, NMFS: The Day 3 topics relate to monitoring program issues that have been brought to the attention of NMFS by people in the room.

C: George Ahmaogak, Ahmaogak & Associates: I've attended monitoring programs for years. It has grown in number from five to the 100 we have today. The purpose of this meeting was to do a peer review process to ensure good quality science and confidence in the data. Mitigation can be taken up by the stakeholders.

Monitoring and Mitigation—Purposes and Requirements

Jim Lecky, NMFS. Jim Lecky, NMFS, presented on the purposes and requirements of the monitoring and mitigation programs. There are exceptions that allow the incidental taking of small numbers, in defined geographic areas, of marine mammals. There are a couple of key findings that must occur before an ITA can be issued: 1) the taking will have a negligible impact on the population of the affected mammal, 2) ensure the total taking will not have an unmitigable impact.

The goal is to achieve the lowest impact considering both economics and practicality. Types of mitigation measures that are in place include: area closures during foraging seasons, safety zones (to prevent injury), and ramping up sound sources (giving animals an opportunity to hear a noise at a sound that isn't injurious and move out of the way).

Monitoring serves several functions, and the reason we are seeking peer review on monitoring is to discover how the activity is progressing, is the monitoring allowing us to verify negligible impacts, and are the identified mitigation measures identified effective, i.e. MMO's, are surveys adequate, have we identified the right triggers for shutting activities down, do we have the right tools to determine when the triggers or criteria have been reached, etc.?

The purpose of this meeting is to provide input on the effectiveness of the monitoring program.

Questions/Answers/Comments:

Q: Harry Bower, AEWC: a concern for many years has been how the Marine Mammal Protection Act is interpreted. Is there any thought about identifying what the "small number of take" might be in terms of species-specific?

A: Jim Lecky, NMFS: Small take is not defined in the statute but is in the regulations; however, it is defined based on the impact to the animal. If program has a negligible impact then it is considered a small take. But if you are looking at the numbers of animals and the migratory movement of animals, it (the animal) could be taken several times.

Q: Bruce St. Pierre, ConocoPhillips: The process used for granting approvals is currently the IHA one year process. Has NMFS given thought to the process used for promulgation of regulations and utilizing a process similar to a five year program?

A: Jim Lecky, NMFS: NMFS has considered it. There is some interest and some concern about it. The benefit of a five year program is it provides certainty for an extended period of time, and it provides for better cumulative effects. The challenge is getting a good estimate from industry as to what their

activities are likely to be over a five year period. It would cut down on the number of resources and could allow for compilation of a good monitoring program.

Q: Robert Suydam, NSB: Perhaps we should add "IHA vs. LOA" to the parking lot. It would help us plan for the longer term, and there are some real potential positives with it. There was mention that the LOA would require an additional assessment of cumulative impacts ... is there a difference in that LOA's require it and IHA's don't?

A: Jim Lecky, NMFS: The difference is that you have to look at every activity that will be completed during that five year period, as opposed to a one year period. It might be a good time to consider this since there isn't much activity anticipated in 2009; however, it could take up to two years to get through the process to implement something like that.

C: John Richardson, LGL: There is historical precedent in issuing 5 year regulations.

C: Chris (unable to identify last name): MMS is hosting a workshop November 17 – 19, 2009, in Boston. It is a science-based conference on the status and applications of acoustic technologies on the mitigation of marine mammals.

Subsistence Issues

Harry Brower, Chairman of Alaska Eskimo Whaling Commission (AEWC), presented the following: He first commented on the retirement of Ken Hollingshead and asked that NMFS staff convey acknowledgement and thanks for his many years of hard work. There is hope that there will be an opportunity to work with Jim Lecky now, as they had with Ken in the past.

Harry introduced George Noongwook, AEWC Vice Chair and indicated they will both be speaking to the changes seen in bowhead whale subsistence hunting due to climate change and some of the concerns they have with the IHA process as it relates to monitoring plans required by the MMPA.

Harry stated that in the past spring ice was thick and very solid for hunting. They depended heavily on spring bowhead whale hunt. Recently, the spring ice has been very thin. Spring hunting is more difficult and dangerous than it used to be. Because of this, in some years they have to rely more on the fall whaling. All of the villages are experiencing the same conditions. Spring whaling is becoming more difficult for everyone, and they have to look more towards the fall now. This means the monitoring plans that are reviewed have added meaning for us. The hunters can give information about how the whales are responding to oil and gas operations in the Chukchi Sea. Since 2006, they are seeing an increase in offshore activity and some impacts especially from near shore traffic. There is concern about operations and how they might affect whales the Chukchi villages are seeing. From what they can tell, some of the monitoring plans are not being designed or implemented to help them with the understanding. They see a lot of activity going on with no monitoring at all because of ongoing equipment failures. If companies do not have ability to ensure equipment operates, they don't need to be out there looking for oil. Now they are being told that Shell will no longer be flying aerial surveys. If this is true, how will the Office of Protected Resources be handling the situation? Another impact of the ice retreating is that the water in the fall is getting much rougher. There are bad storms with high winds and broken ice. If companies are going to be working in the Arctic they need to be prepared to deal with the changes including broken ice, rough seas, and high winds. They must be able to make sure they design monitoring programs that will be useful in these conditions. They have to have equipment that will work in this type of environment. If they can't do that, then they have no business being out there. NMFS has no business issuing authorizations to send them out there. In closing, both the operators and NMFS should keep in mind the increasing importance of fall hunting to the villages. Some villages are

already relying on fall hunts and more will follow. As the bowhead population continues to grow, there is an expectation that even more whales will be seen near the villages in the fall.

Robert Suydam, NSB: He presented slides on where whales were captured in the late 1800's and early 1900's in the months of August and September.

In October, as the ice formed, the boats were forced away from shore and more whales were caught in the middle of the Chukchi Sea as opposed to closer to the coastline. As the current bowhead population continues to grow, it would seem they will mirror past patterns. One tagged whale last year moved down along the near shore of the Chukchi Coast. If this is any indication, in the coming years, there is a good chance for the opportunity for the Chukchi villages to hunt near shore.

Harry Brower, AEWC continued the presentation by indicating the environment is changing and shifting patterns are occurring, but in the past couple of years there has been more open water without much ice near shore. Swells are increasing and coming to shore during the hunt times. These changes are causing some concern when we don't have access to our resource, the whale. We are currently going through changes in terms of our hunting practices. We have had some close calls with people almost falling through the ice because the conditions are such that the ice is being melted from below. It is a very dangerous situation just traveling in the differing ice conditions that we deal with. These are observations we wanted to share today, and hopefully it will be meaningful and helpful in developing mitigation measures.

George Noongwook, AEWC, then presented information from the St. Lawrence Island perspective.

St. Lawrence Island is only 40 miles from Russia and depending where you are at it is 200 miles from the rest of Alaska. The island is situated on the migration path. You can take crab, fish, bowhead, walrus, all kinds of marine mammals and seabirds. Whatever you can think of, it occurs right there at St. Lawrence Island. We are pretty concerned with climate change because it will affect animals we depend on and have from time immemorial. We have been able to adjust to a lot of changes in environmental conditions, but recent experience and predictions on climate models suggest that changes we see today are not normal but are a directional movement towards a warmer climate. With this in mind, we see examples of changes that are being observed by the hunters. Most of the whales were landed during the month of April in the past. By 1990, they were seeing them in November and December. 40% of the bowhead hunt occurs in November, December, and sometimes February now. The harvest levels were high in 1999, in ideal conditions, meeting quota. We have observed more extreme weather conditions. One just occurred last February where we experienced winds over 116 mph on Savoonga. We have never experienced winds of that force ever before. It goes to show you that you have to think about these things that are occurring and that affect all of us. Predictions are difficult to make. Most residents of coastal communities don't like to be put in a situation where they see their future in a hypothetical situation, but we must be better prepared to respond to these changes. For residents, walrus are critical resources. If sea ice retreats, a number of things may happen to walrus, other sea animals and the communities that use them. Many observations have been made about the relationships between people, marine mammals, and sea ice. Ice related marine mammals are very important to the people of St. Lawrence Island in many ways. If the sea ice retreats so that it is further north, then it will become very hard to predict what will happen. It is particularly difficult to convey the significance of these species because they are central to our culture and our identity. We've noticed that the sea level has risen, perhaps because of sea ice melt, and the result is we are seeing 85% of our coastal communities flooding every year. Shishmaref and Kivalina are taking the brunt of it. Ice-related species may decrease in local abundance, but what other species might be attracted in to the area? We don't know. The reduced sea ice will increase some activity in the area including commercial fishing, tourism and oil and gas and with negative impacts on marine mammals. More ships bring noise and chemicals and an influx

of scientists coming in to study and therefore more ice breakers and traffic. It directly affects marine mammals in the area. Endangered species such as spectacled eiders winter in the St. Lawrence Island area. We must preserve these very important creatures, not only for subsistence users but for everyone.

Harry has indicated that Archie Ahkiviana was unable to make it to this meeting due to surgery. He is from a very important area and could talk about the impacts they have dealt with hunting from Cross Island. He is not able to be here to give his observations in regards to the activity in that area in terms of their whaling and associated activities in the offshore area of the Beaufort Sea. They have had one of the most impacted communities in whaling with the offshore operators and exploration.

Thank you.

Questions/Answers/Comments:

Q: Charles Hopson, Barrow: There are concerns from the whaling community that someone needs to answer. Can someone from NMFS and MMS define the word monitoring and what it means?

A: Jim Lecky, NMFS: Monitoring means overseeing the activities that are conducted and evaluating them in a way to make sure the finding of negligible impact on a population is accurate. It also means implementing the mitigation measures so if we have criteria for shutting an acoustic sound source off if animals are close, then we need a monitoring program that can find and detect those animals. Monitoring is an overall evaluation of the mitigation process to ensure there are no unmitigable impacts on subsistence issues.

Q: Charles Hopson, Barrow: What is the definition from MMS on what monitoring means?

A: (Unidentified Speaker), MMS: MMS agrees with the definitions that Mr. Lecky provided.

Q: Charles Hopson, Barrow: My concern is that for many years we had a lot of ships up there talking about monitoring but nobody seemed to want to define what monitoring means. Monitoring to me means we are going to monitor what industry is doing and watch the animals to see what the impacts are. NMFS and MMS don't have ships up there watching. Monitoring needs to be defined. We need to sit down and work on this word. Is it the Coast Guard monitoring? We don't have monitoring from the Coast Guard.

A: Jeffery Loman, MMS Alaska: The MMO is a form of monitoring. We encourage practical suggestions about monitoring.

Q: Jeffery Loman, MMS Alaska: Harry, can you give us some examples of equipment failures you observed and suggestions or solutions?

C: (Unidentified Speaker): The acoustic program had difficulties in terms of placement and retrieval of the recorders in the Chuckchi Sea program. There was an attempt by industry to retrieve the equipment but some were lost and it took time away from the actual monitoring of activity.

C: Caryn Rea, ConocoPhillips: Conoco spent many resources in 2008 to put out 33 acoustic recorders, and we don't take their failure lightly. However, Cornell, to their credit, was able to get new ones out there within a week.

Q: Caryn Rea, ConocoPhillips: George and Harry, are the whaling captains and hunters thinking about adaptations in the equipment currently used to hunt bowheads, i.e. larger boats to deal with swells, etc.? How are you thinking about adapting to the changes you are seeing?

A: Harry Brower, AEW: I think we are going through the process of doing that. We are to use our traditional means. We don't have the capacity to move to larger vessels. We don't have the equipment to do that. It is being thought about, but it isn't being applied yet.

A: George Noongwook, AEW: The International Whaling Commission requires us to use traditional methods.

C: Michael Macrander, Shell: Some of the program that was funded to do acoustic monitoring in the Chukchi had challenges this past year. We produced less data than we had hoped. I would echo Caryn in saying that a large portion of both of these programs are voluntary in basis. They have been the outgrowth of a lot of interaction with NSB Wildlife Department and other state/federal agencies, and we thank everyone for their input to those programs. There have been challenges; it is an aggressive program. That does not mean that we have not gained a lot of insight from these programs. No one was more disappointed than Shell was. We lost opportunities to gain more insight. We remain wholly dedicated to these programs.

Q: Rick Steiner, University of Alaska: George and Harry, can you comment on your thoughts about 1) essentially NMFS is telling industry that they are self-monitoring, and 2) in seismic shoots they are permitting, as long as they clear a particular safety zone, continuing to shoot even when visibility does not permit them to ensure mammals do not enter that area.

A: Harry Brower, AEW: It has been a question in my mind, similar to what you are indicating, that we don't really see how there is a compliance check for what is occurring when visibility is not good. When and where is the compliance check actually occurring? I've heard that it is going to be happening after the fact.

A: George Noongwook, AEW: I share the concerns that Harry brought up on some of the requirements that are set forth by NMFS and MMS, but in terms of monitoring, I think like everybody else they should be subjected to identified, defined monitoring techniques that are accepted by everybody and how that should be implemented to improve it.

Q: Tom Lohman, NSB: You guys talked about bowheads, can you comment on changes you've seen in the harvest patterns and the safety of hunting other mammals?

A: Harry Brower, AEW: The timing has advanced some because of the conditions we face with the ice receding much earlier and the changes in currents and weather. Those things take the resources with it, and there have been big changes and new challenges. We have a challenge in getting out to reach the resources.

C: Bruce St. Pierre, ConocoPhillips: In regards to self monitoring, we try to go to the communities to present our programs and part of that is asking folks as to who wants to work on the boats as MMO's. There is more than just industry involved, but local residents as well.

Q: Bruce St. Pierre, ConocoPhillips: Are there whale experts in the room today that can speak to the current population of the bowhead today and the carrying capacity for bowhead whale stock?

A: Robert Suydam, NSB: The last count of bowhead was in 2001, and the population estimate was 10,500 and growing at a rate of 3.5% per year. If that growth continued there could be 12,000 to 13,000 now. We are in the process of trying to get people out on the ice this spring and next spring to come up with a more current population estimate. In terms of carrying capacity, that is a tougher question to answer. The concept has a lot of merit, but, in reality, it is very tough to measure. There are people who say the bowhead is coming back to a saturation level. The environment is changing tremendously, so we don't really know what the environment can sustain in terms of numbers of bowhead whales. It is

really kind of a guess at this point. Since whales have been counted in the late 1970's, the population increase has maintained itself at about 3% per year, and it hasn't slowed down, which could suggest that carrying capacity hasn't been met yet. Historically there were bowheads that summered in the Bering and Chukchi Sea.

C: George Ahmaogak, Ahmaogak & Associates: Regarding Rick's comment on monitoring capabilities during non-visible times and Bruce's comment on MMO's --- there are no operations to my knowledge from the MMO's logs that weren't stopped when visibility was such that they couldn't see. I don't see any credible evidence that there were problems in ensuring there were no unmitigable adverse impacts to bowhead whales. From last fall's harvest process for bowhead whales all completed their hunt. The western side of the villages did not hunt because of high winds and bad weather.

Q: Rick Steiner, University of Alaska: I would like NMFS/MMS comment on whether or not there is a provision in the permits to shut down the seismic if they can't see to the safety zone.

A: Jim Lecky, NMFS: The requirement that has been in place is based on the presumption that animals don't enter seismic areas. If ramp up occurs in the daytime when you can observe the area, and the operations proceed into the bad weather or night, there is a presumption the animals are not there. If for some reason they have to shut down at night and they can't see or observe, then they are precluded from starting up when the conditions are not clear.

C: Cheryl Rosa, NSB: NSB has concerns about compliance monitoring and the efficacy of shooting guns. We hope these discussions come up in more detail during the next few days. I would definitely like to hear information coming from the villages as I'm not sure Harry should be speaking for them.

A: Harry Brower, AEWC: I am not stepping forward to speak for Archie or any other communities. We are not fully represented here. I hear your concern, but our understanding of certain words and how we perceive them is different. As subsistence hunters, 'take' means to use for food; for the federal government 'take' means something different.

C: Robert Suydam, NSB: I would like to comment on monitoring and compliance monitoring in particular, i.e. the federal government going out and watching what industry is doing. The industry programs are complicated and even though they strive to do what is in the permits, people make mistakes and having the government go out and make sure that things are happening appropriately is a good way to improve the system. It will also help to show how effective the mitigation measures are and if they are working. There is some evidence that seals are attracted to the air gun. There are some important issues that need to be talked about further.

C: Robert Suydam, NSB: I would like to go back to some things Harry and George said about the environment changing and changing in ways that is making it harder for the villages to get the animals it needs for subsistence. Because of those changes, both climatic and subsistence practice changes, it makes it difficult to develop mitigation measures that are effective when things are changing and it is difficult to know the needs of the future. There is a need to be flexible in these changing times in order to protect subsistence hunting and marine mammals.

Q: Aaron (unable to identify last name/organization): Are the MMO logs a matter of public record and where can they be accessed?

A: Susan Childs, Shell: Yes, the MMO logs are public record. ASRC was the contractor for Shell for the MMO records, and the 2008 records are located at the ASRC offices. There is a report being produced, and it will be included the 90-Day Report.

Archie Ahkiviana, AEWG. Archie was unable to attend the meeting but provided the following written report.

Good morning. My name is Archie Ahkiviana from Nuiqsut. In Nuiqsut we hunt bowhead whales from Cross Island, and we have a lot of experience with how those oil and gas operations affect the whales.

We've been seeing this since the early 1980's. We go out there every year for our whole lives so we know what happens and how things change.

When the seismic is there, you will never see the whales. They swim way out. Or they get so disturbed that they only stay at the surface for a few seconds at a time. That's when they get real skittish, and they can be aggressive too.

Back before we got the CAA (Open Water Season Conflict Avoidance Agreement) working good, when the industry was there we would hunt for weeks and never be able to get a whale. One year we didn't catch any of our quota.

But when the industry isn't there, we always see the whales. They come right close to Cross Island, and we can get them within maybe three, four miles. And we know when they are coming because Kaktovik calls and tells us when they see them. But with the big ships and noise, we might not see them at all.

So we know how they change when all that noise is out there. But the CAA works real good because it keeps the ocean quiet so the whales can come through.

But now there is too much activity in Camden Bay again.

You have all these companies wanting to work in Camden Bay right when the whales are in there feeding and resting.

You know, in the fall migration they have all those calves. They go in there with their mothers trying to rest and eat before they keep going. And the whales shelter in there when we get big storms. So you need to make sure these companies stay out of the way and stop shooting seismic or drilling and dumping all that stuff in that area when the whales are using it. And anyway, how are the mothers supposed to take care of their calves when they get so disturbed? How can they take the time to rest and eat and feed those calves?

You could be making it hard for those animals to make it all the way for the rest of their migration. They might get too tired. We've seen that with a walrus just recently. She was so tired that she just brought their pups up to the shore and then she died.

Another thing you need to keep in mind is that we are getting really bad storms. With the ice retreating, we get more open water and the winds really make that ocean rough, with no ice to keep it calm.

So you need to be aware of that when you're planning to work up there. And you need to keep in mind that you won't clean up any oil in that water.

You won't clean it up in broken ice. And you won't clean it up in open water because the ocean will be too rough.

That's all I have right now.

Quyanuk.

Presentation of 2008 Monitoring Results

Beaufort Sea Monitoring Results

BP Monitoring Results for Liberty Prospect

Bill Streever, BP: Dr. Streever presented on BP's monitoring results for the Liberty Project. Liberty is a reservoir in Foggy Island Bay. BP has been looking at this project for approximately 20 years. Up until 2006, BP was involved in concept engineering. In 2007, final engineering and permitting started. Drilling will reach eight miles long and two miles deep, which will be a record. The Shallow Water Seismic Survey in 2008 was a small scale program in shallow water within the barrier islands. It had a limited season of 41 days utilizing air guns on two ships. BP was not able to use the seismic data from prior shoots because there was not information focused on the drilling corridor, and there was an approximately two mile span where BP would be drilling blind because of lack of data.

A plankton study was conducted to determine how much plankton would die as a result of the seismic shoot (i.e. disrupting the food chain). A conservative estimate determined that less than 0.0001% of plankton consumed by bowheads would be affected.

There had been concerns mentioned about the possibility of killing fish, and BP was asked to conduct an environmental assessment, including searching for dead fish (none were found or seen) and reviewing long term monitoring studies. Fish monitoring has been conducted in this area for three decades. A comparison of 2008 data showed no obvious changes.

Katherine Kim, Greeneridge Sciences: Katherine Kim presented on source characterization. There were three main objectives:

- Air gun Sound Source Verification
- Vessel Sound Measurements
- Acoustic Footprint of Seismic Survey

Air gun Sound Source Verification. Dr. Kim presented slides displaying the extent and boundaries of the Liberty project. The sound source verification utilized ASARs and hydrophones. The equipment was placed within 23 feet of water and over a 12 kilometer track line. Two vessels were used: The Peregrine and the Miss Diane. The Peregrine was operated in deeper water (greater than 10 feet) and carried two 440 arrays and four air guns. The Miss Diane operated in shallow water (less than 10 feet) and used two 220 inch arrays and two air guns. Graphs were displayed showing the measurements of seismic impulses; the safety line was considered to be where 100% of the impulses fell below the line. A table summarizing the received levels and the modeling-determined radii as compared to the empirically-determined radii from the bow aspect and stern aspect from the tracks used on the Liberty Project was displayed. Those areas of particular interest are the 190 and 180 dB levels used by NMFS and USFWS for pinnipeds and polar bears and cetaceans and walrus. Of interesting note was that the modeling-determined and the empirically-determined data were within the ballpark of each other.

Vessel Sound Measurements: Dr. Kim presented a slide displaying the track line for vessel sound measurements in 20 feet of water using ASARs. The track lines were 2 kilometers in length. Another slide displaying received levels and distance showing both the bow aspect and the stern aspect was presented. Vessels ran both slow and fast, with fast being transiting speed. Information summarizing the measurements from each of the vessels used and broken out by bow pickers, crew/support vessel, recorder vessel, housing vessel, etc., was also presented.

Acoustic Footprint of Survey: DASARs having directionally capabilities were used: one inside the islands, one between the islands and one outside the islands. As one might expect, the barrier islands act as an acoustic barrier and within the islands the levels were higher.

Questions/Answers/Comments:

Q: Catherine Berchok, NMML: (unable to hear question)

A: Katherine Kim, Greeneridge Sciences: You have a three term equation that is used.

C: Charles Greene, Greeneridge Sciences: In 1996, BP did a shallow survey in Foggy Island Bay. There was one air gun at a one meter depth. We had that information and applied the original measurements to the new air gun arrays to predict what the received levels would be.

Q: Catherine Berchok, NMML: What did you use for the frequency ranges for the vessel?

A: Charles Greene, Greeneridge Sciences: The ASARs range good to 48 kHz.

Q: Robert Suydam, NSB: Regarding the seismic sounds picked up outside the Islands, we all thought the islands would block sounds. How were they transmitted?

A: Katherine Kim, Greeneridge Sciences: Most likely through the ground. If you were to look at the sound pressure levels on the DASARs outside the islands, the sounds were 30 dB lower than one would expect.

C: Shane Guan, NMFS: That is an interesting curve on the display.

C: Katherine Kim: There are two distinct geological changes there. We used the most conservative as the safety radii, so it provided a much higher source level.

Lisanne Aerts, LGL: Dr. Aerts presented on Marine Mammal Monitoring and Mitigation. The main objective was to avoid conflict with the spring beluga subsistence hunt. The Arctic Wolf served as the housing vessel and took 24 days (from June 26th to July 20th) to transit from Anchorage to West Dock. Heavy ice in Chukchi Sea caused delays and forced it to navigate closer to shore.

MMO's were present on the source vessels, the Peregrine and the Miss Diane. The MMO's main objective was implementation of mitigation and monitoring measures. The survey covered 41 days (from July 15th to August 25th).

There were three MMO's present on the Peregrine (one shifting in and out with two always on duty) and four on the Miss Diane (with 2 shifting in and out and two always on duty). Two MMO's had contact every six hours with the communication center and completed 369 hours of observation. Sightings included:

- 29 cetacean sightings of 72 individuals
- 27 pinniped sightings of 34 individuals (excluding walrus)
- 22 walrus sightings of 11,337 individuals (all seen in an area just north of Point Lay and one sighting of 10,000 animals spread out on the ice)
- 2 polar bears sightings of 2 individuals

Total hours of air gun operation were 384 for the Peregrine and 260 hours for the Miss Diane. The Peregrine had 31.5 hours (8%) of operation during darkness; the Miss Diane had 16 hours (6%) of operation during darkness. The majority of observation hours were under good visibility conditions.

