

# Passive Acoustics

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NOAA/Seattle

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U. S. Department of the Interior, Bureau  
of Ocean Energy Management,  
Regulation and Enforcement (BOEMRE)  
Inter-agency Agreement Nos.  
M09PG00016 & M08PG20021



# Current Field Projects

## **CHAOZ (2010-2015):**

### **Chukchi Acoustics, Oceanography, and Zooplankton study**

3 arrays of 5 year-long AURALs (16kHz at 30% duty)  
Sonobuoys for sampling along cruise track  
1 (planned) Cornell auto-detection buoy (now pop-up)  
*[Joint project: Oceanography, zooplankton, passive acoustics, ship survey, photo-id, biopsy, satellite tagging, and climate modeling]*

## **Hydrophones for Hunters (2010+)**

Simple, compact, dipping hydrophone kits  
*[Outreach + getting more info out of long-term recorders]*

## **PRIEST (2007-2010):**

### **Pacific Right whale Evaluation Study**

4 Year-long AURALs (8kHz at 30% duty)  
4 Year-long EARs (4kHz at 7% duty)  
Sonobuoys to find right whales during cruise (shipboard & aerial)  
*[Ship survey, photo-id, biopsy, satellite tagging, oceanography, aerial survey, passive acoustics]*

## **BOWFEST (2007-2012+):**

### **Bowhead Feeding Ecology Study**

6 Year-long AURALs (8kHz at 30% duty)  
5 Short-term EARs (40kHz at 92% duty)  
*[Joint project: oceanography, aerial survey, tagging, passive acoustics]*

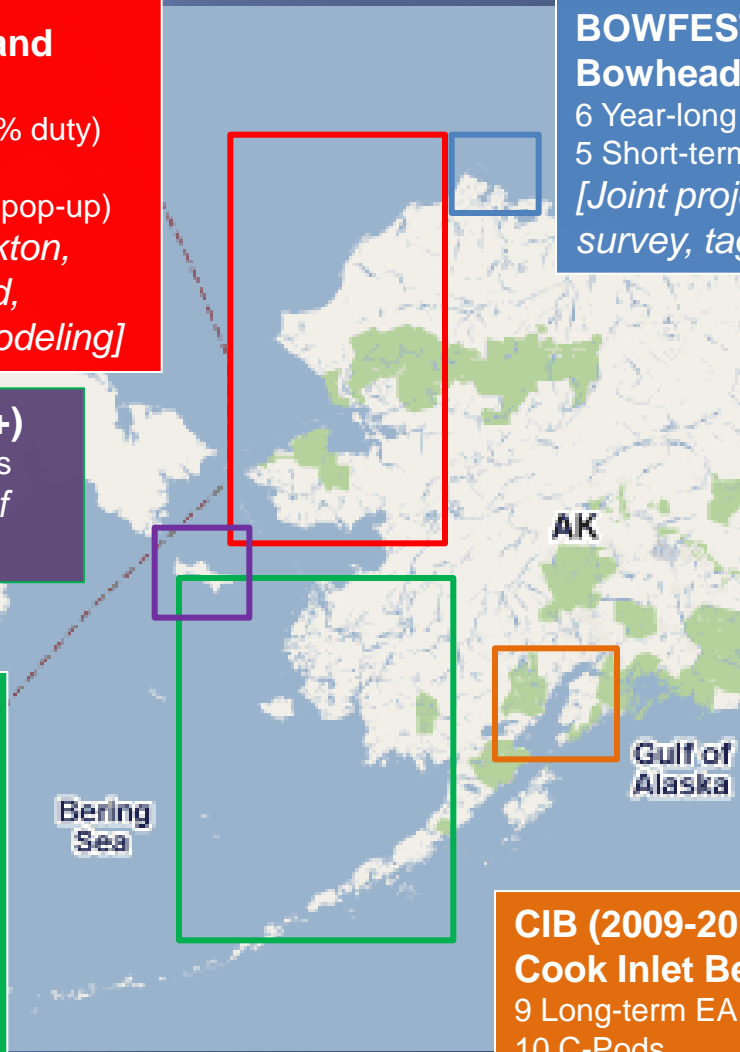
## **International Polar Year (2008-2011)**

1 Year-long AURALs (8kHz at 30% duty) on Chukchi Plateau and 2 in Fram Strait  
*[Joint with Canadians, Germans, and Norwegians: oceanography & passive acoustics]*

## **CIB (2009-2011+):**

### **Cook Inlet Beluga Study (Castellote)**

9 Long-term EAR recorders  
10 C-Pods  
1 DGS-Ocean  
Wideband dipping hydrophone  
*[Passive acoustics & oceanography]*



# CHAOZ

## CHukchi sea Acoustics, Oceanography, and Zooplankton study

- *Phyllis Stabeno, Jeff Napp, Jim Overland, Sue Moore PMEL/AFSC*
- *Oceanography, zooplankton, passive acoustics, visual survey, photo-id, biopsy, satellite tagging, climate and noise modeling*
- *First field season in 2010*



