Challenges When Quantifying Arctic Ecosystems

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Project Objectives

Preferred Option: fish census for oil and gas exploration impact baseline

Operational Solution: ecosystem survey for Beaufort Sea baseline

Impact of Change: expanded objectives; more complex survey design

Joint NOAA NMFS, UW, and UAF project funded by MMS
Survey Objectives

- quantify the species composition, distribution, and abundance of fish and invertebrates.

- sample water column characteristics and zooplankton community

- recommend methods for future monitoring
Sampling Platform

Preferred Option: ice-hardened hull, large science crew, 24 hour ops, unlimited gear

Operational Solution: fishing vessel, 6 science berths, 12 hour ops, limited sampling

Impact of Change: reduced sampling areas, times, types (1 set of doors, towpoints), 2 surveys
Survey Timing

Preferred Option: open water, no operational conflicts

Operational Solution: shifted to accommodate seismic surveys and bowhead whale hunt

Impact of Change: survey delayed by ice, unknown impact of seismic surveys

Survey: July 27 to August 30, 2008
Sample Site Choice

Preferred Option: western transects, Beaufort

Operational Solution: eastern transects

Impact of change: potential Chukchi Sea influence?
Infrastructure Support

Preferred Option: local staging - equipment, boarding, fuel supply, medical support

Operational Solution: Dutch Harbor – staging, science boarding (6 day steam), fueling, EMT science crew, emergency plan with Barrow and Oil companies

Impact: reduced sampling, increased costs, increased time commitment,
Sampling Design

1st Survey: W to E hydrography and bottom trawls with acoustics

2nd Survey: E to W acoustics and midwater trawls with hydrography

Initial plan modified due to ice
Bottom Sampling
Ice, limited bathymetric & biological knowledge

1977 Frost and Lowry Sampling Locations
1990 Thorsteinson et al. Sampling Locations
2008 MMS/AFSC Sampling Locations

Beaufort Sea
Barrow
Alaska
Midwater Fish Distributions

Age-0 Arctic cod, sculpin, eelblenny

Age-1+ Arctic cod

Average = 15,000 fish/ha

Age-1+ Arctic cod
Predator-Prey Overlap

Modified from Moore et al. 2007

Age-1+ Arctic cod from acoustics

2005-2006 Beluga Sightings

Barrow

Modified from Moore et al. 2007
Resource Harvesting

- reduction in sea ice opens “new” water
- potential harvest of arctic cod and opilio crab
- range extensions of other species
Thanks to…

Midwater Results: Poster Session 1.1 Tues. evening
Benthic Results: Session 2.3 Weds. 9:35-12:45 am