Hours of operation where visibility was less than or equal to 1 km (where it might not be possible see to the safety radii edge) occurred 9% on the Peregrine and 2% on the Miss Diane while air guns were operating. Sightings included:

- 4 cetacean sightings of 16 animals; no sightings while air guns were operating.
- 13 pinniped sightings of 13 animals (excluding walrus); 3 sightings with operating air guns;
- 1 power down and one shut down for two of the seal sightings.
- 9 polar bear sightings of 10 animals occurred when vessels were hiding from storms. One sighting of a polar bear was observed when air guns were operating at 1.1 km outside the 190 dB safety radius so there were no mitigation procedures implemented.
- 3 seal carcasses sighted. There were conversations with NMFS on process and procedures when seal carcasses were sighted. One was sighted along Endicott causeway (07/25/09) and two floating in the water (07/24 and 07/28/09). Shut down was implemented so that a preliminary investigation was done to ensure it was not the result of seismic activity.

Summary: there were limited numbers of marine mammal sightings as was expected for that area. One shut down and one power down were implemented for seals; two shut downs were implemented for seal carcasses.

Questions/Answers/Comments:

Q: Cheryl Rosa, NSB: When operations shut down for the carcass sightings, were the carcasses examined?

A: Lianne Aerts, LGL: A preliminary investigation revealed they were clearly dead for a longer period of time. They were photographed and the photos sent to NMFS. One carcass was missing a head, which was believed to be a polar bear kill, and two had bullet wounds.

Q: Megan Ferguson, NMFS: How was maximum take calculated? It seems different than how others calculate it and perhaps there should be some consistency?

A: Lianne Aerts, LGL: Some calculate sightings per area as opposed to sightings per hour, but with the limited number of sightings we just couldn't really justify doing it that way.

C: Robert Suydam, NSB: Regarding the transiting of the Arctic Wolf, one of the objectives was to not disrupt the Beluga hunt. The Wainwright hunters indicated that the Arctic Wolf approached the shore during that hunt. The hunters ended up getting three Belugas but there may have been some disruption there. If there is communication with the Communication Center every six hours, perhaps it would be more worthwhile when the vessels are near villages to have more frequent conversations.

Q: Robert Suydam, NSB: Can you speak to the group of bowhead and gray whales seen in Foggy Bay?

A: Lianne Aerts, LGL: There was one sighting reported by a MMO on the Miss Diane. There were six to eight animals total, but they did not determine how many of each species. They may have been too far away from the animals, or the animals were too close together.

Q: Robyn Angliss, NMFS: Did anyone get a picture of the Rizzo's dolphin sighting?

A: Lianne Aerts, LGL: I doubt it, but will ask.

BP 2008 Monitoring Results for Northstar

Bill Streever, BP. Bill Streever provided some background on Northstar. In 1999, before Northstar was built, BP had looked at the impact on bowheads and whether aerial surveys would be able to assess that impact. It was determined that aerial surveys would not address the question, so DASARs and full array data collection was implemented (2000-2004) in order to triangulate whale calls to determine location and time so a comparison to activity on the island could be completed with a statistical analysis. In 2005, there was a science advisory committee review, and the design was modified to document sounds and whale calls. During 2005-2007, a smaller array was deployed, and data were reanalyzed. It was determined that the whales are responding to sounds from the island. Are the sounds hurting the whales? Probably not. Is it affecting the hunt? It is hard to say. The hunters are still getting their quotas, but there is a definite response to the sounds. In 2008, BP increased its effort using a different full array design (going out further north than in the past), and the plan was to emphasize the levels of sounds received by the whales.

Katherine Kim, Greeneridge Sciences. Katherine Kim presented data on the 2008 field season acoustics. DASARs are the instruments being used at Northstar. The 2008 placement included 10 DASARs reaching from 500 yards from the island, spaced seven kilometers apart heading out away from the island.

Near shore Sounds: Eight panels were displayed showing each season from 2001 through 2008 for comparative purposes. In 2001-2003 there was a density of vessels traveling through the area during the construction period of Northstar. The amount of vessel traffic decreased from 2001 to 2005, increased slightly in 2006, and then decreased again in 2007 and 2008.

The three near shore DASARs recorded a new sound, referred to as "Pops." Approximately 100 "pops" occurred. The frequency of occurrence varied, and the duration was about 1/20th of a second. There was very little energy in 28-90 Hz band, with most in 150-450 Hz band. The sound originates on the eastern side of Northstar, from Northstar itself or in the water next to the island.

Another near shore sound was helicopter traffic. There were 54 arrival and departure roundtrips of helicopters. Underwater tones were detected on only 35% of these and on departures only (tail rotors are 55 Hz and main rotors are 10.8 Hz) because of prevailing winds and the arrival and departure patterns.

Offshore Sounds: 2008 fell well within the range of the previous seven seasons. In 2008, near island DASARs differed from broadband background levels by a greater amount than previous years – "pops." In the 2008 offshore array sounds were 20 dB lower than near Northstar and differed from corresponding broadband levels by -18 dB. In 2008, ISI_5band did not perform as well as years past because of the two new sounds: "pops" and air gun pulses. A graph of data displaying vessel sounds was shown indicating that vessel sounds propagate tens of kilometers out.

Non-Northstar Sounds: Air gun pulses from non BP seismic exploration were detected on all array DASARs and on most days. Pulses were picked up all the way out at DASAR "J". The amplitude goes down as the vessel moves away and gets louder as it turns and comes closer. Maximum SPL's were greatest on D and G and were at 145 dB levels. DASAR "J" had 90,500 air gun pulses alone. In 2008 air gun pulses were received on the entire array. Air gun pulses constitute a strong confounding factor in assessing Northstar affect on bowhead whale behavior; however, not all air gun sounds were from industry (some were from a government shoot to the north).

Questions/Answers/Comments:

Q: Harry Brower, AEWC: Was there a shutdown period for operators before the hunt started and was there any recording during that time?

A: Bill Streever, BP: The only time that was free of seismic air guns was when the wind was blowing too hard to shoot and that was a period of only a few days.

Q: Harry Brower, AEWC: When there was a quiet period, was there any deflection or rate of return, etc.? What were the whales doing?

A: Bill Streever, BP: That's one problem with 2008 data. When we talk about 2009 we are going to propose putting out the full array again because we know the analysis is not going to give us what we need on 2008.

Q: Robert Suydam, NSB: Regarding the mystery sounds, were they correlated with environmental conditions?

A: Susanna Blackwell, Greeneridge Sciences : We didn't do a quantitative analysis but on a calm day there were very few or none, which is why we think it is something banging near the island or having to do with the weather.

Q: Robert Suydam, NSB: Why do you suspect that the seismic sounds heard may have been from a government research vessel offshore?

A: Bill Streever, BP: (unable to hear response)

Q: Christopher Clark, Cornell: This is fantastic work with amazing data. Where was the vessel that was shooting the air gun?

A: Bill Streever, BP: We did not make any effort to see who owned it.

Q: Christopher Clark, Cornell: I wasn't concerned with ownership, but about distance. Do you know location of where that vessel was shooting from?

A: Mike Payne, NMFS: I don't know all the shoots that went on in that area, but there was a Canadian seismic. It did not require a permit and was approximately 150 miles away.

Q: Christopher Clark, Cornell: Can you give us a bit of a description of what an air gun pulse sounds like when it has traveled a fair distance and is now at 120 dB.

A: Susanna Blackwell, Greeneridge Sciences: They are stretched out like high frequencies are coming in first.

C: (Unidentified Speaker): It is no longer a pulse after it has gone through the ocean some distance.

C: Aaron Thode, Scripps: Because of the nature of the environment there is a lot of distortion of the pulses. They can even turn in to some upsweeps. There is a lot of data collected from various companies; we have not investigated in detail a lot of the characteristics of the signals.

Q: Deborah Hutchinson, USGS: What time were the DASARs deployed during the experiment?

A: Bill Streever, BP: August 25th through September 26th.

C: Deborah Hutchinson, USGS: Canadians were collecting data in the northern basin that had a single long line and a series of lines that went east/west, not like the pattern that was described by a vessel turning.

C: Bill Streever, BP: That source vessel was a different recording.

Lisanne Aerts, LGL. Lisanne Aerts presented on 2008 Whale Calls. The main objective was to locate calling bowheads near Northstar to determine whether the distribution of calling whales is related to Northstar sounds. No analysis was conducted in 2008 because of all the non-Northstar sounds on the DASAR records. This presentation will focus on whale call counts, bearings and call types.

DASARs were deployed August 26th through September 25th. The array was deployed much further offshore than in previous years and were located seven kilometers apart, rather than five kilometers. DASAR #3 was identical to past years in order to ensure comparative data. A total of 73,422 calls were localized in 2008 (the highest number ever). There were over 350,000 detected. 2008 data from DASAR #3 was similar to 2002 - 2004 and 2007, all of which were light ice condition years.

Lisanne presented a graph displaying whale call counts with daily call detection for the years 2001 through 2008 between August 27 and September 26. Whale call types reveal there are more simple calls than complex calls in all years. Simple calls can be divided into upsweep, downsweep, constant and undulation. There is no real pattern between these types in terms of percentages of the total number of calls.

Data were also reviewed this year on other marine mammal calls (one day every week for a total of five days) to include bearded seal, walrus and uncertain marine mammals. There were almost 600 bearded seal calls over the five days, 40 walrus calls, and approximately 600 calls that could not be attributed to a particular marine mammal. Bowhead whale calls are detected far and above that of any other marine mammals.

Call directionality was also studied from this data to determine if sounds are louder in front than behind the whale. Preliminarily, 64 calls were selected that were between the east-west DASARs in order to determine the level of the call at the east versus the west DASAR. On average, calls were 5.6 dB stronger in front (at the western DASAR) than behind the whale (at the eastern DASAR). The same test with calibration transmissions showed no difference between western and eastern DASARs.

Questions/Answers/Comments:

C: Robert Suydam, NSB: Thank you for looking at other marine mammals in your research as well as looking at the data on directionality.

Michael Galginitis. Michael Galginitis presented information on the Cross Island hunt. This is eighth year of data collected and presented on the Cross Island hunt. Mr. Galginitis expressly thanked those that have assisted in the project including the Nuiqsut whalers, the Nuiqsut Whaling Captain's Association, the residents of Nuiqsut, the AEWC, MMS, and BP.

Nuiqsut hunters have to cross approximately 90 water miles to reach Cross Island, one of the longest distances whalers have to travel to hunt. Boats used to travel and hunt are approximately 18-24 feet long with 125-250 horsepower motors. A few bigger boats have deeper hulls and are better for rough weather crossing but they are more difficult to maneuver out of the river.

The first crew went out on August 29th and promptly encountered extremely high winds. There was a scout attempt made on September 4th but the winds were still very high. Whales were landed on September 5th, September 6th, September 8th and September 9th. The season was described as a high wind season, relatively short, with whales being found close to Cross Island and with no ice conditions

(which exacerbated the effects of the wind on the sea state). A graph was displayed showing wind speeds during August and September. The whalers prefer to go out when the wind is low and typically strike whales when the wind is low and noises at Northstar tend to be lower.

Mr. Galginitis displayed a graph of all the tracks from all the years by color code from GPS readings. The 2008 season was the most compact, with travel close to the island. The 2008 season was only 14 days, where most seasons are typically longer. The average crew was only out 7.3 days in 2008; other seasons have typically been 10 or more days. The 2008 season was also shorter in terms of the length of the trip in miles and the time spent out on the water. The level of effort for the entire 2008 season was comparable to the lowest years. Sightings of 25 to 30 polar bears were not uncommon on any given day out at Cross Island and whalers maintained a bear watch to increase safety and prevent bears from accessing the landed whales.

Questions/Answers/Comments:

Q: Robert Suydam, NSB: Do you have plans to go to Wainwright or another village in the Chukchi Sea?

A: Mike Galginitis: MMS has funded Point Lay and Wainwright and we're looking to see if it is possible and how we might make it happen.

Q: Diane (unable to hear last name): No polar bears were shot. Was there any difference in the way (unable to hear the rest of the question)?

A: Michael Galginitis: In 2008 the hunters instituted the polar bear watch. In previous years there was no systematic methods taken to ensure the safety of hunters, the landed whale or polar bears.

Q: Mike Payne, NMFS: Is there comparable data for any of the other villages, i.e. summary of effort, number of whales taken per days hunted, etc.?

A: Harry Brower, AEWC: The other two villages that may have this data are Barrow and Kaktovik. There is limited data on GPS tracking for Barrow.

A: Mike Galginitis: There are some data that could be recovered from the communication log books that have been used in the last several seasons but the quality of the data you can extract may vary. The level of effort is derived from GPS data and that would be absent from these other communities.

Shell Monitoring Results for Beaufort Sea Survey

Susan Childs, Shell. In 2008 Shell conducted three seismics in the Chukchi and Beaufort Seas. Shallow hazard and site clearance work was conducted in both locations. Marine surveys were conducted in the Beaufort and monitoring was done in both locations.

The MV Gilavar has been used since 2006. Support vessels included the Gulf Provider, Maxime, Torsvik and the Theresa Marie. In the Beaufort Sea the MV Henry Christoffersen was used to conduct shallow hazard site clearance. MMOs are present on all vessels and in the aerial programs as well. The aerial program is conducted in both seas, but is a bit different from each other.

The 3D Seismic program in the Chukchi Sea went from July 27th through August 28th. The Shallow Hazards program from August 28 to August 30 using the MW Alpha Helix.

In the Beaufort Sea, shallow hazard work was conducted from July 22nd through August 24th using the MV Henry Christoffersen. 3D seismic was conducted from September 3rd through October 10th. Marine

surveys were conducted from July 27th to July 28th with the MV Anika Marie and ice gouge information was collected August 5th through August 21st using the MV Alpha Helix.

2008 mitigation efforts included:

- Communication plan for avoiding conflicts with subsistence users
- Collaboration and communication with whaling associations
- 2008 conflict avoidance agreement
- Subsistence advisors based in Chukchi and Beaufort Sea communities
- MMO's 60 trained/36 on vessels at one time
- Robust marine mammal monitoring protocol
- Real time ice and weather forecasting

Questions/Answers/Comments:

Q: Harry Brower, AEWC: What was the start date?

A: Susan Childs, Shell: Work started in the Chukchi on July 27th. Typically we like to start around July 20th but couldn't begin that early this year because of the ice.

Michael Macrander, Shell. Monitoring includes: on board MMO's, aerial surveys (manned and a possible unmanned program), acoustic program and additional studies. Mitigation includes: the timing of activities, shutdowns of seismic activities and avoidance measures, ingress/egress route management and communication protocols.

The MMO program provides some information on the effectiveness of mitigation, i.e. marine mammals moving away from the source. There were approximately 25 MMO's aboard various vessels at any one period of time. There were two manned aerial programs within 25 miles of shoreline in the Chukchi Sea and another over all the activities in the Beaufort Sea. MMO's are on duty from the time the ship leaves port. Shell utilizes data collected during times when they are not involved in seismic to generate density data, distribution and habitat use. MMO's are on watch during all daylight hours and 30 minutes preceding full ramp ups day and night. Two observers are on duty during the majority of daylight hours. Monitoring is completed for all seismic air gun activities and any other sound source put in the water. Sound source verification is conducted for the air gun array and sound measurements of each vessel are made.

The objectives of the acoustic program are to measure ambient noise levels, seismic survey sound levels, vessel sound levels and marine mammal call distributions. There was an issue in 2008 with the OBH recorders deployed at four locations along the Chukchi Sea coast. These recorders did not gather the data hoped for because of problems with the transistors not holding up to the temperatures encountered. In addition to the open water program of 30 recorders, in the winter/fall of 2007 five recorders were left to record data over the winter. In 2008 that program was expanded with several more recorders and that data will be collected in July or August.

The Beaufort Sea program was successful utilizing a total of 35 DASAR's; seven in each of five arrays from just east of Kaktovik to west of Harrison Bay. PGS and ENI did an acquisition of seismic data on the near shore and additionally funded five recorders in the near shore.

The aerial program in the Chukchi Sea there has been a near shore program. In 2008 in the Beaufort a transect method of flying was used over the area in Camden Bay and Harrison Bay. An unmanned aerial

system evaluation was completed. It was co-funded with ConocoPhillips to test the ability of an unmanned aerial system to detect and census marine mammals. There were some constraints that did not allow for a comparison to manned aerial flights as was hoped for. The ability to see marine mammals successfully was there and there is hope that work in this area will be continued.

David Hannay, JASCO. Dr. Hannay presented on sound source verification. The purpose is to quantify sound levels produced by seismic equipment and support vessels at the location of the seismic survey. Nine SSV field programs were completed. Equipment used included JASCO OBH Recorders for SSV work and aural M-2 Recorders for long term monitoring. Results of the SSV programs were displayed. (Results can also be found in the 90 Day Report.)

Questions/Answers/Comments:

Q: Robert Suydam, NSB: Can you describe the best fit again? Is the dashed line the best?

A: David Hannay, JASCO. Yes, that is correct. The straight line has half the points above and below. We shift the dashed line up until 90% of the points are below it and use that as the best fit. The reason we don't use a line where 100% of the points are below is because there are sometimes bumps against the hydrophones and using 90% takes that in to account.

C: Robert Suydam, NSB: It seems the 90th percentile is not the best method to use; it is not the most conservative.

C: David Hannay, JASCO: We find the maximum of the endfire and the broadside distances. When we talk about these maximum ranges they are conservative. Information will be presented during tomorrow's agenda items regarding using the 95th or 97th percentile.

Q: Michael Mayer, Earth Justice: The distance for the broadside was striking for the 190 level for potential injury to take. Is that sort of thing incorporated in to IHA's or will it be in the future? Is this something that we'll talk about more now or will come up later in presentations?

C: Jim Lecky, NMFS: These numbers are conservative to begin with and from what we've seen in the more recent literature. I think we can try to address this is more detail. Part of the answer is we think those are very conservative numbers.

A: Mike Macrander, Shell: Animals tend to move away from sounds that may be injurious to them and that is the requirement for monitoring in that 180 dB and 190 dB range and why MMO's have been added to the program, vessels, etc., so that we can more effectively keep a watch on that.

C: Harry Brower, AEWC: With regards to SSV, the sound that is being propagated in to the water, and the different levels that are being identified and how it impacts whales in terms of vocalization... I think these things are presenting difficulties for the whales in how their communications work.

C: David Hannay, JASCO: Those are the questions we are trying to answer by tracking the bowhead calls as the seismic guns are shooting and if they are changing the rates of their vocalizations. I think there will be more presentations on that today and tomorrow.

Q: Robert Suydam, NSB: In the Comprehensive Report the sightability report shows the sightings of seals drops off dramatically at about the 200 range. The sighting vessel is one kilometer or more between the support vessel and the sighting vessel. Can you comment on this?

C: Mike Macrander, Shell: Also in the Comprehensive Report is that the sightings are greater at the support vessel as opposed to the source vessel. For seals there may be a bit of a gap there.

C: Robert Suydam, NSB: Half the area between the chase vessel and the source vessel is not being monitored. That leaves 500 meters that isn't being monitored.

C: David Hannay, JASCO: It is interesting to look at difference between the endfire and broadside. This 920 distance on the broadside comes from a very narrow area perpendicular to the array.

Darren Ireland, LGL. Mr. Ireland presented on Beaufort Sea Vessel and Aerial Survey Results. The objectives of these programs were to document the occurrence and, when possible, the behavior of marine mammals near seismic operations. MMO's serve as the basis for implementing mitigation measures. They collect current data on distribution and relative abundance of marine mammals during the open water season and use the marine mammal observations to estimate take by harassment.

The majority of observation effort for the 2008 season was in Camden and Harrison Bays. The number of observations increased significantly in 2008 but directly correlates to the amount of increased effort from 2006 to 2008.

Sightings in 2008 included:

- 48 bowhead
- 4 gray whales
- 0 minke whales
- 31 unidentified mysticete whales
- 8 unidentified whales

A graph displaying data on the number of individuals exposed to the 160, 170, 180 and 190 dB ranges based on non-seismic and seismic densities and the number actually sighted was displayed. Three power downs were implemented, but post season analysis suggests that only one power down was necessary. MMO's acted conservatively, calling for power downs whenever they felt it might be necessary.

Data on seal sightings was displayed. It was often difficult to identify the type of seal, especially when they are at some distance from the vessel. 35 seals were sighted at the 190 dB threshold. 39 power downs and one shut down was implemented. Walrus are pretty rare in the Beaufort Sea. One power down was implemented for a walrus sighting and one for a polar bear sighting.

22 aerial surveys were conducted in Harrison Bay from August 25th to October 11th. 31 aerial surveys were conducted in Camden Bay from July 6th to August 23rd and again from September 13th to September 28th. Beluga sightings jumped from 2007 to 2008, as did the total number of cetaceans sighted. Bowhead surveys indicate the vast majority of sightings occurred during July. BWASP data and aerial survey data show bowheads in the same area. Beluga sightings were seen in the July surveys in the Camden Bay. Data on pinniped and polar bear sightings were presented.

Questions/Answers/Comments:

Q: Harry Brower, AEWC: There is no mention of cow/calf pairs seen in the observations on bowhead whales from aerial surveys.

A: Darren Ireland, LGL: I believe we saw two cow/calf pairs at the most during our observations.

C: Harry Brower, AEWG: There appears to be some miscommunication between BWASP data and Kaktovik hunters in terms of observations of cow/calf pairs near operations.

C: Darren Ireland, LGL: I think there are some areas on the agenda where we will discuss the similarities and differences in the data on hand. Overall, when you look at the BWASP data and LGL data and you spread it out over the amount of effort, the sighting rates are similar over the course of the surveys.

C: Mike Macrander, Shell: We are using a standardized survey technique so there is a multiplier that gets applied to the numbers we use. When you apply that multiplier to our data, it makes the number very similar to the number produced by BWASP data.

C: Jonathan Jemming, NSB: If you look at the same time and place, are the survey results generating the same number of cow/calf pairs? My understanding is that those numbers from Shell were different from the BWASP data.

C: Susan Childs, Shell: We did not see the number of cow/calf pairs on the 18th. There was no seismic occurring at that time as we were shut down for weather.

Q: Megan Ferguson, NOAA: Did you estimate any uncertainty in your estimates _____ (microphone failed). It would be nice to see the confidence limits in the reports because they aren't currently in the tables.

A: Darren Ireland, LGL: We have not carried it through to the actual estimate of the takes.

Q: Robert Suydam, NSB: What is the process used for estimating takes?

A: Darren Ireland, LGL: In the reports you will see 'takes' calculated using data from the vessel observations. We also do it in the aerial survey section using the same process. There are two different locations where we estimate take: vessel and aerial.

Q: Robert Suydam, NSB: Why would you use vessel when the sightings are so much lower?

A: (Unidentified Speaker): (unable to hear response; no microphone used)

C: Robert Suydam, NSB: Boat densities are so much lower. For the vessel estimate the MMO's are observing within the 160 zone. This can be ultra biased on the low end for the takes and the decision makers need to understand this. We need to figure out the best process for estimating takes.

Susanna Blackwell, Greeneridge Sciences. Dr. Blackwell presented on the Beaufort Sea Acoustic Monitoring Program. Its objective was to investigate whale movement with respect to industrial operations and determine changes in behavior due to sound levels. 40 DASARs were used over five sites with seven kilometer spacing within a WNW to ESE spread of 280 kilometers. The distance from shore to the first DASAR was 15 kilometers with a depth range of 15-52 meters. Six complete days were analyzed manually (August 21, August 28, September 6, September 13, September 21 and September 29). 440,295 total calls were detected and 79,704 calls were manually analyzed. 440,295 total calls were detected.

A graph displaying the 2008 Shell data compared to BWASP data was presented showing the distribution at the 90th, median and 10th percentile distances from shore. The arrays were reasonably well positioned to be getting most of the migrating bowheads. There were essentially three different operations going on during the time the DASARs were out which included MV's Gilivar, the PGS and the Henry Christoffersen. A graph presenting call detections per hour at sites was displayed. As always, there were fluctuations in call numbers. If this graph were to be superimposed over the dates and times when seismic activity was occurring at 1, 3 and 4, then site 1 had very few calls in relation to the others.