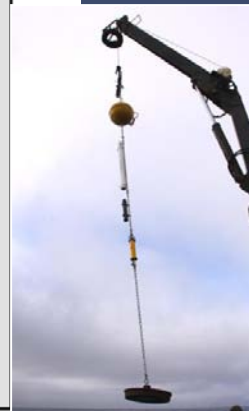
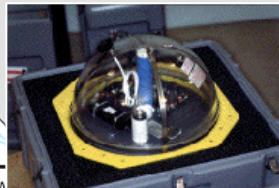
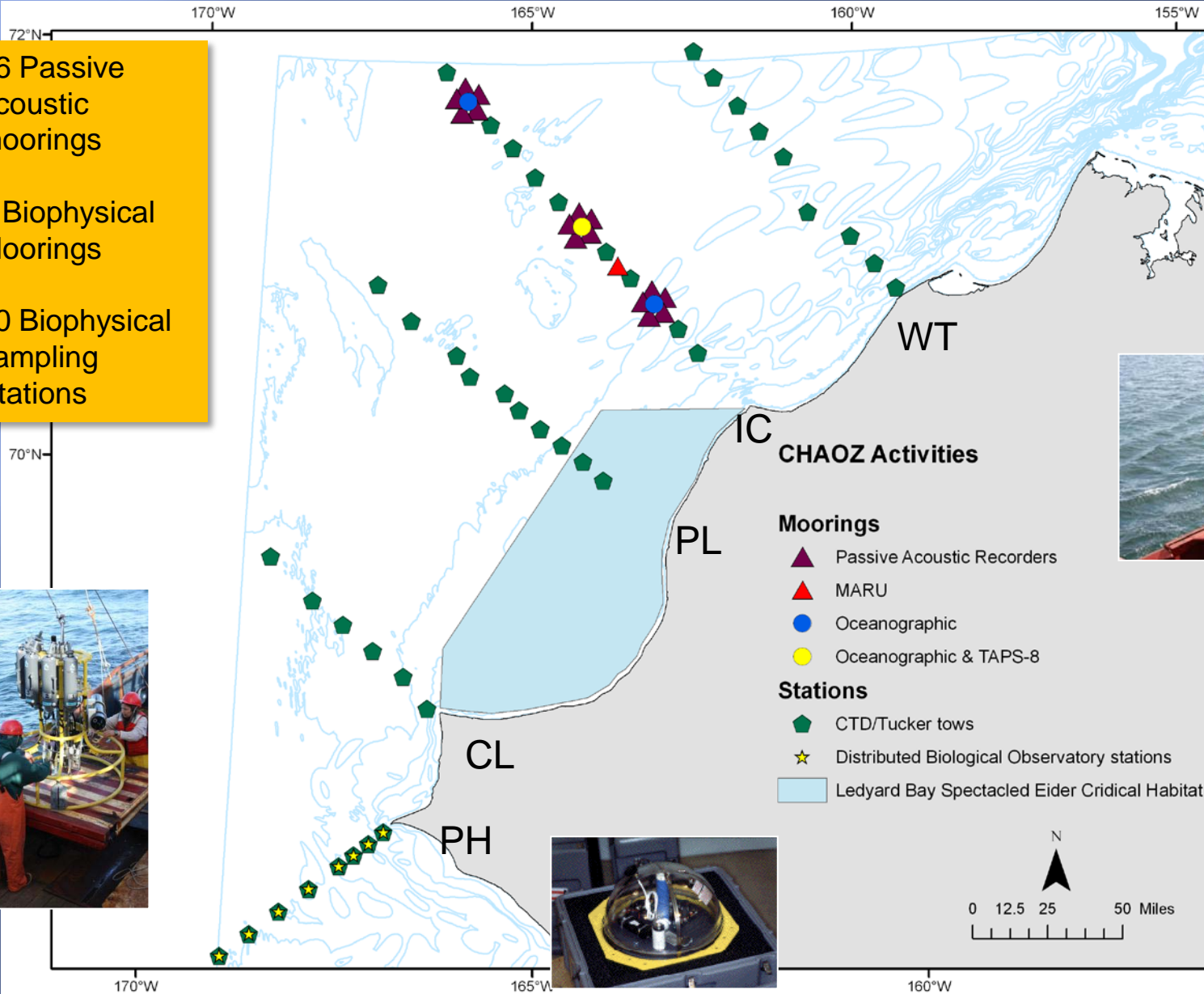
*F/V Alaskan Enterprise  
August 24 – September 20, 2010*