Sites 3 and 4 had a dramatic drop in the number of calls at the approximate time the Gilivar was working. The wind, however, really factors in to the analysis. When the drop in the number of calls occurs and when the air guns were being used there was also an increase in wind speed. When the ambient noise goes up, it is harder to hear the whales and for the whales to hear each other. There is still some analysis to be done looking at the correlation and affect between call detection rates and use of air guns. This year it was difficult because seismic was going on much of the time and at multiple places at the same time.

Because of all the data on whale call locations it was decided to calculate the received level from air gun pulses at the location of each detected whale call. Known data included the location of the vessel, the times during which air guns were being used, the type of the array used, the location estimate of the whale calls and the SSV propagation equations. Received levels from air gun pulses at whale call locations shows there were almost none at received sound levels over 180 dB. Sites 1, 3 and 4 show large percentages of calls while seismic operations are ongoing with received levels over 120 dB.

Chris Nations, West, Inc. Chris West presented on bowhead whale call distribution. An analysis was completed on the percentiles of call location distribution. This particular analysis was restricted to 6 kilometer zone within a centerline drawn through each DASAR array. Preliminary analysis shows that a pattern is difficult to see as relates to seismic operations and received levels. A proposed analysis is suggested on the call location and call rate. This proposed analysis would be to lay out a grid that encloses each DASAR with a hexagon at all the sites and then count the calls within those hexagon areas at some interval such as 5, 10 or 15 minutes. This will produce a call count by time along with an association between received level and call count. The basic idea is to relate the number of calls detected with the received level. The formal method is a Poisson regression (generalized linear mixed model). In addition to received levels there will be other covariates that would be of interest including bathymetry, date, DASAR array, offshore distance, day/night, transients (boats), deep versus shallow water seismic operations, and relative position of operation (bearing). The end result would be a predicted call count in a larger hexagonal grid with and without air gun activity.

Questions/Answers/Comments:

Q: Cheryl Rosa, NSB: 1) you had a list of variables and from previous studies I wondered how you will take in to consideration that some whales may not be calling during seismic activities and 2) another consideration is that whales may be coming in to areas important to them and thereby exposing themselves to levels higher than would be good for them. Have you considered adding feeding areas, etc.?

A: Chris Nations, West Inc.: 1) The object is to determine the relationship of calls during seismic activity versus the number during non-seismic activity. 2) We hadn't considered that, but any kind of covariate could be added.

Q: (Unidentified Speaker): From the data you're looking at in high received areas are you noticing faint calls that you are not able to localize?

A: Susanna Blackwell, Greeneridge Sciences: Unfortunately there is all of that going on. We think that the calling rates drop when air guns are being used and the fact is that if the seismic activity is close, the background levels go up and the higher the background level the harder it is to detect the whale calls.

Q: Robert Suydam, NSB: In 2007 there were a lot of great data collected, but array #1 was not picked up until 2008. Has that data been analyzed and incorporated as to what happened in 2007?

A: (Unidentified Speaker): The data were analyzed and the number of calls appears in the final report for last year. As we suspected, the call rates at Site #1 were just not that high. It is our lowest site in terms of call detection rate. We haven't done anything beyond that. I don't know if we are going to redo some of the data to include Site 1.

C: Robert Suydam, NSB: My suggestion would be to incorporate it and distribute it. Also, whatever method is used should be applied to both years of data.

Q: Robert Suydam, NSB: Have you thought about how you are going to deal with multiple operations in the Beaufort at one time?

A: Chris Nation, West Inc.: We have talked about analyzing all the data looking at multiple years. Yes, I think we can account for multiple operations.

Q: Lianne Aerts, LGL: The call detection from all the arrays are analyzed for each array separately so are there calls that are duplicated between them?

A: Susanna Blackwell, Greeneridge Sciences: Each array is analyzed separately.

PGS Monitoring Results for Beaufort Sea Survey and Eni Activities

Ed Nelson, PGS Onshore. Mr. Nelson presented on PGS activities. Summer activities included:

- 3D TZ Seismic Survey
- Oliktok Point (Nikaitchuq Field)
- Survey area of 107 square miles
- Water depth of 0 to 45 feet
- August 2nd through August 25th acquiring data outside barrier islands
- August 26th to September 10th moved inside the barrier islands at the end of Nuiqsut whaling season on September 9th
- September 10th through September 28th they were both inside and outside barrier islands

Susan Inglis, LGL. Susan Engles presented on the Marine Mammal Monitoring and Mitigation results including

- Communication and call centers (every 12 hours contact)
- SSV
- MMO
- Aerial Monitoring
- Acoustic Monitoring

Sound source Verification:

- SSV performed by JASCO on all PGS/Eni vessels including 12 non-source vessels
- Safety radii based upon SSV for source vessels (Wiley Gunner, Shirley V and Peregrine)
- Mitigation gun
- Source vessel air guns were 880 cubic inch or 440 cubic inch (Peregrine, September 6th-19th)

- PGS 800 m exclusion zone for polar bear and walrus

MMO's:

- MMO's were placed on source vessels
- 2 MMOs per vessel (1 Inupiat and 1 biologist on 12 hour shifts)
- Seals – 38 sightings individuals
- Cetaceans 1 sighting – 3 individuals
- Polar Bear 13 sightings – 16 individuals
- Pacific Walrus – no sightings

The MMO main objectives were to monitor safety radii, implement mitigation measures, and collect environmental, behavioral and species distribution and abundance data. Ramp up procedures monitored by MMO's included a 30 minute pre ramp up observation periods with guns starting at 6 dB with five minute increases. Total MMO effort was 1268 hours with 853 daylight hours. No cetaceans were seen in the 160 dB range while guns were firing. Seal sightings resulted in nine mitigation shut downs and one power down. Estimated polar bear sightings were 16 individuals with one in the water. There was one shut down because of polar bear in the water.

Aerial monitoring and mitigation:

The aerial monitoring and mitigation program was an integrated program with Shell. It took place a minimum of three times per week from August 25th to September 27th. Survey results included:

- 4.2 estimated individual bowhead whales exposed at greater than 180 dB
- 8 estimated individual bowhead whales exposed at greater than 160 dB
- 1 estimated beluga whale exposed at greater than 160 dB

The take results were within the IHA and LOA limits. There was no known interference with subsistence activities. A total of ten mitigation shutdowns and one power down occurred.

Questions/Answers/Comments:

Q: Jeff Denton, MMS: Curious on what constitutes an exposures. Is there a time element? What exactly is an exposure?

A: Darren Ireland, LGL: The way these estimates are calculated ... what we are assuming is when we collect the data that density of animals is estimated across the entire season assuming even distribution for the entire season and as you calculate the boat back and forth through that area if it comes back within close distances if that animal had stayed put in that spot the entire season it would have been affected.

Q: Charles Hopson, Barrow: What do you mean by the words "seals exposed" and "side effects"?

A: Susan Inglis, LGL: It means that the seals actually experienced sound waves from the guns firing. It is assumed that if they do experience it within the 180 to 190 dB range that it would be _____ (unable to hear word). The 160 dB is considered to be potentially disturbing, so we use the 160db range.

Q: Charles Hopson, Barrow: When doing sounding near shore are you finding or charting that the ocean is becoming shallower?

A: Ed Nelson, PGS Onshore: We do have the water depths of every shot we take. We don't have it here with us today, but we do have that data.

Q: Robert Suydam, NSB: Can you clarify the density of seals that are used over the entire season and assuming the seals aren't moving?

A: Darren Ireland, LGL: Sometimes we break it down by month and account for seasonal distribution. The take tables I believe are based on summer season and fall season.

C: Robert Suydam, NSB: So it seems the estimated take are very minimal. We know they don't hang out in one spot and so using a density estimate when we know that animals are moving in and out seems like a problem. The take tables aren't really reflecting the number of animals being exposed.

C: Darren Ireland, LGL: The use of density times area as a take estimate does not necessarily allow for a lot of movement of animals. There are other parts of it, for instance, the aerial survey data where the densities are probably different. If that density of aerial survey from outside the barrier islands were used for inside the barrier islands we would have a more conservative estimate.

C: Robert Suydam, NSB: It seems like this is something we need to work at instead of guessing. We really need to sort this out.

C: John Richardson, LGL: Most projects calculate the take figures two ways: counting the total amount of water area that was exposed at least once to a given sound level but also calculating the total amount of area that is swept out along each of the lines including the overlap area and when the density is multiplied by that second area it results in a much higher number of seals and we often think of that as the uppermost number of animals exposed.

C: Robert Suydam, NSB: It seems that the overlap area was to help calculate the number of exposures for each individual animal as opposed to coming to an upper limit of the number exposed.

C: John Richardson, LGL: I think it allows you to get at both of those matters.

C: Robert Suydam, NSB: When we talked yesterday about large vessels and the sightability dropping off within a couple hundred meters from the vessel, it seems like you would have a real difficulty actually observing the 160 dB zone in particular, especially in offshore areas. Realizing that you calculated the number of take two ways (from boats and aerals), I guess I don't understand why you are even calculating estimates from vessel sightings.

C: Susan Inglis, LGL: We were relying on the aerial surveys. We were inside the barrier islands and weren't expecting animals to venture in to that area.

Q: Robert Suydam, NSB: Concerned about truncating the estimates of take at 160dB. Whales are deflected, at least when migrating through, at 120 dB. Why did you not use the 120 dB zone to estimate take using aerial surveys?

A: Susan Inglis, LGL: We used the 160 dB range because that range is set by NMFS but I recognize your point.

C: Robert Suydam, NSB: We need to consider this because there is a lot of data showing that migrating whales can be disturbed. We need to make the 120 dB zone happen.

C: Susan Inglis, LGL: I actually did do an estimate of the number of animals based on the overlap.

Pioneer 2008 Results and Limited 2009 Activity

Dale Hoffman, Pioneer. Pioneer has not applied in 2008 or 2009 for an IHA because they did not conduct seismic during that time. They have been strictly a drilling and production operation. Work was located near shore in about 4.5 feet of water inside the barrier islands. 2008 activities included:

- Final facility checkout

- Development drilling
- Transportation operations (helicopter and vessels)
- Oil production

Julie Lina, Pioneer. Ms. Lina presented on a joint monitoring program conducted with Eni.

- Monitor in water sound with ASARs near and distant ODS and vessels
- Sounds and spectral content of vessels
- Characterize distribution of whale calls with DASARs
- Characterize distribution of whales from aerial surveys (funded by Eni and Shell)
- Four ASARs deployed August 11th through September 25th
- Searched for drilling noise – no drilling tones were detected on all four ASARs
- Searched for machinery noise – no sounds from machinery were detected
- Characterized sounds from vessels = GPS units installed on vessels. Detected vessels at ASAR ODS E-1.2, sounds at or below ambient conditions (80-90 dB) at ASAR ODS N-4.
- Sound source measurements were taken offshore of barrier islands, nine meter water depth; support vessels estimated at 100 dB at two miles; barge estimated at 100 dB at 2.3 miles. Vessels included the American Resolution, American Pioneer, Snow White and Stryker.

Whale Calls & Aerial Survey results

- Call analysis and aerial surveys detected few bowhead whales within 20 miles of the ODS
- Vessel and drill site sounds did not overlap with whale call locations

2009 activities will mirror 2008. There will be two trips average per day during open water season and an average of seven helicopter trips per day transiting nine miles to ODS.

Questions/Answers/Comments:

C: Dale Hoffman, Pioneer: It was mentioned earlier that Archie had a report prepared but was unable to be here to give his presentation. If possible I would like that it would be included in the record as it would be very helpful to us since it is the closest village to our operations.

Q: Catherine (unable to hear last name): Drilling noise was expected to be around 1.5 hertz, is that correct?

A: Charles Greene, Greeneridge Sciences: The tail corresponds to 1.3 to 2.3 hertz. We've extended the calibration done to one-tenth of a hertz. We have absolutely no evidence of any cyclic component. The roll off is pretty steep but it is tough to measure because you can't get away from your own noise. The data is in the report though.

Q: Bill Streever, BP: Is the information on the drilling noise in a written report available to the public?

A: Julie Lina, Pioneer: It is still in draft form, but it is available.

Q: Robert Suydam, NSB: Can you explain again about the 30 hertz tone?

A: Michael Link, LGL: The spectral density was all 45 days in about 5% of the records. We went back in time to look for its presence. It comes and goes so we suspect it is a vessel. There was some work on the vessels in early September and the noise disappeared so we suspect it might have had to do with something in the boat.

Q: Robert Suydam, NSB: The thought is that the noise is from props or engines and not seismic guns then?

A: Michael Link, LGL: yes.

Chukchi Sea Monitoring Results

Shell Monitoring Results for Chukchi Sea Survey

Michael Macrander, Shell. Dr. Macrander presented an overview of Shell's activities in the Chukchi Sea in 2008.

In 2008 Shell conducted a limited 3D seismic program in Chukchi Sea. Ice was a significant issue causing limitations in the program. Shell also conducted a shallow hazard/site clearance program and monitoring program. In addition to the monitoring program requirements to be in compliance with the IHA, Shell, in cooperation with ConocoPhillips, also participated in quite a few baseline studies in the Chukchi Sea. Those studies are not being presented here since they are not part of the IHA process.

3D Seismic was conducted from July 27th to August 28th using the MV Gilavar. There were only a few days during that timeframe that Shell was able to acquire seismic at the two locations. Shallow hazards work using the MV Alpha Helix was conducted from August 28th to August 30th.

The monitoring program has three main components: on board observers, an aerial program (sawtooth patterned flights with return flights being along shore), and an acoustic program including deployment of 30 recorders across the Chukchi Sea to get an idea of large scale movements through the sea, migration patterns, habitat use, etc. Five overwintering recorders were deployed from the fall of 2007 to 2008.

David Hannay, JASCO. Dr. Hannay presented on sound source verification work. A table was displayed showing sound source measurements for the Chukchi Sea to include the seismic survey at the Kakapo Site, the shallow hazards work performed off Cape Flattery, and for the MV Alpha Helix. The SSV used the JASCO OBH recorders. A chart displaying the measured sound level showing endfire direction and broadside direction from Kakapo was presented. Results included:

- The distances that were passed to the MMO's were the 90th percentile fits to be conservative.
- At 180 the mitigation air gun was 370 meters. The 90 day report contains all the Sound Source Verification and tables for all the data in both meters and feet.

Questions/Answers/Comments:

Q: Robert Suydam, NSB: The Comprehensive Report shows that for the Gilavar the 190 dB zone is 810 meters instead of 610 meters (Table 3.1 on page 3.4 shows 190 dB zone is 810 meters).

A: David Hannay, JASCO: The 90 days report has the most recent levels. We do an immediate analysis within the first few days of the measurement to pass to the MMOs, and then we go back after the fact and reanalyze and adjust and improve the fit and submit a post season set of results.

C: Robert Suydam, NSB: The reports are dated January and March. Please check the data and get back to us.

C: Michael Macrander, Shell: We'll double check that and get back to you.

Q: Robert Suydam, NSB: Can you give us the ranges in safety radii for all these different zones over the years?

A: David Hannay, JASCO: The differences are mainly due to location. I'll tabulate those and get them back to you.

Dale Funk, LGL. Dr. Funk presented monitoring results including tables on the number of cetacean sightings by species and number of individuals per sighting. The greatest number of sightings and greatest number of individuals was gray whales, which has been typical over the past several years. The level of effort in 2008 was comparable to 2006 and higher than in 2007. There is some increase in the number of gray whale sightings. A few bowheads were seen, mostly late in the season. There were a number of unidentified whales as well. There were a few unusual species sighted including:

- Fin Whales (2 sightings, 4 individuals)
- Humpback Whales (1 sighting of 1 individual)
- Nike Whales (a few more than have been seen in previous years)

Exposures greater than, or equal to, 160 dB up to 190 dB were based on non-seismic densities calculated from all the ships and multiplied times the area sonified by the seismic ship. That resulted in a potential of 56 cetaceans at the 160 dB range; 13 at 180 dB; and, six at 190 dB. Using the densities collected during seismic, there was a potential of 27 at 160 dB, six at 180 dB and three at 190 dB. If you take the number actually sighted, it was seven whales within the 160 dB range, six within 170 dB and none at the 180 and 190 dB ranges. If you were to take the non-seismic and seismic and assume the animals remained in the same spot as the seismic ship went back and forth the exposures per individual were 10 at 160 dB; seven at 170 dB; four at 180 dB; and, two at 190 dB.

The greatest number of seal sightings was of those that were unidentifiable. Typically the unidentified seals are either ring or spotted seals. Ring seals were the most frequently identified, followed by bearded and then spotted. The number of potential exposures is 818 based on non-seismic at the 160 dB range; 392 at 170 dB; 193 at 180 dB; and, 92 at 190 dB. Based on seismic densities the numbers were: 196 at the 160 dB range; 93 at 170 dB; 46 at 180 dB; and 22 at 190 dB. Exposures per individual 10 at the 160 dB range, seven at the 170 dB range; four at the 180 dB range and only two at the 190 dB range. Five power downs occurred for four sighted seals and one seal that was approaching.

There were quite a bit fewer sightings of walrus in 2008 as compared to 2007. Exposures per individual were calculated at 10 at the 160 dB range; seven at 170 dB; four at 180 dB; and two at 190 dB. No walrus were seen during seismic activities. One walrus was seen at the 160 range and one at the 170 range.

Eight polar bears were sighted from vessels during 2006-2008. Three of those were in 2008 and five were in 2006.

Aerial surveys were flown in a saw tooth transect down the coast and along the coast on the way back up. The aerial survey effort was comparable to that of 2006 and 2007. Numbers of cetacean sightings were presented. The most frequently sighted were gray whales with 91 sightings of 113 animals. A few belugas were seen, which was way down from the numbers seen in 2007 and 2006. It appears the belugas had passed out of the Chukchi Sea before Shell arrived. Numbers of pinniped sightings were presented. There were quite a few sightings of pacific walrus (197 sightings of 1,278 individuals). No haul outs were seen along the shore in 2008 but numerous haul outs were observed in 2007.

Distribution maps from aerial surveys were presented. A few belugas were seen in July and a couple in August. A few bowheads were seen in July and a couple in August, along with a few more in September and October. In 2006, most of the gray whales spotted were between Point Lay and Wainwright. In 2007 and 2008 when the ice was lower, more gray whales were seen between Wainwright and Barrow. There were quite a few walrus in July and August, mostly around Wainwright and Barrow. As the season progressed in August and September more were seen around Point Hope. Most of the bearded seals were spotted in August and September. Ring seals were distributed pretty evenly along the coast throughout the season, particularly in August and September. There was an attempt to photograph some seal haul outs but it became clear the aircraft was disturbing them. Four polar bears were spotted in August and the remainder was seen in September. There were 12 polar bears spotted in 2008 and five sightings in 2006. No polar bears were seen in 2007.

Questions/Answers/Comments:

Q: Robyn Angliss, NMFS: Last year there were comments and concerns about the number of unidentified whales. I see this year the percentage of unidentified whales is even larger. Have there been changes in training? Are there patterns?

A: Dale Funk, LGL: The number of unidentified whales is large this year. There was a fairly large group of whales that were initially identified as bowheads. We didn't have any conformation of that however and we were getting the data from one vessel. Our aerial program was seeing gray whales in the area. The sightings were questionable enough we moved them to the unidentified category.

Q: Harry Brower, AEWC: Were any pictures taken during the aerial surveys?

A: Dale Funk, LGL: Aerial surveys are typically flown at 1,000 feet. We have some pictures. We took some photographs of spotted seals but it appeared they were moving off of the haul outs because of the airplane and we didn't want to disturb them.

Q: Robyn Angliss, NMFS: (unable to hear question)

A: Dale Funk, LGL: I believe it was about 35 sightings, it might have been 35 animals. It was a fairly high proportion of the unidentified number.

Q: Diane Sanzone, BP: Did you analyze any of the data using the number of individuals for sampling effort, especially for the aerial surveys and the seismic shoot?

A: Dale Funk, LGL: We have that. It is all in the report.

C: George Ahmaogak, Ahmaogak & Associates: For years there have been requests of the operators and NMFS that when they report this information that they acknowledge the use of traditional knowledge in the sightings and identification of marine mammals. The people on board are using traditional knowledge and there should be some acknowledgement of that in all these reports.

C: (Unidentified Speaker): We do have a chapter on traditional knowledge that we are hoping to incorporate in the next version of the Comprehensive Report. We have not yet had a chance to do that, but we are working to get that information in to the report.

C: Robert Suydam, NSB: What troubles me is that the MMO's are putting something down on a data sheet and then someone is going back and changing it. It seems the issues could be dealt with in a different way, i.e. reported as collected and then footnoted changes. It does a dis-service to MMO's and to the biologists that are observing and reporting this information. This is a great concern and has been a recurring topic.

C: Susan Childs, Shell: If this occurs, we'd like to know about it. Provide us with information on the person's name and we'll work to correct it.

C: Robert Suydam, NSB: That would be difficult as the MMO's feel targeted. I would recommend to NMFS that data be reported as collected and any changes be done through a footnoting process.

C: Robyn Angliss, NMFS: I echo the concern about naming names on this data collection issue. If data is edited in the field, it needs to be tracked and documented that it was changed/edited.

C: (Unidentified Speaker): If changes to data are occurring while out on the boat before it gets entered on to a data sheet, then the only way we are going to find out about it is to hear it directly from a person. Otherwise, all we see is the data as it comes back on the data sheet.

C: Susan Childs, Shell: It is really important for that information to come to me since I am responsible for the compliance of these permits. In order to get it resolved, can we get together and come up with a resolution? If things aren't going well on the boats and data is being changed, somebody in charge of the MMO's needs to talk to the compliance manager so it can be resolved.

C: Michael Macrander, Shell: This is a very disturbing point. The frustrating part is the hearsay where I don't have the ability to track down the information and get it fixed. It is especially hard to do anything three to six months after it has occurred.

C: Maggie Ahmaogak, Ahmaogak & Associates: You saw a great difference in the number of whales sighted in the beluga range between Point Lay and Wainwright and that is very much due to the incorporation of traditional knowledge. The communities asked industry to start after the beluga hunt and that is the reason for the increase in numbers. This is known because of traditional knowledge.

David Hannay, JASCO. Dr. Hannay presented on long term acoustic monitoring in the Chukchi. Aural M-2 Recorders were used in a multi-recorder acoustic array deployed between July 2007 and July 2008. Two summer deployments were operated between July 16 and October 25, 2007. The winter deployment recorded on 20% duty cycle from October 21 to August 3, 2008. The combined datasets provide more than a full year of passive acoustic data in the Chukchi Sea. In 2008 an identical deployment of 30 recorders was completed but the data was lost due to a component failure.

Marine mammal calls (bowhead, beluga, walrus and seal) were identified using an automated detector and classifier. A subset of the data was manually processed to compare with and validate the automatic detector. Bowhead calls and songs were recorded in fall, winter and late spring. The winter songs had more structure than the calls recorded in the previous fall. Graphs were displayed showing bowhead detections and call counts per day. There was an expectation that some straggler bowheads would be seen coming through later in the season, but what stuck out in the data was an increase in mid-November and beginning of December and then a rapid increase thereafter, occurring mostly around 50 miles off Point Lay. Songs were categorized into six groups and are the first observations of bowhead songs in the Chukchi outside of spring migration. Songs were recorded almost continuously between October 30th and January 1st. Several song types were often recorded simultaneously but the predominant song types changed over time. Late detections indicate bowheads remain in Chukchi Sea longer than previously thought, even when ice concentrations approach 100%. Overwinter recorders operated July 23 to August 2, 2008. The first bowhead detection occurred on May 27, 2008, then sporadically until the end of the study. Bowhead calls were so prevalent in December 2007 at PL50 they increased broadband ambient levels by 10-20 dB.

Seal calls were present from March to June but the highest numbers occurred in May. Calls were especially loud, increasing ambient background levels by 20-25 dB between 100 Hz and 2 kHz at PL50. Most were bearded seals calls and there were calls from multiple individuals simultaneously.

A brief seismic program was conducted in October and was responsible for increased sound levels. When the ice started to form in mid-November the sound levels rapidly decrease at high frequencies. We would have expected that decreased level to be maintained throughout the ice coverage, but because of the bowheads there was a dramatic increase in November.

ConocoPhillips Results for Chukchi Site Clearance Activities

Bruce St. Pierre, ConocoPhillips. Mr. St. Pierre presented on ConocoPhillips activities. In 2008, Conoco went out over the Prospect area (also called the Devil's Paw area) and acquired shallow hazard survey data to look for geohazards such as gas pockets in the near environment. The goal is to drill a well in summer 2011. The type of rig that will be used is still undecided. It is expected to be a summer operation.

Last year was a successful year for data collection and there has been coordination of effort and costs with Shell. The plan for summer 2009 is to conduct similar a research program as last year. Caryn Rea is the team lead for that program. This year Conoco is looking at a geotech program to gather additional core locations to place a rig. There is a need to understand the substrate. There is also a plan to go out to the west coast villages along the Chukchi Sea to provide information, relay the plans and strategies and open communications. The plan is to do a rollout of the ConocoPhillip's studies later this month in Wainwright, Point Hope and Point Lay.

Questions/Answers/Comments:

C: Caryn Rea, ConocoPhillips: We are planning to meet with research scientists, North Slope Borough scientists and the Alaska Eskimo Whaling Commission at some point to roll out the program results.

Jay Brueggeman, Canyon Creek Consulting. Mr. Brueggeman presented on ConocoPhillips's seismic program. Its purpose was to conduct shallow hazard survey work at Klondike Prospect, collect core samples along two potential pipeline routes, map bathymetry and map seafloor characteristics.

The program ran from September 7th to October 31st using the Norseman 1. The seismic source was a fairly low energy devise (sparker). The coring equipment was done with a drop core system, not a drill rig. A multibeam echosounder and side scan sonar were used.

The MMO's objectives were to determine the type and number of species within the safety zone of 180 dB, the behavioral disturbance zone within 160 dB, to determine the number of seismic survey shutdowns, and record behavior and natural history. Two observers were used, taking four hour shifts, for all daylight hours and at start ups. A line transect procedure was used to collect data. Standard data protocol was used for the type of data on marine mammals and when the seismic was active or inactive, etc.

Total observations of pinnipeds only were seen. There were 48 sightings of 79 animals. More seals were seen outside of the Klondike area than within. Cetaceans, polar bears and whales were seen only outside of the Klondike area. During the seismic activity, when the sparker was shooting within Klondike, there were almost 225 hours of observation effort. There were over 75 hours of observation conducted at Burger during periods when there was no seismic activity. Temporal distribution at Klondike of seals and walrus show the majority of seals during the first half of the program and a batch

of walrus in later September. More seals and walrus were sighted during non seismic activity even with a lower level of observation effort. Seal density sightings were 10 within Klondike during seismic and 24 during non seismic, resulting in a density of .038 during seismic activities and .284 during non seismic activities. During seismic activity there were more animals looking at the vessel than during non-seismic activities. However data from outside Klondike during non-seismic activity also showed a majority looking at the vessel.

Conclusion:

- Species composition typical for the region
- Most belugas and bowheads passed through the region before and after the program
- Most bowheads appear to migrate north of the program area in the fall
- Considerably fewer seals observed during seismic versus non-seismic activity and within Klondike than other survey areas suggesting possible localized effects
- Seismic effects not corroborated by behavior/distance
- Other factors could have caused difference between seismic and non seismic activity on marine mammals
- Shallow hazards survey had no more than a negligible effect on individual marine mammals and no population level effects

Questions/Answers/Comments:

Q: Robert Suydam, NSB: Many people will be out on the ice hunting in late April. Can you clarify what you did for the pipeline route?

A: Jay Brueggeman, Canyon Creek Consulting: Only core samples and bathymetry.

C: Robert Suydam, NSB: It would be helpful to calculate the 120 dB level and the animals that might be taken there as we certainly know that bowheads will deflect at low levels of sound.

C: Jay Brueggeman, Canyon Creek Consulting: Some of the data Lori Quakenbush has collected on bowheads does not confirm that and so there is some uncertainty about the 120 dB level.

Q: (Unidentified Speaker): The number of spotted seals in Chukchi was greater than ring seals, which is what I would expect. The data Shell presented was opposite to that.

A: (Unidentified Speaker): I wouldn't trust the data because you have ring and spotted mixed in with unidentified. The unidentified number could change the species allocation.

C: (Unidentified Speaker): Given that NMFS is facing the need for some process to separate the ring and spotted seals, it may be worthwhile to work on separating those types.

Q: (Unidentified Speaker): I was curious that you didn't see any bowhead or beluga.

A: (Unidentified Speaker): They could have been out there. We were surveying a small area.

C: Caryn Rea, ConocoPhillips: We will be including some information in our summary report regarding what we heard from our sparker report. We did hear one beluga call and one or two bowheads on the recorders that weren't observed.

C: (Unidentified Speaker): One of the reasons we felt better about it was because you had the instruments out there and it would be a good way to help us fill in baseline data. The pop up data will be important information.

A: Caryn Rea, ConocoPhillips: The combination of the MMO's along with the acoustics is really compelling and we need to look at that more as we move forward in the Chukchi Sea.

C: Robert Suydam, NSB: If the hydrophones are picking up calls of cetaceans and they aren't being seen there is a potential problem in estimating take from the work in 2008.

A: Caryn Rea, ConocoPhillips: it will be important for us as we look at the data to see where calls were recorded relative to the where the activity was being conducted.

Q: Charles Hopson, Barrow: You mentioned there were two observers. What do you mean by observers? Are the MMO's agents of NMFS? If you hire them as such, then they are, in fact, federal agents.

A: (Unidentified Speaker): There were two trained marine mammal observers. NMFS requires the use of MMO's.

A: Jim Lecky, NMFS: MMO's are not employees or agents of the federal government. MMO's are hired and trained by industry.

C: Charles Hopson, Barrow: For thousands of years in the Arctic the Inupiat people have accumulated knowledge. If anyone is going to the Chukchi Sea and Beaufort Sea, they need to take that knowledge along with them.

A: Bruce St. Pierre, ConocoPhillips: Our effort is to incorporate traditional knowledge in to our program.

Q: Chris Winter, Crag Law Center: There is confusion within the subsistence community as to whether the core samples were authorized by the IHA. The interpretation was that the core samples were not authorized by NMFS through the IHA. Are the core samples covered under the IHA? What monitoring was done to assess whether those activities are having an impact on subsistence and is there any data we can get on that?

A: Shane Guan, NMFS: I don't think the IHA issued covered core sampling.

A: Bruce St. Pierre, ConocoPhillips: The core sampling was not part of the IHA application. The IHA application focused on the seismic tool.

Q: Chris Winter, Crag Law Center: The federal register described proposed activity to include core sampling and the authorization from NMFS for (unable to hear)... Is there an IHA needed for core sampling or along pipeline routes? What is NMFS' position?

A: Shane Guan, NMFS: We do not think it has potential impact to marine mammal therefore the IHA issue does not cover core sampling. There is no significant noise to impact marine mammals.

Q: Chris Winter, Crag Law Center: What is the basis for the determination that there is no impact?

A: Shane Guan, NMFS: Because it does not produce large sound sources.

C: Chris Winter, Crag Law Center: My request is to clearly set forth in the public notice that information. The community had no information that that was what NMFS' conclusion was from the public notice.

A: Bruce St. Pierre, ConocoPhillips: The application we submitted had a project description. Our caution would be perhaps to narrow it down.

Q: (Unidentified Speaker): Is there a concern at all that vessel movement associated with core sampling activities can interfere with subsistence?

A: Bruce St. Pierre, ConocoPhillips: The IHA typically has been a process for seismic tools that make noise in the water. Last year we questioned what tools would make a significant enough noise to require an IHA. Historically geohazard type surveys have not been in that realm. We disclosed those. MMS terms those an ancillary activities. With respect to vessel traffic, I don't doubt there could be some interference, we have some communication but it doesn't tie to the IHA process.

A: Shane Guan, NMFS: The federal register identifies a noise equivalent or higher than 180 dB as the activities that we take a really close look at, so we don't regulate vessel activities and other sound sources which may not reach that level.

C: Caryn Rea, ConocoPhillips: We had Inupiat communicators on vessels and in contact with communities to let them know what we were doing, where we were doing it, etc.

C: Harry Brower, AEWG: I just wanted to state for the record that ConocoPhillips did not sign a conflict avoidance agreement last fall.

Q: John Richardson, LGL: It was mentioned at outset that there was also an echosounder and sonar. What were the operating frequencies of those and were they in the range of any marine mammal in the area and was that taken into consideration for the IHA?

A: Jay Brueggeman, Canyon Creek Consulting: I don't know what those frequencies were offhand. They are in the IHA, but the monitoring was focused on the sparker because it would override any other noise if they were occurring at the same time.

C: George Ahmaogak, Ahmaogak & Associates: The objective and purpose of this meeting is to go through and listen to the monitoring report and for that report to be subject to peer review to see the monitoring is done fairly and presents good facts. If you want to get educated about federal registers, take it outside this meeting. I think you should be commended for doing the monitoring but not doing a conflict avoidance agreement was an issue. There was a consensus that the Barrow whaling captains would like to see the CAA be signed and adhered to and that negotiations be done in good faith on part of both parties. The attitude of distrust needs to go away and good faith efforts be made.

C: Bruce St. Pierre, ConocoPhillips: ConocoPhillips did not sign the CAA last year. We are pursuing a plan of cooperation to meet some of the mitigation measures to avoid conflict. We will stay at the table and work on a CAA. There are still some differences, but we will stay at the table. Regarding the comment on the 120 dB, we did file legal challenge with NMFS on that requirement. There are some operational issues that come with that and we are still not convinced that the science behind it supports the 120 dB.

2008 Monitoring Results – Facilitated Discussion

Attendees brainstormed topics for discussion regarding the 2008 monitoring results. Ideas included:

- **Robert Suydam, NSB:** Aerial surveys (Shell happenings in 2008)
- **Robert Suydam, NSB:** Understanding of takes / exposures in 2007 versus 2008
- **Robert Suydam, NSB:** 120 dB zone
- **Robert Suydam, NSB:** Overwintering hydrophones
- **Robert Suydam, NSB:** What have we learned about impacts to marine mammals in the past couple of years.
- **Bill Streever, BP:** Consistency of application, i.e. those that are doing things that produce the same sound levels. There should be consistency in what they are held to.

- **Rick Steiner, University of Alaska:** mitigation, compliance monitoring, and an additional process outside this for how to raise the bar on how these activities will be done better in the future.
- **Harry Brower, AEWC:** better definition of “take”
- **George Ahmaogak, Ahmaogak & Associates:** Using traditional knowledge to further enhance the data; acknowledgement of traditional knowledge and bridging the gap between science and traditional knowledge.
- **Robyn Angliss, NMFS:** Focal animal studies where you look very specifically at animal behavior; moving towards plotting info on seismic and animal distribution on the same map.
- **Michael Mayer, Earth Justice:** Cover some of the unknowns or things that are not clear, i.e. what are the limitations around monitoring? Cover the interagency report that came out in January 2009 expressly noting the limitations and what does that tell us about what the affects and harms might be?
- **Caryn Rea, ConocoPhillips:** In the discussion on potential exposures/takes, what does this mean to the animals? What does it mean to companies 100 miles offshore? What does it mean to subsistence hunters? Etc.
- **(Unidentified Speaker):** Discussion on integration of acoustic information and coordination of statisticians and how data will be interpreted.

Other themes of a more over-arching nature for the parking lot:

1. Mitigation
2. Compliance
3. Off site panel to recommend program improvements
4. Use of traditional knowledge
5. Implications of future permitting
6. What is the biological significance of takes
7. Integration of acoustic data and interpretation (Wednesday’s agenda has this as a later presentation)
8. The calculation of take

Questions/Answers/Comments:

Q: Robert Suydam, NSB: When we suggested coastal surveys in the Chukchi Sea back in 2006 we were especially interested in marine mammal distribution near the coast, especially near villages where they will be hunted. There is great data collected but no analysis as to how activities might impact the animals. Has offshore activity impacted marine mammal activity near the coast?

A: Michael Macrander, Shell: We have not, to date, completed any statistical analysis on the data from the Chukchi Sea. We have certainly looked at it qualitatively. The first thing that jumps out is that there are some overarching trends in terms of changing patterns of distribution throughout the season, within a season, and between seasons. For example, in 2007 we saw remarkable change in distribution of walrus compared to other seasons and compared separately to 2006 and 2008. We’ve seen some general trends of bowheads moving down shore at least as far as Wainwright. Those offer a lot of information in terms of understanding seasonal and inter-seasonal variability of distribution of these animals. We have not done a detailed analysis and we’d have to figure out a multivariate way of doing this. My sense is we may not see much, but that is my qualitative opinion.

C: Robert Suydam, NSB: It would certainly be appropriate to do some analysis and it is needed.

Q: Robert Suydam, NSB: As relates to some of the off transect sightings, was that a deadhead? What was up with that?

A: Darren Ireland, LGL: The off transect sightings included sightings such as if fog conditions had come in.

C: Robert Suydam, NSB: The overwintering hydrophones provide some useful insights and we appreciate the effort and information. In particular all those bowhead songs in December make me wonder what is going on. Is it a breeding or mating area? We need to better document that. I've heard the intent is to not put out overwinter hydrophones out again and my recommendation would be that we do keep them out. Given the results from this first year, we need additional information to see variations across years.

Q: Michael Macrander, Shell: We left recorders in both seas in 2007-2008. Beaufort recorders had an error, so no data was recovered. The Chukchi recorders did provide exciting information. For the winter of 2008-2009 the recorders are be out in both seas again and the Chukchi Sea program was expanded with an additional three recorders. We will have two years worth of data in the Chukchi. We would love to continue the recordings next year but the truth is a lot is dependent upon Shell's relative success going forward. If it looks like we will be able to drill in the Chukchi in 2010, then that greatly enhances the possibility of our continuing the program.

Q: Robert Suydam, NSB: Is there data available on the comparison of takes between 2007 and 2008? How similar is the estimated exposure between those two?

A: Michael Macrander, Shell: That should be in the comprehensive report.

A: Darren Ireland, LGL: What we tried to do in the comprehensive report was to calculate a density on the pooled years' data. There will be some differences based on this year's comprehensive report than each year's 90 day report.

Q: Robert Suydam, NSB: Has the method changed from 2006 or has it remained consistent?

A: Darren Ireland, LGL: It has been consistent using the density times area method.

Q: Jolie Harrison, NMFS: When we're talking about take estimates, the take estimates used in the application for NMFS to do its analysis are based on peer reviewed density estimates, right? As opposed to data calculated after the fact informing next year's application?

A: Darren Ireland, LGL: We still rely on peer reviewed literature articles and BWASP results for writing IHA applications. Now that there is three years of data, we are considering whether to look at using those in the future.

Q: Jolie Harrison, NMFS: Can you speak to generally how the density reports compare to the literature?

A: Darren Ireland, LGL: I don't think anything has caught my eye as very different. The densities estimated from data are different between aerial, vessel, etc. We'd need to look at a case by case basis to see if they fall within the realm.

C: Michael Mayer, Earth Justice: (unable to hear beginning of comment – no microphone used.) It may not be informing decisions on IHA but it is being used and we need to emphasize getting it right.

C: Harry Brower, AEWC: We have been asking for years to see how the marine mammals are being affected. We want some information from the monitoring and yet we still have concerns. We need ways to learn more of what is actually out there. There are other marine mammals out there beyond the five that are being listed. In terms of aerial survey information, it would be really useful to know

how the resources are being impacted. We know the resources are there to the extent we go out hunting, but how does all this seismic activity confuse the localization of marine mammals? How do you do the ground-truthing about harmful levels to each of the resources from the types of activity that are occurring? The number of take is being shown as small but the level of migration occurring right during the time of activity...that is a large number. In regards to overwintering hydrophones, we are not sure if animals are spending time in the Chukchi in the winter. We need to verify it.

C: Arnold Brower Jr., Subsistence Hunter: I wanted to remind NMFS that the presidential executive order says to consult the tribes on any activity that will impact their livelihood. No other tribal coastal government is here other than the North Slope Borough. There are five coastal communities that should be afforded a say in the process and I don't see them here.

C: Chris Winter, Crag Law Center: Regarding density estimates, what NMFS did for the 2008 IHA for ConocoPhillips _____ (unable to hear remainder of comment).

Q: Robert Suydam, NSB: There is big disappointment with the presentations in that there hasn't been an analysis of the impacts or a summary of what has been learned. We really need to try to figure out how to do that. In the 90 day report Shell used seismic versus non seismic times for density ratings and there were substantial differences. In the comprehensive report those comparisons of seismic versus non seismic went away and were replaced with above and below 120 dB. Can you explain the reasoning and process?

A: Darren Ireland, LGL: One of the things we tried to do in the comprehensive report was show greater and less than at the 120 and 160 dB zones. Because of the different sizes of sound sources we had (shallow hazard and site clearances) and data from loud sound sources (like the Gilivar), one of the alternatives was to present the data broken out by individual operation. This would, however, create a huge report, so we tried to use the SSV distances to categorize the data as occurring within certain levels. Sighting rates are listed by dB and sounds greater than 160 dB is usually seismic data. The non-seismic zone is roughly equivalent as less than 120 dB zone.

C: Robert Suydam, NSB: I think there is some merit to that, however there needs to be some real careful thought putting together data on site clearance and shallow hazards and seismic. They are very different. It may really cloud our understanding of impacts and I would encourage continuation of looking at seismic versus non-seismic and not watering it down.

C: Michael Macrander, Shell: Part of the difference is the attempt in the comprehensive report to understand a more holistic view, where the 90 day report is looking at Shell's impact in very specific situations.

C: Mike Payne, NMFS: We don't really differentiate between impacts to resources versus the impact to the availability to subsistence. The bottom line is, is there an impact to the availability of subsistence harvest? The companies work closely with the communities to make sure that doesn't happen but as you move forward you might try to think about how we might analyze the affect on the availability to subsistence users. Does deflection result in an increase in the likelihood that the availability has somehow been impacted? It is not just about disturbance to the whale.

C: Mike Payne, NMFS: We get information from industry and we try to minimize uncertainty and effects. However, getting the information from hunters about how something on a particular day did, or did not, affect their ability to go out and get a whale that day would be very useful.

Q: Jana Lage, ASRC Energy: There is a communication call center where vessels call in and work with subsistence advisors so there is communication between vessels offshore and the hunters so they can

see if there is an impact. Is there ever a presentation as to what the whalers have accomplished every year? Are they meeting their quotas? Reports by community?

C: George Ahmaogak, Ahmaogak & Associates: The concern has been brought out about negligible take and no unmitigable impact. What are the criteria? When do we determine unmitigable impacts or negligible take? There are data being gathered by harvest reports in each and every village and whether quotas were met. Right now there is a total disconnect and there is no collaboration of information and communication. All the subsistence harvest data is available. I'm not convinced today that these reports are saying there as negligible take and unmitigable impacts.

C: Bill Streever, BP: I propose the group consider a smaller meeting with a smaller group to get at the definitions. There are definitions in some of the regulations and they are all different. There is a concern about the hunt. A targeted workshop defining different levels of "take" is needed. A few have commented on lack of information on the hunt and that is one reason why BP has been supportive of the Cross Island project.

C: Harry Brower, AEWC: There are different interpretations by hunters, researchers, and regulators. We need more clarity as to what we are trying to communicate. We have multiple definitions of single terms. There are data there that could be brought in and used to answer these questions that keep coming up.

C: Mike Payne, NMFS: The Cross Island data were extremely well summarized. It seems like, at a minimum, we could determine if that dataset would be able to be utilized to make some of the decisions.

C: Maggie Ahmaogak, Ahmaogak & Associates: You have the right idea. With some collaboration between NMFS and the AEWC we might have that.

C: Michael Macrander, Shell: There is a common theme coming out here. There is frustration that industry pulls up short at drawing conclusions on impacts to hunts. As long as it is left to us we will be timid about making that conclusion. However, we do need to move forward towards some mechanism that doesn't minimize traditional knowledge but quantifies and captures on a regional basis where we can say 'this' activity produced 'that' affect. We come together and lob grenades back and forth and go our separate ways. Perhaps we need to identify taskforces of invested stakeholders to address certain issues so by the time the next open water meeting rolls around we have an answer.

C: Charlie Hopson, Barrow: During our Barrow whaling captains meeting we reported on impacts seen by whaling captains. We were chasing spooked whales and this was after the date of work over at Harrison Bay. We say these are the impacts we had, but who has the responsibility to inform whom and who addresses them? Maybe no one heard about the impacts because we got our quota. We need to let people know we were impacted.

C: Harry Brower, AEWC: We did get some comments from Barrow whaling captains that whales were acting spooked and acting different than usual. The captains didn't know which direction the whale was sitting and it was dangerous.

C: Robert Suydam, NSB: Charlie's point is something that we do hear regularly. There is a lot of documentation as to when hunts have been disturbed. The MMS started to document traditional knowledge as to impacts to availability of marine mammals. The information is out there. How we deal with it in a more formal manner? I'm not sure. The AEWC has developed the conflict avoidance agreements to make sure the hunts aren't impacted on particular dates. Our push for analyzing the scientific data is really trying to get at the question of the availability issue. Maybe there is a way to take

that information once analyzed and put it to that question. Another note... the AEWC is represented here but the other marine mammal committees aren't.

C: Caryn Rea, ConocoPhillips: What I'm hearing is that we are looking at changes in distribution nearshore and offshore but we don't have documented the time of availability of the animals. I would challenge the group to think about that moving forward. I would encourage that we capture information and data on when hunts occurred, were they successful, etc. and to wrap that in to the distribution data.

C: Bill Koski, LGL: Industry has set up a system to help communicate problems through the communication center. The AEWC and whaling captains should be made aware of it so they can report directly to the communication center.

2009 Proposed Activities and Monitoring

Shell 2009 Shallow-hazard Operations and Monitoring Plan (Chukchi Sea)

Susan Childs, Shell. Ms. Childs presented on Shell's 2009 mitigation plans. Plans were made to drill in 2009 but there were issues with a 9th Circuit court decision and the company is still waiting to make a determination as to what effect it will have. However, a commitment was made to Mayor Itta that Shell would not be drilling in 2009 so the only plans for 2009 is a shallow hazard/site clearance plan to acquire data in the Chukchi Sea that was not able to be obtained in 2008 in the Burger area. Weather and ice permitting, Shell intends to return to Burger to gather more data. Other prospects may become part of the program as time and weather permit. All data to be collected is from an area at least 60 miles from the shoreline and 140 miles from Barrow. Shell will continue biological baseline monitoring in the Chukchi and Beaufort Seas including some joint programs with ConocoPhillips and the University of Texas (COMIDA). There will be an ecological characterization at Chukchi priority prospects including benthic sampling, bird and mammal observations, fish trawls, and physical data acquisition. There has also been an air monitoring station in Wainwright to support 2010 major source air permitting that Shell has cost-shared in.

The proposed mitigation includes:

- Collaboration and communication with whaling associations, the marine mammal commissions and Chukchi communities
- Communication protocol for avoiding conflicts with subsistence users
- Shell's current plan is to utilize the closest community (most likely Wainwright) as a communication center for 2009 operations at Burger
- There is a plan of cooperation and work is currently underway for a 2009 conflict avoidance agreement with the Alaska Eskimo Whaling Commission
- There will be subsistence advisors based in Chukchi Sea villages and Kotzebue as necessary, providing a source of traditional knowledge.
- There will be marine mammal observers aboard the energy vessel which (either two 10 cubic inch guns or sparker technology will be utilized). The appropriate number of marine mammal observers as recommended by NMFS and AEWC will be utilized.
- There will be a robust marine mammal monitoring protocol
- Real time ice and weather forecasting will occur

Susan acknowledged Robert Suydam of the North Slope Borough and his recent acquisition of his PhD.

Questions/Answers/Comments:

Q: Harry Brower, AEWC: You indicated that you just received the traditional report last week. Will it be distributed?

A: Susan Childs, Shell: Yes. It will most likely be on the website as well.

C: Cheryl Rosa, NSB: I have heard that Shell is not planning on participating in the communication centers?

A: Susan Childs, Shell: The only thing happening in the Beaufort Sea by Shell is some acoustic work. It remains to be seen within the Chukchi Sea whether we will work with point Hope and Point Lay but right now Shell's work will be off of Wainwright and that is the focus.

Q: Cheryl Rosa, NSB: We've heard over past few years several concerns from whalers about operations occurring in darkness, poorly trained MMO's, examination of dead animals, etc. How has the proposed mitigation measures changed to take those in to account?

A: Susan Childs, Shell: We believe we have implemented protocol for trained observers and Shell has put forth the list to the AEWC to review.

Q: Cheryl Rosa, NSB: Is there evidence that the mitigation plan has evolved?

A: Michael Macrander, Shell: Shell has been aggressive in expanding the number of MMOs in our programs and on our boats, mainly in the 3D program. We heard criticism about standards and training of MMO's in 2007 and 2006. We expanded the training program in 2008 and instituted a clearing process with AEWC of providing the names of people who will be MMO's. We are putting a lot of effort in to compliance assurance. We are making sure vessel operators, etc., are familiar and up to speed with regulations.

A: Susan Childs, Shell: If there are continuing concerns, this is where Shell would welcome assistance from a small group committed to helping us improve.

A: Robert Suydam, NSB: You are invited to come up and talk with us regularly about that. We do it with BP on Northstar.

Q: Robert Suydam, NSB: Are you going to present more on what monitoring is going to happen?

A: Michael Macrander, Shell: Yes, we will be presenting more information.

Q: (Unidentified Speaker): Can you provide clarification on analytical methods used for determining estimated take in the IHA application?

A: Darren Ireland, LGL: I believe we used the effort recorded and the number of sightings reported within the water depth. Information was separated by season, water category, effort and the full number of sightings is given. FO and GO values there that were applied to that effort are available.

C: (Unidentified Speaker): There aren't FO and GO values in that and I would be interested in the references for that.

A: Bill Koski, LGL: The FO and GO can be found in the 90 day report.

Q: Catherine Berchok, NMFS: Verification was only done at the beginning. Are you doing it throughout the season each year?

A: David Hannay, JASCO: In regards to verification, we are manually processing a portion of the data and comparing it to the automated results. The effectiveness of those systems is dependent upon a lot of things including ambient noise levels, presence of other species, etc. It is still a work in progress. We

are always trying to improve the detector. It is very location dependent; it might work well in one location and might not work as well someplace else.

Q: Layla Hughes, WWF: Did Shell submit an application for an IHA for this coming season?

A: (unable to identify speaker): Yes.

C: Layla Hughes, WWF: A recommendation might be to have copies of the IHA prior to this meeting.

A: Candace Nachman, NMFS: The proposed IHA should be published the first week of May and will be on our website.

Q: Layla Hughes, WWF: When do you expect to submit your exploration plan for 2010 drilling?

A: Susan Childs, Shell: Pretty soon.

Q: Layla Hughes, WWF: Will it be a multi-year?

A: Susan Childs, Shell: No, one year.

C: Bill Streever, BP: Regarding the automated call processing subject, I fear that the question posed earlier might be implying that manual call processing is assumed to be better. We know, from repeated processing of the same data set, it is sloppy. At least with the automated system, it may be wrong, but at least it would make the same error every time. I wouldn't say the manual standard is the gold standard to go by. What bothered me about the answer is that it doesn't cost much to reprocess past data but if you do that, the small cost is reprocessing but now you have a new data set and have to do a reanalysis, then you have to do report, and pretty soon it has snowballed.

C: David Hannay, JASCO: I agree you need to be careful. My comment was more about looking at seasonal variations and making sure you are using consistent methodology year to year.

Michael Macrander, Shell, 2009 monitoring program: Dr. Macrander presented on the 2009 Monitoring Program. One vessel with a relatively small sound source will be operating 70 miles offshore with on-board MMO's. The Chukchi and Beaufort acoustics programs are going to be repeated, even though Shell has no operations in the Beaufort Sea. We value the data sets and it looks like an opportunity to collect meaningful data in a year with limited operations in the Beaufort Sea. The Chukchi Sea program is a joint program with ConocoPhillips. As a result of the lease sale, we know the area where operations may be focused in the coming years, so it makes sense to focus on some of the prospects. We hope to gain specific understanding on behavior and area usage around Shell, ConocoPhillips and some of the other industry partners areas in the Chukchi Sea and to maintain a 'theater wide' approach to the program to be able to answer some of the questions.

In looking at data from the past few years the sounds from near shore did not propagate into the near shore recorders, so we are looking at collapsing the near shore recorders and splitting the difference and moving the near shore recorders out to the prospects in an effort to not have to blanket the bottom of the Chukchi with recorders. With ConocoPhillips the ecological characterization at Chukchi priority prospects will include benthic sampling, bird and marine mammal observations, fish trawls are being considered, and plankton and physical data acquisition. There are ongoing conversations amongst industry on co-locating efforts and collaborating with COMIDA. There will be no aerial monitoring program in 2009 since there are no operations conducted in the Beaufort. The Chukchi Sea program has been limited to a near shore program and it doesn't seem like we will gather a lot of data on the impacts to an offshore program by utilizing a near shore aerial survey. A 2010 aerial program remains to be seen.

Questions/Answers/Comments:

Q: Robyn Angliss, NMFS: In 2008 work was done on focal animal studies on behavior and harassment. Will you pursuing this in 2009?

A: Michael Macrander, Shell: That's part of what we do every year.

C: Robyn Angliss, NMFS: If people are doing focal animal studies, you are not also doing safety radii. The recommendation is that you have two different people doing those.

C: Robyn Angliss, NMFS: If you are interested in having someone review the fish study design, I would be happy to pass it along. I like the idea you are considering adding that.

Q: Robert Suydam, NSB: Could you show us where you are intending to do shallow hazards and site clearance work?

A: Michael Macrander, Shell: (Dr. Macrander pointed out the three areas on a map).

Q: Robert Suydam, NSB: How do you intend to do those same types of things at Crackerjack and the other location?

A: Michael Macrander, Shell: We have recorders at these other areas. They won't be as dense but they are similar to arrays we had in data presented for 2007.

Q: Chris Winter, Crag Law Center: I have two questions. One, regarding the set of objectives for the monitoring program, there are some questions as to its efficacy. Is there a design to test efficacy of the mitigation? Two, is there any plan to do geophysical work in Chukchi Sea?

A: Michael Macrander, Shell: On question one regarding evaluating the efficacy of the mitigation measures, there is a lot of data collected and I would encourage you to read comprehensive report. We have data collected from additional monitoring vessels on either side of the program. Whether it has been specifically enunciated in the report, the data is there.

A: Susan Childs, Shell: Regarding the second question, the only thing we plan to do this summer is shallow hazards work over Burger. If the ice is cleared from Burger, we will stay there. If we can't, we'll move over to Crackerjack.

Q: George (unable to identify last name): Will the physical studies also cover the current as it supports the feeding and migration of the mammals?

A: Caryn Rea, ConocoPhillips: Yes, there will be an acoustic Doppler mounted to the vessel to document that.

Harrison Bay 2009 Open-water Seismic Operations and Monitoring (Beaufort Sea)

(This presentation was cancelled because of the cancellation of the proposed project.)

Monitoring for Northstar 2009 and Liberty 2009 Activities (Beaufort Sea)

Bill Streever, BP. Dr. Streever presented on the Liberty activities for 2009 indicating BP has started work on a drilling sound model. People have heard drilling noises before and at the request of the AEWC and NSB, BP agreed to take a look at it. JASCO is working on the project with BP. Once the modeling has been completed, monitoring for drilling noise will begin when drilling starts. Other activities include:

- The satellite drilling island is being expanded in order to handle the drill rig that will be coming in.
- Bridge superstructure work is being done at the Sag River Bridge
- There is intent to transit a couple of barges with the drill rig to the satellite drilling island. Two barges will be used (40 x 105 foot) and four tugs will bring them around the main part of the passage and maneuver inside the barrier islands. The goal is to deliver the rig and be out by August 15th.
- No seismic will be occurring this year. The intent is to start drilling in 2010.

Questions/Answers/Comments:

Q: Caryn Rea, ConocoPhillips: You are targeting August 15th to get up to Endicott, but what time does that mean you'll be leaving and transiting through the Chukchi?

A: Bill Streever, BP: Following ice break.

Bill Streever, BP. Dr. Streever presented on the Northstar activities for 2009. The 2009 activities will look very much like those that occurred in 2008 with approximately the same number and types of activities. Northstar monitoring activities include:

- Seal monitoring
- Seal site fidelity work
 - Photographic records
 - Hair/tissue sampling at select locations (DNA)
 - Safety, disturbance, permit issues need to be considered – may be able to get over hurdles but probably not for the 2009 basking season (May/June timeframe?) but maybe 2010
- Archive 2008 data (It has been challenging to apply the analysis on 2008 due to air gun noises. There are things that could probably be done, but the most straightforward thing would be to deploy the 2009 array and archive the 2008 for now).

C: Robyn Angliss, NMFS: There is a Canadian project slated to occur again in 2009 so you may have that issue again.

- Switch to auto processing of calls starting 2009. We have employed a lot of people on a part-time basis listening to whale call recordings. It looks like the automated processing is a better way to go; it is more consistent. Will most likely do some comparisons on automated and manual comparisons.
- Find and if possible shut down mystery sound
- Deploy array (full array in absence of seismic surveys, or 2007 array if seismic surveys underway)
- Helicopter measurements (if permit modification is possible) – stipulations in LOA and NSB ordinance, air permit and corps of engineer permit, so BP may not be able to do this but it is something we are willing to look at.
- Visual boat-based observations of bowhead whales (limited effort of five days). (If you don't hear a call doesn't necessarily mean there aren't any whales there, so there is an ongoing thought of correlating this but past information shows it may not prove useful.)
- Cross Island work with Michael Galginitis will continue

Questions/Answers/Comments:

Q: Jay Brueggeman, Canyon Creek Consulting: I'm wondering if you've thought about coordinating your calls with the satellite tagged bowheads?

A/Q: Bill Streever, BP: That would be very cool. It is definitely something to look at, and looking at the BWASP data as well. How many are transmitting?

A: Robert Suydam, NSB: Eight are transmitting.

C: Robert Suydam, NSB: The idea of archiving 2008 data sounds like a great idea and I'm supportive of that. I think it is important to archive the 2008 data and am also hopeful that we can understand cumulative effects from all the industry in the future. I'm pleased that you are doing vessel boat based observations. The NSB pushed BP initially to use acoustic data to look at impacts at Northstar. As we thought more about that we realized we were missing a big part of the picture. The combination of visual and acoustic is important.

C: Bill Streever, BP: I feel like we've learned a lot from the various work that has gone on and when I try to think about what we've really learned, we've learned a lot about how to do it and the methods more than what we've learned about bowheads. Acoustic data alone can really paint you in to a corner without the added information from visual data.

Q: Paul Stang, Stang Consulting: Two questions: one, how is Laos operating? And two, how many years of production are left on Northstar?

A: Bill Streever, BP: Laos is a league detection system purchased for Northstar. It is working well as far as I know. Regarding your second question, who knows? It is dependent upon price of oil and new innovations and technology.

C: (Unidentified Speaker): I would like to see all of you continue to do manual checks once in a while to make sure you are producing results (unable to hear end of comment).

C: Harry Brower, AEWC: There was an indication that the whales were going quiet in one set of data but I'm not sure an answer was ever researched.

A: Bill Streever, BP: I think what you are talking about is the BWASP data. It hasn't been completely forgotten, but I heard rumors that MMS was looking at the BWASP data.

C: Robert Suydam, NSB: We did actually. The analysis is almost complete. The report should be done within the next couple of months.

C: (Unidentified Speaker): Regarding analyzing the hole within the BWASP data, I wanted to take a look at it to see if the BWASP data is really the best data source to address that large of a question?

Q: Bill Streever, BP: Normally at this meeting we decide what is going in to the LOA but I'm not sure we have done that this time. Do we do that offline?

A: Candace Nachman, NMFS: Yes, we will do that off line.

Sound Source Verification Testing

Shane Guan, NMFS. Mr. Guan presented on sound source verification testing. The MMPA permit currently requires industries to conduct SSV tests for all seismic sources and vessels using OBH recording systems prior to seismic surveys. Reports must be submitted within five days of completing the test. The report includes empirical distances from the air gun array and other acoustic sources utilized to

broadband received levels of 190, 180, 160 and 120 and radiated sounds versus distance from the seismic activity. The purpose of the testing is to establish more realistic safety zones, ground truth the modeled safety zones provided in MMPA permit applications, and increase NMFS' understanding on overall anthropogenic noises from activities.

Mr. Guan presented information on modeling versus measurements based on location and air gun array by received levels for years 2006 through 2008. Measurements throughout those years are similar at the 180 and 190 range but there is more variation at the 120 dB range. Mr. Guan also presented information on the results of SSV tests for vessels. There was quite a bit of variation in the results for the received levels between 120, 130 and 140 dB.

Conclusions drawn included:

- Discrepancies between modeled and measured values of RL in both Chukchi and Beaufort seas for all air guns.
- Variations of sound propagation under different oceanographic regimes: more or less different propagation ranges for same air gun arrays in the same ocean basins in different years.
- Large variation of vessel noise propagation ranges from the same vessel (*MV Gilavar*) in different years.
- From the best fits models, sound source level of *MV Gilavar* seems to have little change over the years (169.1 – 173 dB *re* 1 μ Pa).

Points for further discussion might include:

- SSV testing database for acoustic sources including vessels?
- If so, what needs to be included (source level, air gun configuration, etc.)?
- Standardization in SSV testing? (e.g. percentile to establish the fit curve or equation, vessel speed, range of frequency, etc.)
- When should a specific sound source be re-measured (change in location, annually, etc.)?
- Cumulative vessel noise analysis? Total noise budget in the survey area?

Questions/Answers/Comments:

C: Bill Streever, BP: The joint industry program on marine life and underwater sound is working on a standardization of method that would be a good starting point for this.

Q: Bill Streever, BP: Regarding the five day requirement, in the permits it often says we have to submit results within five days of completion and then we have to decide what is a "completion" of the test? Is it five days from the date our computations are finished or five days from when we pull the equipment? Requiring it more quickly isn't helpful to us.

A: Shane Guan, NMFS: The five days is from when you finish all the measurements. We would like you to write up a simple report after your calculation is finished.

Q: Bill Streever, BP: Regarding focus on sound pressure levels, I'm curious if, when and how, NMFS intends to look at SELs instead of SPLs.

A: Shane Guan, NMFS: I think we are still working on that and will probably have something on that soon.

A: Jolie Harrison, NMFS: We have been working on it for a while and it is progressing. We will probably be taking dual criteria in to consideration.

Q: David Hannay, JASCO: I wanted to point out there is quite a bit of variation on the SSV vessel radii and a lot of that is due to the use of the metric. Sometimes you get a very short blip and sometimes a drawn out variation. As an acoustician, I believe the SEL metric is the way to go. It is really difficult to compute RMS source levels. There is not a lot of benefit to using the curve approach.

Q: Robert Suydam, NSB: I support the idea of developing a database for SSV tests. I don't understand the SEL and SPL differences, but the data archived will be useful. You showed there was a lot of variation, how does NMFS deal with that variation in the SSV test if it is used to set the safety zone?

A: (Unidentified Speaker): This is where standardization would be helpful. Currently we use the most conservative curve or received level range.

C: John Richardson, LGL: There is some agreement that the SEL measure will ultimately be agreed to be the better measure, but it is not the official standard so far. I do believe most, if not all, of the recent measurements in the Alaskan Arctic have included SEL measures as part of the SSV process. That information is available when, or if, it is needed. Another thing that would be good to come to agreement on is how the curves are fit to the data. There needs to be some more consistent way of doing that. It would be nice to have those curves in the reports for use by anyone making use of the SEL data.

C: Bill Streever, BP: If there ends up being a separate workshop about definitions it would be good to try to organize a tutorial or seminar to help the rest of us understand SELs and SPLs.

C: John Richardson, LGL: There are a couple, probably more, studies in which people have attempted to derive estimated cumulative sound exposure levels received by an animal whether it is a hypothetical animal or a more realistic animal moving in some fashions. There are efforts to figure out those types of things but they are in the early stages of development.

Q: Charlie Hopson, Barrow: Are we hurting the whale or the plankton when they shoot out there in the feeding area? Do we have information that when they shoot they are killing any animals?

A: Bill Streever, BP: I don't think anyone has actually run tests on what the whales are eating. One thing that seems consistent in the data is that air guns are not killing plankton at any great distances. About 10 feet out from the air gun there was about a 30% or so mortality as the worst case scenario and in some cases animals could be well within one meter of the air gun bubble and there was 100% survival.

A: Michael Macrander, Shell: We've also done an evaluation. The number that I remember from a few studies that two meters is the closest number that have shown some impacts and that was not mortality but a few cases of reduced vigor.

C: Robert Suydam, NSB: Charlie's question is one heard frequently from hunters. The other important question is, is the distribution changing? Bowhead, in particular, relies on aggregation of distribution. We need more information.

Monitoring and Reporting of Dead and Injured Marine Mammals

Candace Nachman, NMFS. Ms. Nachman presented on the monitoring and reporting of dead and injured marine mammals. IHA's have included a condition that immediate shutdown be conducted if an injured or dead marine mammal is sighted and the PR be contacted and air gun operations suspended.

Problems with the condition include:

- Pinniped carcasses were commonly sighted in near shore project survey areas
- Condition required immediate shutdown no matter the cause of death

- Problems with immediate notification on weekends and after core business hours

A solution for the 2008 season included a modified condition to clarify when an emergency shutdown was required. Points to be clarified included: areas (distance from activity) for shutdown, separating out injured versus dead animals, MMO certification of animal, providing additional points of contact to deal with time zone issues, and outlining instances when NMFS approval was required to restart air guns.

Possible future solutions might include a requirement to contact NMFS of stranded marine mammals within a reasonable time period (24 or 48 hours after sighting) and outlining possible types of information that should be collected including species or description of animal, condition of the animal, location and time of first discovery, observed behaviors if alive, photo or video if available.

Cheryl Rosa, NSB. Ms. Rosa presented on the NSB stranding agreement. The agreement is in place as of October 2008. Three dead bowheads were reported in 2008. In the last 30 years there have been one, or possibly two, reports of bowhead whales. We had the ability to respond but not until the end of the open water season and there were issues with reporting and examination of dead stranded animals.

There was an October 13, 2008, report from Shell MMO's of dead floating whales. Photos were filed, which were useful. There was an October 20, 2008, report of a whale head that washed up in Barrow. It could have been the head of the whale from the previous report but it couldn't be verified. It is not an unusual occurrence for the head to detach as stomach gases eat away at the thoracic area releasing the head from the body.

The benefits of stranding response/necropsy will allow:

- Biopsy will allow tracking and provide useful information
- Necropsy can allow for determination of cause of death
- Impacts from a variety of sources could be more fully assessed
- Scientific data collection
- Carcass marking can help avoid double counting dead marine mammals.
- Hearing data is of high priority in whales

The plan is for aerial monitoring and shoreline surveys, helicopter and boat based responses in both the Beaufort and Chukchi Seas. There is a need for cooperation between NMFS, industry operators and the NSB to include timely communication, funding specific to shoreline surveys and industry activities, and NMFS summary of Level A take reports post open water season.

Questions/Answers/Comments:

Q: George Ahmaogak, Ahmaogak & Associates: Was the tongue in place completely or was it gone? When the predators are chasing them they take the tongues.

A: Cheryl Rosa, NSB: On the October 20, 2009, sighting we couldn't assess the tongue although there were killer whale marks on the base of the skull but they appeared to be post-mortem. It is hard to say on that one. On the October 13, 2009, sighting, it was upside down and I read nothing in the report about the tongue being gone.

Q: Robyn Angliss, NMFS: I am excited that you are authorized to do stranding response. This is very useful nationwide. I'm curious about the cost and whether you've already worked that out? What kind of costs are there?

A: Cheryl Rosa, NSB: It is expensive; we budgeted about \$100,000. About half was for aerial surveys. Helicopter charges were through the roof.

Q: Robyn Angliss, NMFS: The reports of dead animals that industry sees are not getting to the Alaska Region.

A: Cheryl Rosa, NSB: It is a database problem.

Q: Caryn Rea, Shell: Will there be guidance given on what information you want? Have you put any thought in to what marking the animals might look like?

A: Cheryl Rosa, NSB: We want to avoid speculation, especially when you are not qualified to make a call. For marking, there is something along the lines of paint gun blotches that can be used.

C: Bill Streever, BP: There is a marker for livestock and we also have the MDSD sheet on it!

C: Jolie Harrison, NMFS: I want to make two clarifications: 1) there was reference to Level A takes. A Level A take is considered harassment, differentiated from mortality. Level A is an injury. 2) Be cautious when classifying these as "takes."

C: Mike Payne, NMFS: The Level A form under the stranding network is different than a "level A Take" under the IHA program.

Q: Bob, (unable to identify last name or organization): Tissues for biopsy (unable to hear remainder of question).

A: Candace Nachman, NMFS: You need a scientific research permit to stop and take samples.

C: Mike Payne, NMFS: If you received a letter of authorization under the stranding program you can do it.

C: Robert Suydam, NSB: Because the IHA says you have to examine the dead animals it gives authorization to industry.

C: Mike Payne, NMFS: We'll figure it out and get back to you.

C: Bill Streever, BP: May be different for the bowhead than the non-listed species.

Q: Layla Hughes, WWF: If the dead mammal is miles and miles away it doesn't make sense to have the protocol triggered. How do you take in to account an animal was injured and then traveled a great distance before it was spotted? The IHA basically requires the MMO to determine if the animal has been dead for 72 hours and cause of death ... are they trained in that?

A: Candace Nachman, NMFS: The area within the operation area of the 24 hours within the 160 level. MMO certification has to be done by the lead MMO with the most biological background. It is our understanding that with experience and training they would be able to do that.

C: Jolie Harrison, NMFS: (unable to capture comment)

Q: Jay Brueggeman, Canyon Creek Consulting: To follow up on the topic of when NMFS looks at taking samples, please also take look at marking because we can't really touch an animal. We need to have some clear guidance on how to respond to the NSB request to gather this information. We do our best to avoid animals, so we need clear guidance.

A: Cheryl Rosa, NSB: As soon as we get some clear guidance we can give more guidance.

Q: George Ahmaogak, Ahmaogak & Associates: Is there a process for disposal? We don't want it drifting to the villages bringing polar bear problems.

A: Jim Lecky, NMFS: Regarding marking animals, we are going to look at including that as a condition of monitoring because it informs the process.

A: Cheryl Rosa, NSB: The plan was to use the barrier islands well away from any community.

C: Susan Childs, Shell: Marking is a very good idea, especially if you don't have to get off the ship to do but we'll have to figure out how we'd take a sample from a big ship because then it becomes a safety issue.

2009 Monitoring – Facilitated Discussion

Robert Suydam, NSB: I'd like to make a quick announcement. I know that many folks here in the past couple of days are relatively new to the process and there is an opportunity tonight to learn more tonight on a show airing on PBS about whales throughout the Arctic and the importance of beluga hunting especially to Point Lay. It airs at 8:00 p.m. on PBS.

Robert Suydam, NSB: Regarding aerial surveys and the proposal to not have any aerial surveys in the Beaufort and Chukchi Sea: In 2009, with the relatively little industrial activity that will be occurring, it seems like a great opportunity to collect data when there are relatively few sounds being put in to the ocean. I would really recommend aerial surveys be done if at all possible. It seems like we are coming to rely more and more on acoustic data to better understand the general distribution and relative abundance but there is a problem using only acoustic data. When we just listen to animals, we might sometimes be missing things. Animals may not be calling and just swimming through the sea and we may not be picking them up. We need to do something more than just listening to animals. MMO's provide some data but there are limitations. This especially applies if Shell is going to be doing shallow hazard work and site clearance work at Crackerjack and Shoebill. There aren't many hydrophones nearby and so again, we need to push to understand what impacts there are, not just from large seismic work but from shallow hazard work as well.

Susan Childs, Shell: I have a question for Michael. From the slide you showed yesterday, is it Shoebill that has hydrophones missing?

Michael Macrander, Shell: The placement of the recorders is subject to negotiations between the parties that are cooperating and we are looking at multiple priorities as to what data are important to get. Certainly understanding the large scale movements near shore is a priority and the location of our primary prospects is a priority. We need to build a base level of understanding of the ecological resources and we're still debating. One option being discussed is do we put two more out there and if so where do they come from? We would welcome input on that.

Robert Suydam, NSB: Maybe there are some other alternatives.

Harry Brower, AEWC: I have similar comments and concerns to Robert. It seems like it will be a quiet season but there will be some activity there and in my mind that is an important time to collect data for comparison between when there is activity and when there is none. Also, it is important to have the other commissions here and have their voices and concerns heard. We are so focused on the research but we are not seeing the cumulative impacts that are occurring and that aren't being mentioned in these discussions.

Michael Macrander, Shell: It is certainly our view that we see value in aerial surveys. The aerial has been important in collecting data, rather than being a specific attribute of a monitoring program that we are going to be doing this year. Shell welcomes input and we recommend putting it in writing with the goals that you recommend. I also recommend not just addressing it to Shell.

Susan Childs, Shell: I second that and the quicker the better.

Michael Macrander, Shell: It gives us something to take up the chain about your voices being heard and your opinions being expressed. I'll be frank and open that it will be a very hard push.

Harry Brower, AEWC: There are more than just the bowhead whales out there that need to be monitored in the sawtooth aerial surveys. We learn a lot from the data collected but we don't really understand the affects the operations are having on the resources, or impact to the communication between animals and the problems.

Charles Hopson, Barrow: NOAA and MMS, is anyone watching the health and welfare of the animals out there? Is there funding to monitor the health and welfare of the animals? As a whaling captain I have to answer AEWC and the International Whaling Commission. Am I responsible to report dead animals? What kind of funding do you have for the health and welfare of the animals that are floating around dead?

Jim Lecky, NMFS: That is one of the reasons we are having this monitoring meeting - to collect information about the affects to the whales. We are trying to expand our stranding network to collect information from stranded animals to learn what the causes of those strandings are. Ultimately the best measure is what is the population doing and we haven't had a population count for some time. I understand there is one in the near future. That will be our best measure. In terms of stranded animals affecting the International Whaling Commission - in the next go around (which occurs about every five years) they will assess that information and make a decision about sustainable levels of harvest.

Q: Charles Hopson, Barrow: I wasn't talking about monitoring; I was talking about the health and welfare of the animals. Is there funding?

C: Cheryl Rosa, NSB: I think Charlie is referring to the health of individual whales. It does seem like NMFS is willing to work with us on stranding. We collect and work with subsistence hunters to collect and archive samples. Unfortunately we haven't had any funding for several years. MMS has had our beluga health assessment program in Alaska the last three years and they have failed to fund that now. With no one looking at dead stranded animals and the whales collected through subsistence hunts, there is a disconnect there. I would like to encourage some type of plan for doing that. We are happy to work with MMS, NMFS, and with anyone that wants to help push that along. It is valuable. People want to know what is happening to the whales, not just the population but individual animals.

C: Mike Payne, NMFS: Yesterday a question came up about a process for collecting samples. I asked Barb Mahoney specifically to talk about the process of sampling.

C: Barb Mahoney, NMFS: The stranding agreement with the NSB authorizes them to collect and deal with stranded animals. They will be receiving a letter that they can deal directly with endangered species. They can have co-investigators to biopsy and collect samples, such as MMO's, under some paperwork with authorizations. Full necropsy of bowheads can also be done; it just needs to be authorized.

Q: Jay Brueggeman, Canyon Creek Consulting: What is the process that would be followed by private contractors to work under the NSB authorization and have you worked that out? The season is rapidly approaching.

A: Cheryl Rosa, NSB: We will have to discuss that internally. We will do what we can to make it work but there could be some issues using folks we haven't trained, etc.

Q: Robyn Angliss, NMFS: It is going to be a quiet year for Shell and ConocoPhillips. It will be a fantastic opportunity to collect data. Michael, you said it would be helpful to get a list of questions on analysis. I would be happy to do that. How soon would they like to have that list? Within a couple of weeks?

A: Michael Macrander, Shell: Yes.

Q: Jim Wilder, NMFS: To follow up on Cheryl's statement on the MMS study that has been unfunded for past three years, what was the name of that study?

A: Cheryl Rosa, NSB: Bowhead Whale Health Assessment.

C: Robyn Angliss, NMFS: The other thing we can do is spend some time on what will happen in 2010 and beyond. I hope we can make some progress on the monitoring issues on that over the next year.

C: Charles Hopson, Barrow: I need to make a comment. I was an MMO for the Liberty project and the MMO's kept running in to the same dead seals. In my culture you don't just leave the dead animal lying around. I wanted to take the dead animal to the beach. We didn't even have the ability to put a hook in to it and drag it to the beach for other animals to eat. It is not right. We need to have the ability to hook it and drag it to the beach. We need to make adjustments to how we do this.

C: Susan Childs, Shell: For two years Shell has been hosting meetings with Marine Mammal Commission trying to keep those folks in the loop on everything we do and specifically our transit that started in 2007. We did just give Manilliq some seed money to form a consortium for the entire Arctic.

C: George Ahmaogak, Ahmaogak & Associates: A consultation process is what you are talking about when meeting with the commissions to detail your plan of operations to see if there is any conflict. It should be mandatory that these meetings take place. I think the regulators, after having seen these meetings and the consensus that comes out in forms of mitigation, that it is the bottom line in doing away with the adverse impacts. At the end of the day after the consultations there are terms of agreement where subsistence would not be conflicted and if they see any problems with the plans of operations and they'll say so. Breakdowns and disconnects happen. To the regulators and federal agencies requiring these consultations, I would like to invite them to go attend the meetings where the operators are required to go out to each and every village. There is a lot of rancor and uneasiness. The disconnect is the federal regulatory agencies are not paying attention and saying things that must be done and yet they are not there to see things. The oil and gas industry means well and they are trying. After the plan of cooperation you go to eight to ten villages and this is a tedious process. You'll come up with a plan of cooperation and the hunters will say one thing. You agreed to that but then when you get to the other side of things like the AEWC. Whatever was agreed to in the villages cannot be done because of the conflict avoidance agreement. I'm not knocking the Conflict Avoidance Agreement, it is important, but then things change and industry is put on the spot. They may have to give to one to please another. The monitoring program is such that it should be where you can analyze these agreements that are made and monitor how well AEWC and industry are coming up with their conflict avoidance agreement.

C: Jim Lecky, NMFS: I agree that we should reach out and hear from the other commissions. I appreciate advice to visit North Slope, and I would like to. We did talk about trying to transition in to a more robust process at the beginning of this meeting and this relates not just to the peer review process but more.

Q: Robert Suydam, NSB: George's suggestion to involve co-management organizations is a topic that has been on the table since 2006. So at the next open water meeting will NMFS take the lead in coordinating with these other commissions?

A: Jim Lecky, NMFS: I think the idea is good. I don't know how to make it happen but we need to figure out internally a good way to involve them.

C: Susan Childs, Shell: Regarding tagged seals at Kotzebue, the seal committee puts out a good map. Kathy's email list sends it out. It's on the website too.

Q: Michael Mayer, Earth Justice: Regarding collection of discovered carcasses, I hope we keep advancing that effort. We are finding animals but are we figuring out what is contributing to their death or injury? Regarding the Harrison bay open water discussion, is there a request for IHA?

A: Candace Nachman, NMFS: An application was submitted but it will be withdrawn soon as no activity will be occurring.

C: Darren Ireland, LGL: It is an interesting point being made that no one is looking for dead or injured animals out there. It is one of the primary functions of the MMO's. We have 30 to 40 MMOs on boats throughout the season.

Q: Bruce St. Pierre, ConocoPhillips: Regarding the status of the seismic EIS that Ken was working diligently on, can you give us an update?

A: Mike Payne, NMFS: Ken had been working on the EIS for a number of years. He is still working on that. He is in the final stages of producing a graph on the EIS. There will be an internal review and I don't know (and don't want to presume) when it will be published. The scope of the EIS is almost four years old. We may take a hard look at supplementing it. If it changes dramatically from what is in the draft we may have a public review of the amended EIS before we go final. The 2009 season is giving us a break. One of the things that EIS does not cover is drilling. At the time its focus was seismic and now there is a question about drilling.

C: Robyn Angliss, NMFS: On the topic of focal animal studies, the concern is that one of the reports included some results of some detailed behavioral information on animals near vessels. Focal animal studies should be carried out independent of the observer watching the safety radii. We need to make sure that it is done independent of the primary survey effort. Also, I couldn't find any place in the documents where information on received levels was put in the same map as animal sightings. Co-occurrence of seismic and animal sightings is not plotted. A more thorough job of integrating industry activities along with the distribution and behavior of the animals would be helpful.

C: Darren Ireland, LGL: The behavioral data included are behavior at initial sighting and the closest point of approach and if the animal is re-sighted. The observers do not do focal animal observations because they would be pulled from observing the safety radii. There are some difficulties in plotting received levels and animal sightings together on the same map because the interpretation of it on a single map would be pretty flawed.

C: Robyn Angliss, NMFS: Based on looking at the maps, the 120 dB zone would be beyond the scale of the map and in many cases it would be informative to put it together in one place. It doesn't provide a full picture when scattered throughout the report. Some inventive ways of putting the information together would be helpful.

C: Jay Brueggeman, Canyon Creek Consulting: Plotting a moving target is difficult. Maybe a solution would be to assign a unique symbol to all animals that fall within a given zone. If it turned out the animals that were within the sonification zone were not covering too large of a time period, you could give each animal a symbol showing which were in and which were out of the zone as the ship passed.

C: Jim Wilder, NMFS: This past season we initiated a new in-season prototype management system with Fish and Wildlife and MMS to meet at least once a week to plot the locations of marine mammals

that have been observed and the seismic vessel locations to keep a handle on situations that might be occurring.

Michael Macrander, Shell: Dr. Macrander presented on the 120 dB range issue. Shell is interested in the issue of 120 dB and what affects, if any, can be seen within this range. There are people that are collecting information that can help inform the understanding of this issue. The issue arose out of statements and observations made by hunters that deflections occur a good distance away from a seismic vessel and from a study done in the late 1990's that used aerial data to plot information about the 120 dB range. Shell's activity in the past couple of years has included looking at collecting information that will continue to inform the consideration of what decibel levels are important. After discussions at the Open Water meeting yesterday, several attendees went back and pulled out slides and graphs that would be relevant to the discussion of the 120 dB range.

The first graph presented was from Susanna Blackwell's presentation on Monday. The black dots illustrate plots of BWASP data that has been conducted for a number of years. The data is from 1998 to 2004 and 2007 and 2008, all of which are characterized as low ice years and therefore provide the most comparable data to the 2008 season. The lines represent the 90th percentile, the median distance from shore and the 10th percentile. The gray dots illustrate the entire years worth of data for the acoustic program that came from Shell, BP and Pioneer/ENI recorders during 2008. Seismic activities weren't going on throughout the season, so what you can't see from this static slide is the hole that may have occurred when operators were conducting activities. What you can see is the vast majority of migration lies within the band of the BWASP data.

The next slide shown was from Darren Ireland's presentation on Monday. The black triangles illustrate bowhead whale sightings that occurred during seismic between 120-160 dB. The green dots are bowhead whales exposed at less than 120 dB. The grid areas illustrate shallow hazard activities and the yellow illustrates seismic activities. The white triangles are bowhead whales that were not exposed. White triangles with black dots are bowhead whales post seismic activities. The lines are the same as from the graph above. The point made is that the majority of black triangles which were exposed to 120-160 dB due lie within the norm of the BWASP data.

Questions/Answers/Comments:

C: Mike Payne, NMFS: The white triangles are clearly well above the 90th percentile given the Shell shallow hazards are in the middle of BWASP data.

C: Darren Ireland, LGL: (unable to understand the response – no microphone used.)

C: Megan Ferguson, NMFS: The BWASP data was collected late August through end of October when the whales are heading to the west. It is known that on the eastward migration whales are located further offshore. I think we may be comparing apples and oranges.

C: Darren Ireland, LGL: These are not all from July; only the triangles in the upper east corner. That is a problem with putting all the sightings on the map. Ignore the northeast corner and you have August through October.

C: Michael Macrander, Shell: The green and black triangles are the most important on this graph as it shows August through September and where the whales were during seismic activity.

C: Jolie Harrison, NMFS: There were no sightings of bowhead whales by aerial surveys within the 160 dB zone?

C: Robert Suydam, NSB: There were very few or no surveys flown closer than 13 kilometers.

C: Darren Ireland, LGL: The effort was relative small because the zone was relative small.

Q: Jeff Childs, Biologist: Can you identify where cow/calf pairs were observed?

A: Darren Ireland, LGL: No, I don't have that off the top of my head.

A: Michael Macrander, Shell: We can provide it; we just don't have it at this point.

C: Jay Brueggeman, Canyon Creek Consulting: I have a general comment about the 120 dB zone. Yesterday we saw some values on how far out 120 goes. That has tremendous implications on industry and how they operate. These implications are based on a pretty thin layer of information supporting 120. It really is contradictory to the way we do science. We try to have a lot of rigor before we come to a decision with big implications. I think the one report is very inconclusive. I would recommend that NMFS put together an independent science group to take a look at this issue to see if it is in fact an issue or if it is an artifact of the way the study was done. The results are really based on one year of data; the other two years of data are pretty thin. The practicality of trying to survey and monitor an area the size of this is an issue. I feel we're building upon a case that is pretty weak and it needs an independent look.

C: Layla Hughes, WWF: I agree with the notion that we want all of this to be based on science but I think it depends upon which way you are looking at it. I would like to see the science that proves the 120 zone is not harmful.

C: Robert Suydam, NSB: The recommendation yesterday was to hold a workshop to talk about this. It deserves a lot of time to jump in to the studies that are available. The stuff John Richardson was involved in was the best data at the time and it showed bowhead whales were excluded from a zone 120. Work that has been done by LGL, BP, etc. at Northstar shows bowhead whales are responsive to low levels of sound. More importantly, traditional knowledge tells us that bowhead whales respond to sound. Even a step on the ice will make a whale deflect. We need to talk about this in great detail.

C: Danielle Savarese, LGL: I would like to point out that by monitoring the 120 we are flying pretty far offshore and there is relatively little effort in 160.

C: George Ahmaogak, Ahmaogak & Associates: We wanted to see good quality science with good sample sizes. If we are going to do the 120 the sample size is too small. My understanding was that years back the 120 was only for cow/calf pairs. That's not the case in the slide.

C: Michael Macrander, Shell: We are required to monitor the 120 dB and report all animals in there. There are criteria for shutdown around cow/calf pair numbers using a monitoring protocol and also aggregations of 12 or more adults that are non-migratory. It is not specific to only cow/calf pairs.

C: Jay Brueggeman, Canyon Creek Consulting: There are studies that support and some that don't support 120. I would like before this meeting ends to have some commitment from NMFS that a workshop is a reasonable thing to do before it lapses in to another season. It would be a great help for all involved.

C: Bill Streever, BP: We need to task a person with making a workshop happen, whether it is NMFS or somebody else.

C: John Richardson, LGL: Since the 120 idea came in significant part in studies we were involved in, I would like to say that the data is pretty meager to be basing a full management regime on it when it has

severe implications for everybody. On the other hand, the study was clear in what it did show. To look at the maps that are in the report on that work that was done in 1996 through 1998, you would be hard pressed to convince yourself there was any affect from that static map. I would like to reinforce Darren's comments about the lack of definitiveness of plotting these sightings on a static map in relation to sound contours that are moving around all the time. By plotting sightings in terms of coordinates relative to the ship it becomes clearer. One other point, in our computation of 1996-1998 data we concluded there was a pretty strong avoidance in the range of 120-130. It was pretty clear that results for feeding whales are different from migrating whales and bowhead whales are often seen much closer to seismic vessels when they are feeding than when they are migrating. We've seen this often, confirmed in various studies.

C: Michael Macrander, Shell: The seismic activity was done well outside the path that you would expect the bowhead whales to be utilizing as far as the BWASP data.

C: Bruce St. Pierre, ConocoPhillips: A workshop would help to put a lot of these issues out there. It is important to emphasize that ConocoPhillips has strong concerns about how we got to where we are at today and we understand that the 120 is of great concern. We need to stop, step back and look at the premise it was based on.

C: Jolie Harrison, NMFS: We need to distinguish between science and the traditional knowledge and balance it with the management regime that is based on that science. What are the justifications for why we say certain things need to have (unable to hear) and the effectiveness of the measures.

C: Mike Payne, NMFS: This will take some coordination but it is not likely to happen between now and May (i.e. the 2009 season).

C: Jonathan Jemming, NSB: We need to step back from the 120 issue. Whatever way it is pursued we need to be asking ourselves if the principles of environmental justice that underline the issue are being considered. I've heard folks remind us of the importance of traditional knowledge. There is an assumption that traditional knowledge only has value when it can be confirmed and verified by hard science. We have too much traditional knowledge to devalue it. The 120 sets a much more cautionary approach. You really have to speak the language that these people use.

C: Susan Childs, Shell: We can't wait. We need to understand the 120 dB before drilling in 2010.

Subsistence Issues

Harry Brower, AEWC. Mr. Brower presented the 2009 recommendations from the Alaska Eskimo Whaling Commission.

Monitoring:

- Monitoring equipment must be sufficient for Arctic conditions
- Equipment should be tested thoroughly before it is deployed
- If monitoring equipment fails, exploration should stop
- Monitoring and mitigation measures need to be designed to adjust to changing environmental conditions, especially for the fall time.
- NMFS must conduct compliance monitoring to make sure mitigation and monitoring tasks are conducted appropriate and to help improve monitoring and mitigation
- Monitoring techniques for offshore areas need improvement. Acoustics alone not sufficient and MMOs not completely adequate for estimating takes or avoiding Level A takes.

Mitigation:

- To ensure small takes, NMFS must institute time and area closures in known areas of high concentration of marine mammals or in areas with limited or no information.

Future open water meetings:

- Should include FWS and other Alaska marine mammal co management organizations
- Follow up meetings are needed to address unresolved issues, i.e. need closure including aerial survey techniques, approach for estimation of number of takes, SSV consistent approach.
- Allow enough time for discussion (possibly add days).

Other items

- IHA should be issued as drafts so that the AEWC and public has an opportunity to comment on mitigation and monitoring stipulations before they become final.
- US Government sponsored seismic studies must obtain an IHA. They are contributing sounds to the waters and may be impacting marine mammals important for subsistence.

Questions/Answers/Comments:

C: Robert Suydam, NSB: The more information about subsistence hunts we have is good. Continuing to obtain that information would be good for all of us to strive for and not just information on whales. A good database on all human activities would be helpful. MMS was working on one in the past. The Borough has been pushing companies to record and archive data on helicopter and boat trips. If we don't have a good database on human activities we will never be able to tackle the issues of cumulative impacts. I would recommend that we develop a human activities database to capture that information.

C: Caryn Rea, ConocoPhillips: What I'm seeing here is an even greater step change from when I first came in to the meeting in terms of what the open water meeting has evolved to by bringing in other commissions.

C: Jim Lecky, NMFS: The statute doesn't make a distinction as to which animals belong to which agency. To the extent we are authorizing take there is an LOA process in place and those should be considered so conflicts are not created.

C: Michael Payne, NMFS: Even though polar bears are not under NMFS, they are listed.

Q: Rick Steiner, UAA: Harry Brower has raised the bar on what oil and gas exploration in the Arctic can be. Is NMFS prepared to give a response to the AEWC on all the things they are requesting to improve the program?

A: Jim Lecky, NMFS: We want to take Harry's comments in to consideration. The purpose of the meeting is to peer review the monitoring plans for 2009 and some of the recommendations we've struggled with over the past day and a half are well beyond that. We want to take those recommendations and see how we can develop a more robust program in a broader timeframe and scope. Getting them in place for 2009 is probably not practical.

C: Robert Suydam, NSB: Jim mentioned that this is a peer review meeting. There has been some assumptions and questioning during the past few days as to who are peers. Sometimes the stakeholders get pushed out. Harry and George probably know more about bowhead whales than any other person on the planet. Both are published authors. We need to avoid the confusion of peer review being only scientists with degrees; these gentlemen have more experience.

C: Mike Payne, NMFS: Regarding the comment that NMFS should publish IHA's in draft, in fact we do publish IHA's in a proposed format. I do recognize those are in a federal register and not a document that most people access every day. If there is a better way to get them to people affected by the activity, please let us know. Regarding the U.S. Government should be made to apply for an IHA for all seismic activities; we are pretty diligent in holding them to that same standard.

C: (unable to identify speaker): I'd like to clarify that we don't publish draft IHA's in the federal register but we do put them out for public comment.

C: Susan Childs, Shell: NSB and AEWC have been pretty good about supplying comments on past IHA's from Shell.

C: Robyn Angliss, NMFS: The seismic operation that happened last year that the U.S. Healy was involved in was actually a Canadian operation and that may be why there is some confusion as to why there is a feeling that IHA's aren't issued to the U.S. government.

C: Robert Suydam, NSB: NSB does try to comment on IHA applications as much as we possibly can. The point the AEWC is trying to make is that the IHAs are published without the final wording being commented on. If we had an opportunity to review those we might be able to help with some of the issues or point out where clarification may be needed. The other issue about consistency of applications, that topic is about the seismic shoot that was government-sponsored last year. The U.S. was working in conjunction with the Canadians and if there are operations out there that involve the U.S. government, then we should really talk about things in total if we can. Some of the activity overwhelmed the hydrophones at Northstar and we need to keep those things in mind and be consistent.

C: Layla Hughes, WWF: I echo Robert on reviewing the language of the IHA's. For example, last year Shell's trigger for shutdown for cow/calf pairs referenced only aerial surveys. If read literally, if the chase boats observed a cow/calf pair it wouldn't be a trigger for mitigation. It references only Shell's observation of the cow/calf pairs and we all probably would have commented that any legitimate source of observation of a cow/calf pair would be an appropriate trigger.

Results from other Meetings/Discussions to Inform Monitoring Requirements Discussion

Results of February Chukchi Sea Acoustics Workshop

Catherine Berchok, NMML. Dr. Berchok presented on the results of the February Chukchi Sea Acoustics Workshop. The Alaska Department of Fish and Game received a coastal impact assessment program grant with two components: to provide for a workshop and to conduct research studies. The workshop was held February 2009 in Anchorage. The purpose was to review acoustic monitoring studies and determine priority research objectives. Participants included representatives from government, academia, native organizations, oil companies, and consulting firms.

Primary agenda items included:

- concerns about underwater noise (federal regulatory issues and Alaska Native subsistence issues);
- overview of natural and anthropogenic underwater noise in the Arctic;
- overview of passive acoustic monitoring from 1980's to 2006
- acoustic recordings in Chukchi and W. Beaufort Seas since 2006.

- What is the baseline? (i.e., concerns from native groups that objectives from the 1980's about does noise deflect whales has not been met; a universal sampling process and common detection algorithms would be ideal)
- Potential impacts of climate change on acoustic environment (more noise from commercial shipping, industrial activities, less ice and more wind, etc.)
- Recommendations included
 - Long term studies
 - Monitoring marine mammal vocalizations as well as ambient noise
 - Consistent with original CIAP proposal
 - Fine scale studies (making acoustic recordings simultaneously with visual observations to link vocalizations to marine mammal species and behavior and enhance the analytical capability of the long term monitoring studies)
 - Oceanographic measurements (integrating oceanographic sensors with acoustic recorders on same moorings and expand the application of the long term recordings to a broader marine ecosystem context)
 - Summarize existing efforts (agreement among all participants to summarize information on acoustic studies to enhance awareness of projects underway, data collected, analysis run, to promote collaboration, identify data gaps, etc.; the need for standards/guidelines and data form developed by participants. A summary information data form was developed)
- Looking ahead: ADF&G will seek collaboration with others to implement workshop recommendations including directing CIAP funds to specific projects that follow the recommendations.

Questions/Answers/Comments:

Q: Aaron Thode, Scripps: Did the subject of acoustic tagging come up?

A: Catherine Berchok, NMML: Yes, it was thought that it would be a good thing to get tags with acoustic recorders on them.

Q: Ben Greene, NSB: Did topic of ocean acidification come up? Propagation has significantly changed as our oceans have become more acidic.

A: Catherine Berchok, NMML Ocean acidification affects higher frequencies in the water and the low frequencies the whales are experiencing will have minimal affects.

Q: Charles Hopson, Barrow: I've studied the Arctic Ocean for over 50 years. There is global warming. Are the buoys taking water temperature?

A: Catherine Berchok, NMML: The aurals do have temperature sensors.

Q: Charles Hopson, Barrow: Are you making a baseline?

A: Catherine Berchok, NMML: We are collecting the information now and will be able to measure that as time goes on.

Q: Charles Hopson, Barrow: Magnetic north is moving east. The ice is going away. Do we know where the ice is going? We refuse to study the current. We are dealing with the current and it is causing the ice to move to the other side and melting it. People need to start realizing we need to study this more. Is it because magnetic north is moving? Is it causing our current to move more? What does low ice year mean? Were they talking about the whole Arctic Ocean?

A: Catherine Berchok, NMML: The entire Arctic Ocean. The percentage of ice in the entire ocean was reduced.

Q: George Ahmaogak, Ahmaogak & Associates: Is there any consideration given to on-ice seismic acquisition?

A: Catherine Berchok, NMML: All the recorders are picking up everything going on out there. The recorders are recording everything over an entire year (those recorders that are overwintered).

C: (Unidentified Speaker): My concern is the research and development of on-ice activities

Q: Caryn Rea, ConocoPhillips: Regarding the acoustic tags, do you have to be able to retrieve these from the animals in order to get the data?

A: Aaron Thode, Scripps: Yes. That is the main logistical challenge to the process. We are investigating possible solutions. Although you have to retrieve the tags, the tags last 180 days. If you were willing to wait for the data and enlist the help of communities in getting the tags back, it isn't an insurmountable problem.

Q: Chuck Monet, MMS: MMS has been supporting a whale tagging study. The work is being conducted by ADF&G but implemented by the whalers in Barrow, coastal communities and in Canada. The study is starting to demonstrate tag retention for over six months and we're starting to look towards the future and other possibilities. There may be a move towards whales carrying devices.

C: Aaron Thode, Scripps: I think this is such an important thing because when using passive acoustic recorders you face the problem of whether the animal is simply falling silent or if there sounds are being masked by acoustic activity. Tags provide answers to some of those questions.

BWASP and COMIDA Update – Results from 2008

Janet Clarke, SAIC. Ms. Clarke presented a BWASP and COMIDA update displaying maps of the study areas. Deadhorse is located in the center of the BWASP area. The survey ran August 31 through October 20, 2008. The COMIDA project ran during three three-week time periods from mid-June through the first of July, during the month of August, and again October 21 through November 10, 2008. Objectives of the programs were to:

- Monitor bowhead whale migration temporally and spatially
- Investigate inter annual variation in bowhead abundance, distribution, habitat and behaviors
- Collect information on other marine mammals species

A Twin Otter was used for a seven to eight hour period. The plan had bubble windows, two observers on board, a data recorder and two pilots. It flew a randomly selected north south oriented transect lines. Conditions for surveying include a minimum 1000' ceiling, good visibility, and a Beaufort state of less than 05. Daily flight summaries are posted on the MMS and NMML web pages to allow for rapid dissemination of information to interested parties.

2008 BWASP data was similar to previous years. There was not as much survey effort in area to the east of Deadhorse because of weather conditions. It included 20 total flights and a total survey of 276 bowheads. The 2008 COMIDA effort had a total of 119.4 hours (not including 35.8 hours of deadhead or non-usable survey time) and a total of 24,803 kilometers (including transiting where data is still being collected).

Ms. Clarke presented slides showing data on BWASP and COMIDA numbers of sightings by species. It was pointed out that there is historical aerial survey data that shows whales don't all head north toward Wrangell; some travel the coastline. In the Chukchi Sea they are seeing more and more species. Species are considered unidentified if its body cannot be seen. Other sightings included a fin whale in early July. There were very few beluga sightings, mostly scattered except for on one day. Polar bears were seen mostly in the Beaufort. Ten polar bears in the Chukchi were seen on August 16th, all swimming. Two-thirds of the walrus sightings occurred on two days. No walrus were seen at all during the last COMIDA survey, probably because of lack of large ice. 17 bowhead cow/calf pairs were seen; only one of which was in the Chukchi Sea. Feeding/milling bowheads were seen on six different occasions.

Plans for the 2009 COMIDA surveys are to conduct these from June 16th through October 31st with a dedicated aircraft based in Barrow. 2009 BWASP surveys will be conducted from August 31st through October 20th with a dedicated aircraft based in Deadhorse.

Questions/Answers/Comments:

Q: Chris Winter, Crag Law Center: I have two questions: 1) do you have safety data statistics and incident data from previous aerial records? And, 2) do you have the cost per flight hour?

A: Janet Clarke, SAIC: Back in 1983 there was a twin otter that went down, everyone got out safely and I believe bad fuel was the cause. No, I don't have the cost per flight hour data.

A: Chuck Monet, MMS: For 180 to 200 hours, the program cost is about \$1.8 million per year. It runs about \$1,000 per hour.

Q: Bill Streever, BP: Are you wearing mustang suits?

A: Janet Clarke, SAIC: Dry suits.

Q: Bill Streever, BP: Do you ever use Native observers?

A: Janet Clarke, SAIC: We have never done so because we do try to get people with aerial survey experience, specifically bowhead experience. We do invite folks but once they hear we are up for seven hour with no bathroom, we don't get a lot of interest.

Q: Rick Steiner, UAA: This is a fantastic study; keep it up. I have heard repeatedly that there is a discrepancy between what you see and what industry sees. Can you comment on the inconsistency and how often there is a discrepancy and why?

A: Janet Clarke, SAIC: I can't comment on how often. We fly different areas. There are few instances we fly the same area. There are differences in how we survey, i.e. we circle back and industry doesn't.

A: Robyn Angliss, NMFS: There are differences in the two techniques. We figured out last year and we talked openly at the table that circling gives different results than not circling. Qualitatively I looked at BWASP and industry data and there seems to be a fair amount of variety on when people fly and I didn't see any obvious patterns but that was just a qualitative look. There may have been very good mechanical or operation reasons for not being in the air.

Q: George Ahmoagak & Ahmoagak and Associates: Traditional knowledge! In the springtime there are multiple layers of migration. I've been hearing from Cross Island the middle pack of the run is starting on September 10th. Traditional knowledge tells us that this is the middle of the run. Your information doesn't tell me that specifically but kind of confirms September 10th as being the time of mid-pack. I think there is a gap here and it needs to be a part of the report that this data confirms the traditional knowledge.

There are management regulations under AEWC that says don't go after the cow/calf pair. No one is alerting anyone that the cow/calf pair is entering the vicinity and notifying the whaling captains. It could be a problem with the MMPA by telling where the whales are, but it could be used for more useful purposes to prevent whalers from getting prosecuted for going after cow/calf pairs.

Q: Charles Hopson, Barrow: For your safety are you aware of ERMA?

A: Janet Clarke, SAIC: No.

Q: Charles Hopson, Barrow: Satellites are taking pictures of ice. You should work with NOAA and get pictures to see from 200 miles up.

A: Janet Clarke, SAIC: We do look at satellite data at the ice and cloud cover to help us figure out if that day is a good day to fly. Essentially the automated flight following piece does that.

Shipboard Observers in Monitoring

Jim Wilder, NMFS. Mr. Wilder presented information on shipboard observers. The MMPA and implementing regulations provide the authority that requires monitoring and reporting of marine mammal takes. To that end the objective of the MMO's is to accurately gather and record data to satisfy monitoring goals. MMO's help estimate when, where, how, and how many marine mammals by species and cohort are taken by authorized activities. The MMO's observe and record behavior of marine mammals, and observe and record environmental and anthropogenic factors. They document nature, location, duration and scale of oil and gas activities; they assist in minimizing impacts of activity on subsistence users primarily through the use of Inupiat speaking monitors to communicate with captains and comm. Centers and they assist in implementing mitigation measures.

Issues that have been identified include the possible misidentification of species and inconsistency in observer practices. One step that has been taken to address this is to develop standards and guidelines for MMO training and performance. This process was started in the Alaska region in 2007 and in 2008 it morphed in to a national inter-agency effort with MMS. Within the last month or so draft standards have been finalized and the guidelines are currently in the agency review process.

An incident command center was started this past season. It is an interagency group between MMS, NMFS and FWS for real time monitoring of OCS activities to plot ship locations, marine mammal sightings, safety zone radii, etc., using real time communication from MMO's (both ship and aerial), comm centers, whaling captains and industry. There is hope that the ICC will continue and be refined in 2009.

Training, certification and proficiency of MMOs:

- Effective training is a necessary component.
- 2009 will require that MMO training curricula and instructor qualifications be submitted and approved by NMFS prior to training.
- MMO's must be approved by NMFS. In 2009 MMO's with Bachelor of Science or prior experience/MMO training will be automatically approved, pending completion of pertinent "refresher" training and submittal of their resumes to NMFS.

Monitoring in poor visibility conditions:

- How can monitoring in poor visibility be improved?
- Are there any new technologies to improve detection of marine mammals in low visibility situations?

What changes are needed for this program?

- Standardized, NMFS-approved MMO training and qualifications
 - Quality control expectations for MMO performance
 - Successful completion of standard exit exam
- Standardized electronic MMO reporting form
- NMFS needs source vessel locations during “active” periods
- Direct “real time” (daily) reporting by MMO’s to federal agencies (to help agencies monitor effectiveness of mitigation and compliance in a timely manner)
- Better coordination of communication between ship and aerial MMO’s, comm centers, whaling captains, and interagency command center
- Establishment of a hotline (phone and/or email) for MMO’s to report incidents of harassment or intimidation while performing their jobs or other concerns
- Use of Inupiat speaking subsistence monitors to help mitigate potential impacts to subsistence hunting

Questions/Answers/Comments:

Q: Jeff Childs, Biologist. One clarification comment: people with a Bachelor of Science degree would be automatically certified as a MMO. My recommendation would be that that person be of a biology degree, not chemistry or geology, as they don’t have the same training.

A: Jim Wilder, NMFS: We are trying to make it as consistent as possible with the national program for Fisheries. It is not directly translatable, but we’re trying to make it consistent. In conjunction with the BS there is also the requirement for what eventually might be a two-week MMO specific training they would have to pass.

C: Mike (unable to capture last name), Edison Offshore: Regarding MMO’s and the education they are receiving - we represent a company that provided the oil spill response vessel in 2007. I was involved with the training. I can personally say the amount of training they are receiving is increasing every year. Something that I realized on how interactions between vessels and the mammals is happening, I saw a big need to integrate the MMO’s even further. My company is working with the state to provide an apprentice program at AVTECH in some of the vessel operations. In my experience a lot of what is happening is new workers coming on the vessel don’t have the experience with the interactions between vessels and animals and there is a need to get them the information and experience on what to expect. There are a lot of great things being developed.

Q: Ben Greene, NSB: There was a statement about draft guidelines and standards that was in review. Will these go outside for public review and comment?

A: Jim Wilder, NMFS: That’s my understanding.

A: Mark Hodor, General Counsel, NMFS: We don’t know yet to what extent those will be going out for review.

A: Jim Lecky, NMFS: Typically we do put them out for comment, so we will do that this time as well.

Q: (Unidentified Speaker): Is data from the MMO’s used to develop background density estimates? It seems clear from yesterday’s discussions that those observations are used for this. Is it appropriate for MMO data to be used to estimate and calculate density?

A: Robyn Angliss, NMFS: The best practices for computing exposure levels before and after the field season is an issue in the 'parking lot' and the group that works that issue should take that in to consideration.

A: Jolie Harrison, NMFS: Peer reviewed data is preferred but in the absence of any other data, data from MMO's can be helpful in doing that.

Q: Charles Hopson, Barrow: It is troublesome to see that MMO's have to have a Bachelor of Science degree or experience. I have MMO's myself that will not qualify for these. Who is funding the Incident Command Center?

A: Jim Wilder, NMFS: There is a provision for past experience performing as an MMO and having MMO training to qualify for approval and there is a provision to substitute past experience for education. There is another level of MMO that is termed a subsistence monitor for areas where subsistence is taking place and those will be required to be Inupiat speakers, as they have been in the past. Funding for the Incident Command Center is basically the federal government. We are still trying to secure a little funding for GIS and database support.

Q: Susan Childs, Shell: How MMO's will be employed? MMO's give the communities an opportunity for employment. I would like NMFS to remember that and retain that. NMFS should engage with AEWC and other marine mammal commissions if nothing else and give preference for these jobs. On Shell's vessels the MMO is the only one that can shut down an operation. They have as much authority as the captain. On a side note, is there anyone that can talk about infrared capabilities to see at night?

A: Mike (unable to capture last name), Edison Offshore: There are several different types such as radar but what we are talking about here is a forward looking infrared system. It is very sensitive. The systems are available. They were put on the Nanook, one of Shell's assets. They are still developing the technology. It is a very reliable way of identifying. You can't tell if it is a bowhead or a humpback, but you know there is an animal there. The unit we had would go out several hundred yards.

Q: Robert Suydam, NSB: When it has been tried in the past you can't see bowheads because they are so well insulated their skin is the same temperature as the water. I wanted to comment to Jim that I think it is important for MMO's to have a debrief at the end of the season to figure out what went well and what didn't go well to make improvements for the future.

A: Jim Wilder, NMFS: That is part of the draft guidelines.

Q: (Unidentified Speaker): Who is the debrief going to be with?

A: Jim Wilder, NMFS: It is still a point of debate as to which agency will do the debrief.

Q: Robert Suydam, NSB. The NSB started a program to go out and count bowheads. At the International Whaling Commission (IWC) there was concern and suspicion about whether they could believe the data, so the IWC came up and observed the program and certified it. The same 'fox guarding the henhouse' issue applies to MMO's. If the MMO's are hired by the companies and they are authorized to shutdown seismic, are they really not being pressured and are they really doing what they should be doing? What is NMFS thinking about the program going forward? Will they do something similar to Fisheries where you hire, train and debrief or will you leave it to industry to manage?

A: Jim Lecky, NMFS: We are not proposing to take on hiring MMO's. We do not have the capacity, budget, etc. But, we could improve oversight and we're working on that.

A: Jolie Harrison, NMFS: In addition to what Jim said, although we aren't planning on funding MMO programs, we are exploring ways to expand our oversight.

C: George Ahmaogak, Ahmaogak & Associates: Looking at it from a standpoint for improvement, MMO's are a key element of a monitoring program but there is a person in command on board that is very important. When I hear the questions about whether density measurements were made on marine mammals, the MMO has to report to the biologist. That biologist is in a supervisory role and oftentimes there is friction between the two. We want the MMO's to stay on board and be consistent but there is turnover because of the friction, rancor and mistreatment. I commend Shell as they've done a lot to improve that but where are the regulatory individuals? The operators have to handle these things. We commented to NMFS on the training and what type of training they should receive but many of the MMO's have no clue about mitigation, about the MMPA, about conflict avoidance agreements, etc. We had to provide that training and then they understood. It worked out well to use the local college to develop the training component.

C: Mike (unable to capture last name), Edison Offshore: The apprentice program integrating the MMO's in to the crews is a very important piece. If anyone intimidates or disrespects an MMO they won't be disciplined, they will be removed. We all take the cultural awareness courses before we are allowed to work on the vessel. We take it very seriously.

C: Catherine Berchok, NMML: There are times when there is little visibility. Is it possible to tow a small array or streamers?

A: Barbara Bohn, Shell: I'm not currently aware of any capability to do that.

C: Shane Guan, NMFS: Technologically it is difficult, but there are a couple of IHA's going on that require passive acoustic monitoring. To a degree it has worked.

C: Bill Koski, LGL: There has been some attempt to look at data from arrays but part of the problem is the arrays are geared to very low frequencies. They will work with some calls but not all or maybe not even a majority and they work poorly with most other cetaceans. The other issue on infrared, I did an earlier experiment using infrared to detect whales and on bowheads it doesn't work well. Gray whales can be detected at considerable distances but the area is very narrow so I don't know how useful it would be.

C: Bill Streever, BP: Regarding using towed passive acoustic monitoring for whales and the end noise masking the calls - I don't think there are many people in the room that know the with the BP shoot in Canada next year we will be field trialing towed "pam."

C: Bob Day, ABR: There has been some research on bird movement at night in hopes of trying to minimize collision problems. We've done extensive radar and Forward Looking Infrared (FLIR). There is tremendous variation in the FLIR units we've looked at. Some are barely able to detect an iceberg in front of the ship and others are so sensitive you could see the exhalation out of a bowhead. I'm convinced that FLIR could be a potentially useful thing but it will take someone working with these high end companies.

C: Michael Macrander, Shell: Regarding technologies on towed arrays - there was a study done in Australia where they were taking blue whale calls off a towed array but one of the issues is that for data storage aboard a vessel it isn't a constant record, it is a clip, and then it doesn't record for a period of time rather than being a continuous recording. FLIR has some possibilities. There are some radar technologies that hold some promise. The point is technology is developing.

C: Charles Hopson, Barrow: Regarding the use of Inupiat speakers - we have a new breed of people in Barrow. They are very good hunters, very good whalers, very good with GPS and computers but we're losing our language. Inupiat speaking MMO requirement will eliminate a lot of people that can work.

C: Jim Wilder, NMFS: There are two categories of MMO and the Inupiat speaking requirement is to communicate with the command center but if they don't speak Inupiat there is still another way for them to qualify.

C: Jeff Childs, Biologist: I have a word of caution to NMFS in developing an MMO program for Alaska around the national program. Can we bring in people from another country and put them through our very basic MMO training, get them certified and use them on the vessel? It raised some flags about just who can come in and work as an MMO; just a word of caution.

A: Jim Wilder, NMFS: We have addressed that in the standards. There are requirements that MMO's be U.S. citizens and proficient in the English language and hopefully that will address some of the concerns.

Q: Harry Brower, AEWC: (unable to hear question)

A: Jolie Harrison, NMFS: I think one of the things we have to keep in mind is that NMFS is tasked with issuing authorizations if we have certain findings. We are authorizing a certain amount of impacts to occur but we are trying to make the least adverse impact we can.

Q: Rick Steiner, UAA: How does the agency define least practicable impact and isn't the purpose of this meeting to get to that?

A: Jim Lecky, NMFS: We try to give meaning to every word in the statute. The grammar in that phrase is terrible. We interpret it as least impact practicable. That's our mission. We first make the findings based on the best available science that the activity will have a negligible impact and then go on to make the finding there is negligible impact on subsistence. Practicable is an economic and feasibility test. We have a strategy for dealing with the safety zones that we have employed.

Aerial Monitoring

Robyn Angliss, NMFS. Aerial monitoring and mitigation has been used by many in this room for a long time. One key question is: can you do both at the same time? There may be some tradeoffs you have to make to being successful in one role versus the other. Other options to consider might be: is there a need for another place? Do roles need to be prioritized?

Successful monitoring includes:

- Clearly state what is needed to be measured
- Clearly state the affect size of interest
- Survey type and design

One of the best things we can do at this point, since there isn't any surveys planned in 2009, is we can look at the survey designs from the past and see how they differ. We need to spend some time at future meetings as to what it is that we want to measure, identify those clearly and specifically, and then design the survey.

Questions/Answers/Comments:

C: Jeff Childs, Biologist. What I've seen a lot here is treating the analysis at a very high level and there have been some underlying assertions made that based upon this information these activities are having an effect on the animals. As a scientist I don't think we can make that decision yet. To plot all the bowhead sightings on a map and plot seismic surveys there doesn't really get to the question as to

whether it is influencing a subset of species. Looking at cow/calf pairs is a subset, we can ascertain if there is an influence. We need base line data as well. I would encourage that we begin to look at some subset instead of treating all bowheads alike. Different life stages have different sensitivities, etc.

C: Bill Streever, BP: The studies were designed to answer some very specific questions. Part of this is to figure out what are the most important questions to look at and what can we accomplish. It is not the fault of science that we can't answer all these things at once; it is the nature of science.

C: Chris (unable to identify last name/organization): There is a strong interest in the community to see some independent monitoring. I think the MMO and aerial monitoring might benefit from having the agencies manage those programs. It would help find common ground between industry and community to have the agency independently monitor.

C: Susan Childs, Shell: It is as much about money. It costs around \$5 million to fund the MMO program. It is important to look at cost when you look to government to fund a program.

C: Robyn Angliss, NMFS: The agency does not have the resources for the aerial program.

C: Jim Lecky, NMFS: it is not uncommon for NMFS or other agencies to require industries to monitor these types of things. There is a resource gap.

C: Lisa Rotterman, NMFS: It is important to design a study to answer a question. I would caution that we don't need to reinvent the wheel. While some of the technologies have improved over time, some of the approaches have been looked at in previous papers. One to familiarize yourselves with is the Human Activities database that MMS funded, or the Covariate Study. The idea was to gather the available data on what all the human activities were in the Arctic in that time period and look at the bowhead data for the same time period. The study came to the conclusion that some types of affects we just can't look at at all because the underlying dataset was insufficient to answer the question. Very specific types of data are necessary to answer some of these questions. What is the quality of data we need to unravel a specific question? I would argue the quality we are gathering now is not sufficient.

C: Johnny _____ (unable to identify last name/organization): Regarding independent monitoring, it is not uncommon for federal agencies to externalize processes such as the NEPA process, so it seems more than reasonable for NMFS to carry an oversight role with collaboration with communities and commissions. Susan has a good point about costs and looking at what is reasonable but at the same time we need to look at.

C: Jim Lecky, NMFS: Improved oversight is what Jim Wilder's presentation was trying to get at. We are trying to move in that direction. My earlier comment was about a NMFS-operated program.

C: Robert Suydam, NSB: The reason we're talking about this issue is that collaboration didn't work the way we had hoped. Competing observations were saying something different and when that was tied to mitigation efforts it created some problems. I hope we can go forward with more detailed discussions about aerial surveys with clear objectives stated up front. The purpose of aerial surveys is mitigation. There are some severe limitation with MMO's and if MMO's don't work to cover everything we need then there needs to be another way to look at marine mammals. I don't know if there are other techniques outside of aerial where seismic sounds carry a long way. If industry is not wanting to put planes in the air because of human safety concerns, then what are the alternatives to observe marine mammals? If there aren't monitoring techniques that are effective, then maybe exploration shouldn't move forward as Harry said earlier.

C: Jim Lecky, NMFS: Regarding the issue last year about comparing two different survey techniques with two different purposes, it isn't surprising that there were two different answers. Have we

identified the appropriate things to monitor and if so, what is the best technique to detect the things we are trying to monitor? The aerial surveys are also used to provide density estimates for calculating take. That is an issue that needs to be considered. If they are spending more time circling, then there is less time surveying, so that diminishes that parameter.

C: Robert Suydam, NSB: I agree with your point. Robyn's statement about being as transparent as possible because developing aerial surveys for two different needs wasn't even on the table. It was about mitigation not collecting density estimates. We need to get density estimates when there isn't a lot of activity/sound in the area, which is why I'm pushing for aerial surveys this year.

C: Michael Macrander, Shell: An answer might be to do a certification program like the International Whaling Commission did with the NSB. When we get an IHA, to a certain extent our monitoring program is laid out for us. I agree that a study design needs to have good consideration about what you are trying to answer. I would not hold out the mitigation based monitoring program, which was used and implemented as study design that would answer some of these harder questions to get at the relevance of this. So we end up doing two aerial programs: one for mitigation and one for density estimates. We need to determine what our priorities are and then design the program around them.

Q: Susan Childs, Shell: Do you have the ability to call the ship when flying for BWASP data?

A: Janet Clarke, SAIC: We have SAC phones and radios but I don't believe we have a marine band radio; and, we are not a regulatory aircraft.

C: Jay Brueggeman, Canyon Creek Consulting: None of these systems is perfect. They all have their limitations. The equipment has limitations, the observers have limitations. We need to recognize that none are perfect. We have made some great improvements but there are some limitations we just won't be able to escape.

C: Bruce St. Pierre, ConocoPhillips: I'm dumbfounded by the level of mistrust of what we do. We come together every year and it feels like no matter what we do or what is imposed upon us by a regulatory or conditional permit, we collect the data but it isn't trusted. I think this forum should have us come together to show what we have done right, what data is available, and what questions have been answered.

C: Robert Suydam, NSB: I distinctly remember in 2006 Michael said we can't answer all the questions in the first year; it will take time. Some of my frustrations are that we've been coming here for three years and we want to understand what industry has learned. It isn't easy to pull out of these reports and I don't feel like we've made a lot of progress over the last three years. We are moving forward on an industrial approach but not on a science approach. There's data, yes, but we need to catch up with the science.

Program and Process ... what works?

- Tremendous amounts of data have been collected that has great potential
- Sharing of information
- Working together in spite of differences
- Shutdown operations for short periods for hunters to be able to hunt
- Collection of multi-disciplinary data in the Chukchi Sea from 2008
- Collaboration in communication and goal setting
- Incident command center
- Prior receipt of data to digest beforehand

- Communication systems where people can talk to each other while activities are going on
- Data gathered and increased number of arrays/recorders
- NMFS attention has increased on how to better make this process work
- Patience of people while agency tries to balance extraction of energy with subsistence
- Teambuilding happening within the room
- People's patience
- Creativity seen in the room ... the data wouldn't have been collected without the creativity in science
- We are making progress
- Funding spent on environmental
- Stepping out and trying new things
- Progress on standardizing and outlining MMO program
- Less contentiousness
- Commends industry stepping up trying to answer the questions
- Commends NSB and AEWC for setting the bar high
- Stranding network
- Studies industry has advanced generating good science
- Peer review is a positive interaction and improves the quality of the science and work we're all doing which improves regulatory framework for our activities
- Result of this process we have new inventions or rapid evaluation of new inventions like DASARs
- Statistical methods have been invented to process the data

Parking Lot Issues

Issue 1: Workshop Approach

Issue/Question: A mini peer-review was conducted and stakeholder input received. What are the positives of this approach?

- Inclusive of perspectives
- People are being frank
- Identification of data gaps
- Identification of need for new technology
- Identification of gap between the gold standard of offshore oil and gas and where the regulatory system is now;
- Collaboration and engagement.
- NMFS has taken accountability.

Issue/Question: What would you do differently?

- Lengthen the meeting to accommodate more in depth discussion
- Have sub groups work on issues prior to the meeting
- Expand invitation to other relevant stakeholders, i.e. beluga commission, polar bear, walrus commission, etc. (Those organizations may lack the funds necessary to attend, but their attendance is important.)
- Shorten presentations to include only the important facts of the data and leave more time for discussion. Alternate view given: the peer review is needed to really understand the science and technical details so shortening presentations may not be the answer.

- Separate peer review and stakeholder engagement in to two separate meetings or better clarify objectives of the meeting. There may be some merit in separating the meetings based on technical details and stakeholder input.
- Hold a small group teleconference to discuss what needs to be presented and discussed during the meeting, clarify objectives and decide on a better meeting format
- Set clear goals and objectives to solve the issues
- There is a need by industry to leave these meetings knowing what industry's role will be in the upcoming year.
- Hold the meetings later than in April so that instead of looking at preliminary data, there is a more final data analysis. Alternate view given: The AEWC would not want the meetings to be held much later than April.
- Lock in meeting dates well ahead of time
- Sequence presentations on previous year information to be followed immediately by what is intended to be done in the coming year.

Next Steps: NMFS to consider workshop approach alternatives.

Accountability: NMFS

Issue 2: IHA's versus LOA's

Issue/Question: Continue the IHA process or move to an LOA process? There was agreement that it would be helpful if all parties agreed that the annual authorization process is not providing the broader view needed and doesn't provide certainty in terms of mitigation and cumulative impacts. An LOA process would address those issues, but moving to an LOA process would be a challenge. Stakeholders need to understand what the process is about and how it would work. There was general consensus amongst the attendees to move forward with this issue and look at the LOA process.

Next Steps: Complete discussions and reach consensus on framework, develop plan to proceed with timeframes. Experience has been that this is a two-year process. The goal is to reach agreement within the month, put together a draft schedule and plan of action by the end of June 2009.

Accountability: NMFS. Bruce St. Pierre, ConocoPhillips and Susan Childs, Shell are interested in being involved in the process.

Issue 3: Compliance Enforcement / Self Monitoring

Issue/Question: There is some confusion or lack of understanding of the requirements and regulations with monitoring and compliance enforcement. Many feel that some observation by NMFS to ensure things are being approached properly would be beneficial. How is compliance measured? What are the merits and feasibility of independent monitoring versus self-monitoring? Other questions include:

1. Are the agencies ensuring that the stipulations set forth in the IHA/LOA are being followed in the IHA/LOA and that they are effective?
2. Are there opportunities for truly independent monitoring going forward?
3. Is it an issue of trust or is it an issue of monitoring?
4. Is it a bigger issue of how robust our science program is?

Next Steps: 1) NMFS to clarify requirements; 2) NMFS to initiate dialogue with NSB to discuss concerns further.

Accountability: NMFS

Issue #4: Best Practices for Calculating Exposures

Issue/Question: What is the best practice for estimating exposures, i.e. standardization of method used? What data are appropriate to use for estimating? There are two parts to this issue: 1) the pre-activity estimate (currently the most often used data is peer literature, but in some cases there is not ideal literature available in which case other data may be used on a case by case basis by NMFS. There needs to be a process for identifying gaps in the peer review density data ; and, 2) post survey analysis, which does not have any specific process applied at this time other than the use of the best available science to make the decision. It was suggested that the agency clarify for the public what level of data is sufficient to justify negligible impact to the resource; and if we do have acknowledged data gaps, what is the process to fill those data gaps?

Next Step: Should be addressed as a principle concern at the next peer review workshop.

Issue #5: Best Practices For Calculating Affect On The Population

Issue/Question: What are the best practices for estimating exposures, i.e. there is a need for standardization of methods used. What affect is there on the species population?

Next Steps: Should be addressed at a special workshop

Issue #6: Aerial Surveys

Issue/Question: Aerial surveys are seen by many as an integral part of the data gathering. Can aerial surveys be continued, by whom, etc.

Accountability: NSB to take the lead to move forward a discussion on aerial surveys; set objectives and agenda, etc.

Issue #7: Negligible and Unmitigable impacts

Issue/Question: how does NMFS make those determinations? NMFS to take the lead to better explain and define negligible and unmitigable impacts and the process used to evaluate IHA applications. Building communication networks between whaling captains and offshore work, etc., may improve the certainty that hunts are not disrupted.

Next Steps: NMFS to define and explain negligible and unmitigable impacts involving NSB and AEWC and North Slope villages to better understand areas, times, etc.

Accountability: NMFS for definition and explanation of terms; Robert Suydam, NSB, and AEWC, to pull together information on areas, times, etc.

Other Miscellaneous Issues:

- Providing draft IHA's ahead of time (Mike Payne, NMFS, indicated this is usually an issue of timing but attempts can be made to see if the agency can work that in to a schedule. Basis for the agency's determinations on IHA's need to be communicated to the community prior to activities taking place.
- Traditional Knowledge: The North Slope Science Initiative will be helpful. Bill Streever, Caryn Rea, and Robert Suydam will take responsibility to get information back to this group.
- Integration of acoustic data and interpretation. Michael Macrander, Shell, will take accountability for pulling people together on this issue.
- Tutorial for SELs/SPLs. Bill Streever, BP, will organize and push this forward with help from others. It may take approximately six months.
- Biological significance of exposure. JIP is working on this with a two year estimated timeline for completion. Caryn Rea and Bill Streever are members of the JIP. Caryn Rea will take responsibility for keeping stakeholders informed on this process.

Closing Remarks and Adjourn

Jim Lecky provided closing remarks thanking participants for the time, patience and commitment to the process.

Recommendations

- Incorporate traditional knowledge
- Workshop or task force to address issue of the 120 dB zone
- Develop methodology for documenting subsistence activities that are adversely impacted, i.e. direct information from whalers and other subsistence activities (perhaps by utilizing communication call centers and/or projects such as the Cross Island data collection project) and method of distribution of information to stakeholders.
- Layered definition of "take" as used in variety of ways
- Consistent calculations of "take"

Attendees

Name / Address	Organization	Phone Number	Email Address	Report
Susan Childs	Shell	907-301-5792	Susan.childs@shell.com	
Phil Smith	Shell	504-728-4252	Phil.b.smith@shell.com	
Barbara Gilhousen				
Mike Payne	NMFS	301-713-2289	Michael.payne@noaa.gov	
Jim Lecky 1315 East West Hwy Silver Spring, MD 20910	NMFS	301-713-2332	Jim.lecky@noaa.gov	
Susan Inglis 823 Main Street Acrishnet, MA 02743	LGL	508-817-7023	F&sdi@uaf.edu	
Jolie Harrison 1315 East West Hwy Silver Spring, MD 20910	NMFS	301-713-2332	Jolie.harrison@noaa.gov	
Shane Guan 1315 East West Hwy Silver Spring, MD 20910	NMFS	301-713-2289	Shane.guan@noaa.gov	Yes
Steven K. Davis NOAA Fisheries 222 W. 7 th Ave, #517 Anchorage, AK 99577	NAA	907-271-3523	Steven.k.davis@noaa.gov	
Paul R. Stang 524 E. 15 th Terrace Anchorage, AK 99501	Stang Consulting	907-279-1092	prstang@alaska.net	yes
Robyn Angliss National Marine Mammal Lab Seattle, WA	NOAA	206-526-4032	Robyn.angliss@noaa.gov	Yes
Megan Ferguson NMML Seattle, WA	NOAA	206-526-6274	Megan.ferguson@noaa.gov	Yes
Arnold Brower Jr. Box 402 Barrow, AK	ICAS	907-852-5367	Northstar4450@gci.net	Yes
Candace Nachman 1315 East West Hwy Silver Spring, MD 20910	NMFS	301-713-2289 x156	Candace.nachman@noaa.gov	
Allan Filipov Fairfield Industries 1111 Gillingham Sugar Land, TX 77478	Fairfield	713-818-8466	afilipov@fairfield.com	Yes

Catherine Berchok 7600 Sand Point Way NE Seattle, WA 98115	NMML	206-426-631	Catherine.berchok@noaa.gov	Yes
Jim Hale 4503 Dredge Lake Juneau, AK 99801	NMFS	907-586-7491	Jim.hale@noaa.gov	Yes
Chris Winter 917 SW Oak Street, #417 Portland, OR 97205	Crog Law Center	503-701-6002	chris@crog.org	Yes
Glenn Ruckhaus 420 L Street, #100 Anchorage, AK 99501	Arcadis	907-277-3774	Glenn.ruckhaus@arcadis-us.com	Yes
Jeff Denton Centerpoint Drive Anchorage, AK 99503	MMS	907-334-5262	Jeffrey.denton@mms.gov	Yes
Charles Hopson				
Clive Hurst Houston	Eni Petroleum	713-393-6100	Clive.hurst@enipetroleum.com	Yes
Anneliese Tschannen 2161 Lake George Drive Anchorage, AK 99504	PAS	907-727-3931	exec@pas-ak.com	
Dee Williams	MMS	907-334-5283	Dee.williams@mms.gov	Yes
Jon Isaacs	URS	907-261-6714	Jon.isaacs@urscorp.com	
Russell Tait 800 Bell Street Houston, TX 77002	Exxon Mobil Production Co	713-656-2525	Russell.d.tait@exxonmobil.com	Yes
Jeffery Loman	MMS	907-334-5200	Jeffery.loman@mms.gov	
Michelle Turner	ASRC Energy Services	907-339-5460	Michelle.turner@ascenergy.com	Yes
Jeff Walker	MMS	907-334-5300	Jeffrey.walker@mms.gov	
Dale Funk 1101 E. 76 th Ave Anchorage, AK 99516	LGL Alaska	907-62-3339	dfunk@lgl.com	Yes
Tom Lohman 4011 Winchester Loop Anchorage, AK 99507	NSB	907-349-2606	tomlohman@aol.com	Yes
Michael Macrander 3601 C Street, #1000 Anchorage, AK 99503	Shell	907-646-7123	a.macrander@shell.com	
Holly Smith 4201 Wilson Blvd Arlington, VA 22205	NSF	703-292-7713	hsmith@nsf.gov	Yes
Joe Gagliardi 4207 Cooper Sky Ln Katy, TX 77494	GX Technology	832-878-5071	jgagliardi@iongeo.com	Yes
Sarah Tsoflias PO Box 921	IAGC	785-749-9343	Sarah.tsoflias@iagc.org	Yes

Lawrence, KS 66044				
Michael LeVine 174 S. Franklin #418 Juneau, AK 99801	Oceana	907-586-4050	mlevine@oceana.org	Yes
Darren Ireland 526 E. Bennett Dr Flagstaff, AZ 86001	LGL Alaska	928-226-0884	direland@lgl.com	Yes
William Koski 22 Fisher Street King City, ONT	LGL	905-833-1244	bkoski@lgl.com	Yes
W. John Richardson 22 Fisher St, POB 280 King City, ONT L7B1A6	LGL	905-833-1244	wjr@lgl.com	Yes
John Bengtson	NMFS	206-526-4016	John.bengtson@noaa.gov	Yes
George Noongwok PO Box 202 Savoonga, AK 99769	AEWC	907-852-2392	gnunguk@hotmail.com	Yes
Janice Meadows PO Box 570 Barrow, AK 99723	AEWC	907-852-2392	Aewedirebarrow.com	Yes
Erling Westlien 3601 C Street #1000 Anchorage, AK 99503	Shell	907-770-3700	Erling.westlien@shell.com	Yes
Amanda Henry 3201 C Street #302 Anchorage, AK 99503	UIC UMIAQ	907-677-8262	ahenry@uicumiag.com	Yes
Megan Blee 1101 E. 76 th Ave #B Anchorage, AK 99518	LGL	907-562-3339	mblees@lgl.com	
Christopher Clark 159 Sapsucker Woods Rd. Ithaca, NY 14050	Cornell University Bioacoustics	607-254-2408	Cwc2@cornell.edu	
Carole Holley 1034 W. 20 th #2 Anchorage, AK 99503	Pacific Environment	907-277-1029	cholley@pacificenvironment.org	Yes
Jeff Childs PO Box 111406 Anchorage, AK 99511		907-240-7880	oceanzwts@gci.net	
Bill Streever	BP	907-440-8324	streevbi@bp.com	Yes
David Aldrich PO Box 568 Seward, AK 99664	AOS/Fairweather	907-244-0060	dgaldrich@aldrichoffshore.com	Yes
Andy Mack 3000 C Street, #201 Anchorage, AK 99503	North Slope Borough	907-646-8210		
				Yes

Bruce St. Pierre PO Box 100360 Anchorage, AK 99510	ConocoPhillips	907-265-6417	Bruce.st.pierre@conocophillips.com	
Caryn Rea	CPAI	907-265-6515	Caryn.rea@conocophillips.com	Yes
Martin Cohen	Statoilhydro.com	713-291-7346	mch@statoilhydro.com	
Tim Thompson	Statoilhydro.com	713-291-7346		Yes
April Parsons	Statoilhydro.com	713-291-7346	aprp@statoilhydro.com	Yes
Ken Boyd, Consultant	Statoilhydro.com	713-291-7346		
Shirley Kelly 510 L Street Anchorage, AK 99501	EDA	907-271-1439	skelly@eda.dec.gov	
Michael Link	LGL	907-562-3339	mink@lgl.com	
Diane Sanzone 900 Benson Blvd Anchorage, AK 99519	BP	907-242-6459	Diane.sanzone@bp.com	
Rick Steiner	University of Alaska	907-786-4156	afrgs@uaa.alaska.edu	
Dan Forster	NSB Planning	907-852-0320	Dan.Forster@north-slope.org	
Robert Province	Eni Petroleum	907-947-3793	Robert.province@enipetroleum.com	Yes
Jay Brueggeman 1147 21 st Ave E Seattle, WA 98112	Canyon Creek Consulting	206-324-6292	jaycanyoncreek@aol.com	Yes
Danielle Savarese 1107 E. 76 th Ave, #B Anchorage, AK 99518	LGL	907-562-3339	dsavarese@lgl.com	Yes
Scott Raborn 207 Pearce Road Pineville, LA 71360	LGL	318-787-2222	sraborn@lgl.com	
Joel Garlich-Miller	USFWS	907-786-3820	Joel_garlichmiller@fws.gov	Yes
Greg LeBeau 4341 B Street #101 Anchorage, AK 99503	Ak Maritime Agencies	907-562-8808	gcl@anc.alaskamaritime.com	
Rich Kleinleder PO Box 367 Homer, AK 99603	URS	907-235-8702	Richard_kleinleder@urscorp.com	Yes
Barbara Bohn 3601 C Street #1334 Anchorage, AK 99503	Shell	907-646-7186	Barbara.bohn@shell.com	Yes
Lisa O'Brien 24010 Clearing Eagle River, AK 99577	Alaska Training & Consulting	907-229-4682	atc@ak.net	Yes
Ben Greene	NSB	907-852-0320	Ben.greene@north-slope.org	Yes
Ed Nelson	PGS Onshore	907-569-4049		
George Ahmoagak Sr.				Yes
Bill Fricke	PGS Onshore	907-980-1453	Bill.fricke@pgsonshore.com	

Mark Hodor	NOAA	301-713-9669	Mark.hodor@noaa.gov	Yes
Robert Day	ABR	907-455-6777	bday@abrinc.com	Yes
Kimberly Skrupky	MMS	703-787-1807	Kimberly.skrupky@mms.gov	Yes
James Wilder	NMFS	907-271-6620	James.wilder@noaa.gov	Yes
Scott Carr Halifax, NS, Canada	JASCO	902-405-3336	scott@jasco.com	Yes
Deborah Hutchinson Woods Hole, MA	USGS	508-457-2263	dutchinson@usgs.gov	Yes
Danny Garcia Sugar Land, TX	Fairfield Industries	281-275-7677	dgarcia@fairfield.com	Yes
Janet Clarke 14620 268 th Ave E Buckley, WA 98321	SAIC	360-897-6592	Janet.clarke@saic.com	Yes
Bill Lang Arlington, VA	NSF	703-292-7857	wlang@nsf.gov	
Peter Hanley 16430 Virgo Ave Anchorage, AK 99516	Chiniak Environmental	907-830-6146	pthanley@gic.net	
Julie Lina 700 G St #600 Anchorage, AK 99501	Pioneer	907-343-2106	Julie.lina@pxd.com	Yes
Bob Britch 2454 Telequana Anchorage, AK 99517	Eni	907-243-7716	bbritch@alaska.net	Yes
Dave Hannay 2101-4464 Victoria, BC	JASCO	250-483-3300	David.hannay@jasco.com	Yes
Dale Hoffman	PND	907-343-2108		
Jana Lage 2700 Gambell #200 Anchorage, AK 99503	AES	907-339-6452	Jana.lage@asrcenergy.com	Yes
Micahel Galginaitis PO Box 101352 Anchorage, AK 99510	Applied Sociocultural Research	907-272-6811	msgalginaitis@alaska.net	
Katherine H. Kim 4447 Muir Ave San Diego, CA 92107	Greeneridge Sciences, Inc.	858-354-0194	khkim@greeneridge.com	Yes
Jon Childs USGS MS 999 345 Middlefield Menlo Park, CA 94025	USGS	650-329-5195	jchilds@usgs.gov	Yes
Larry Watt 3201 C Street Anchorage, AK 99503	PGS Onshore	907-569-4049	Larry.watt@pgs.com	Yes
Robert Sorley	PGS Marine	250-294-9951	Robert.sorley@pgs.com	

15150 Memorial Dr Houston, TX 77079				
Pete Sloan 3805 Centerpoint Dr Anchorage, AK 99503	MMS	907-334-5328	Pete.sloan@mms.gov	Yes
Robert Suydam Barrow, AK	NSB	907-852-0350	Robert.suydam@north-slope.org	
Dean Kennedy 20 Duntara Cres St. Johns, NL, Canada	GXT	281-725-1590	Dean.kennedy@iongec.com	Yes
John Davis 2525 Gambell #400 Anchorage, AK 99503	Western Geo	907-360-3518	jdavisg@slb.com	Yes
Rebecca Noblin PO Box 100599 Anchorage, AK 99510	Center for Biological Diversity	907-274-1110	rnoblin@biologicaldiversity.org	Yes
Alan Bailey 13265 Badger Lane Anchorage, AK 99511	Petroleum News	907-345-9622	abailey@petroleumnews.com	
Aaron Thode San Diego, CA	SIO	858-212-1481	athode@ucsd.edu	
Trent McDonald Laramie, WY	West, Inc.	307-760-4721	tmcdonald@west-inc.com	
Charles Greene 1411 Firestone Road Santa Barbara, CA 93117	Greeneridge Sciences	805-967-7720	greene@greeneridge.com	Yes
Harry Brower PO Box 712 Barrow, AK	AEWC	907-852-2392		Yes
Lisanne Aerts Anchorage, AK	LGL	907-337-2747		Yes
Stan DeForest 149 Sapsucker Woods Rd Ithaca, NY 13073	Cornell University	607-254-6250	SFD38@cornell.edu	Yes
Chris Nations	West, Inc.	307-760-0047	cnations@west-inc.com	
Sheyna Wisdom	URS	907-261-6705	Sheyna.widsom@urscorp.com	
Brian Havelock	State of Alaska, ADNR	907-247-6291	Brian.havelock@alaska.gov	
Arlene Thomas 2700 Gambell St Anchorage, AK 99503	AES/RTS	907-339-6465	athomas@asrcenergy.com	Yes
Tom Rueter 4341 B Street #101 Anchorage, AK 99503	Alaska Maritime	907-223-2907	twr@anc.alaskamaritime.com	Yes
Dan Fitzgerald	NSTS	907-766-2141	danfitzge@gmail.com	Yes

PO Box 467 Haines, AK 99827				
Andrew Hartsig 1775 Morningtide Ct Anchorage, AK 99501	Ocean Conservancy	907-229-1690	ahartsig@oceanconservancy.org	Yes
Taquile Hepe	NSB	907-852-0750		
George Ahaogak	Ahmaogak & Associates	907-334-9636	George.ahmagoksa@gci.net	
Ken Byrd	Statoil	907-694-2397		
Heather Collins-Ballot	CPAI	907-265-6213	Heather.s.collins-ballot@conocophillips.com	Yes
Michael Mayer	Earth Justice	206-280-6093	mmayer@earthjustice.org	Yes
Don Perrin	DNR	907-269-7471	Donald.perrin@alaska.gov	
Layla Hughes	WWF	202-459-3903	Layla.hughes@wwfus.org	Yes
Tatyana Venegas 900 E. Benson Blvd Anchorage, AK	BP	907-564-5457	Tatyana.venegas@bp.com	
Craig Reiser 9631 Elmore Rd Anchorage, AK 99507	LGL	907-562-3337	creiser@lgl.com	Yes
Cindy Bailey PO Box 196612 Anchorage, AK 99519	BP	907-564-5537	Cindy.bailey@bp.com	Yes
Susanna Blackwell 120 Tmarack Dr Aptos, CA 95003	Greeneridge Sciences	831-332-6042	susanna@greeneridge.com	Yes
Rex Snyder	UMIAQ	907-227-1924	rsnyder@uicumiaq.com	Yes
Victoria Hykes Steere	US	907-258-4985	hykessteere@gmail.com	
Rick Trupp	CGG Veritas	907-276-6037	Rick.trupp@cggveritas.com	
Mark Wiggin		907-244-5041	mwiggin@yahoo.com	
Ben Greene	NSB	907-852-0320	Ben.greene@north-slope.org	Yes
Ed Nelson 3201 C Street, #403 Anchorage, AK 99503	PGS Onshore	907-569-4049		Yes
Jonathan Jemming	NSB	907-852-0484	Jonathan.jemming@north-slope.org	
Maggie Ahmaogak 12811 Monterey Circle Anchorage, AK 99516	Ahmaogak & Associates	907-334-9636	George.ahmaogaksr@gci.net	Yes
Meghan Larson 2700 Gambell #201 Anchorage, AK 99503	ASRC-AES	907-339-5492	Meghan.larseon@asrcenergy.com	
Cheryl Rosa	NSB-DWM	907-852-0350	Cheryl.rosa@north-slope.org	Yes
Jocelyn Fenton	ARCADIS	907-277-3750		
Robert Sorley	PGS	250-294-9951	Robert.sorley@pgs.com	Yes

15150 Memorial Drive Houston, TX 77079				
Lisa Rotterman 222 W. 7 th Ave #517 Box 43 Anchorage, AK		907-271-1692	Lisa.rotterman@noaa.gov	
Jeff Stephan PO Box 2917 Kodiak, AK 99615	United Fishermen's Marketing Association	907-486-3453		
Dale Brower Stotts UKpeagvik Inupiat Corp Barrow, AK	UIC	907-677-5242	dstotts@umiaq.com	
Chris Campbell	MMS	907-334-5264	Chris.campbell@mms.org	Yes
Colleen McCarthy	ConocoPhillips	907-263-4576	Colleen.m.mccarthy@conocophillips.com	Yes

Prepared By:

Professional Administrative Services, Inc.
2161 Lake George Drive, Anchorage, AK 99504-3514
www.pas-ak.com