# Moorings and Sampling Stations

16 Passive acoustic moorings

7 Biophysical Moorings

50 Biophysical sampling Stations





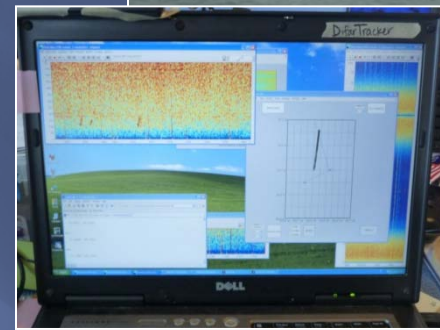
# Passive Acoustic and Visual Surveys

- ▣ 102 sonobuoys deployed

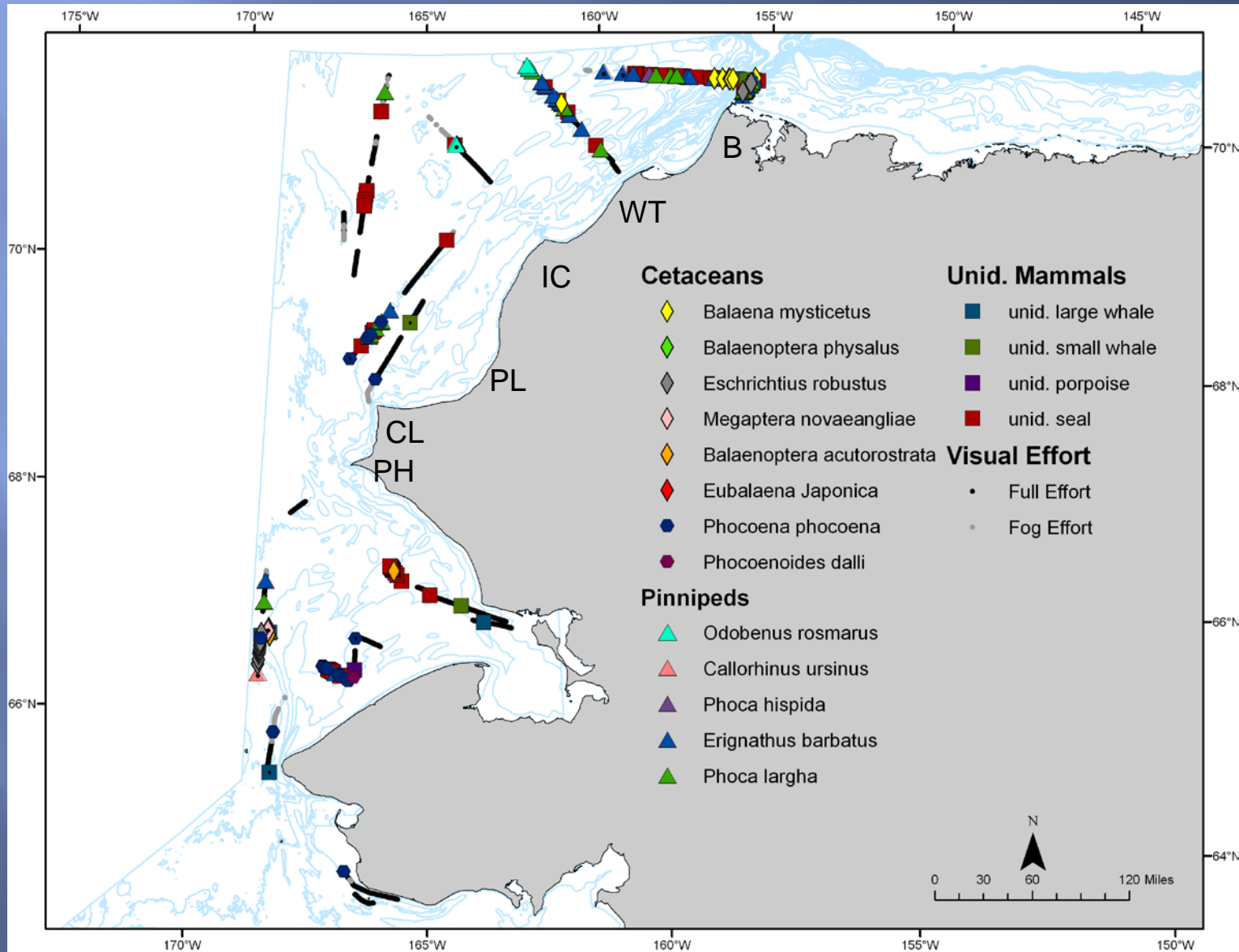
- ▣ *Fin*
- ▣ *Bowhead*
- ▣ *Walrus*
- ▣ *Airguns*

- ▣ 1,478 miles visually observed

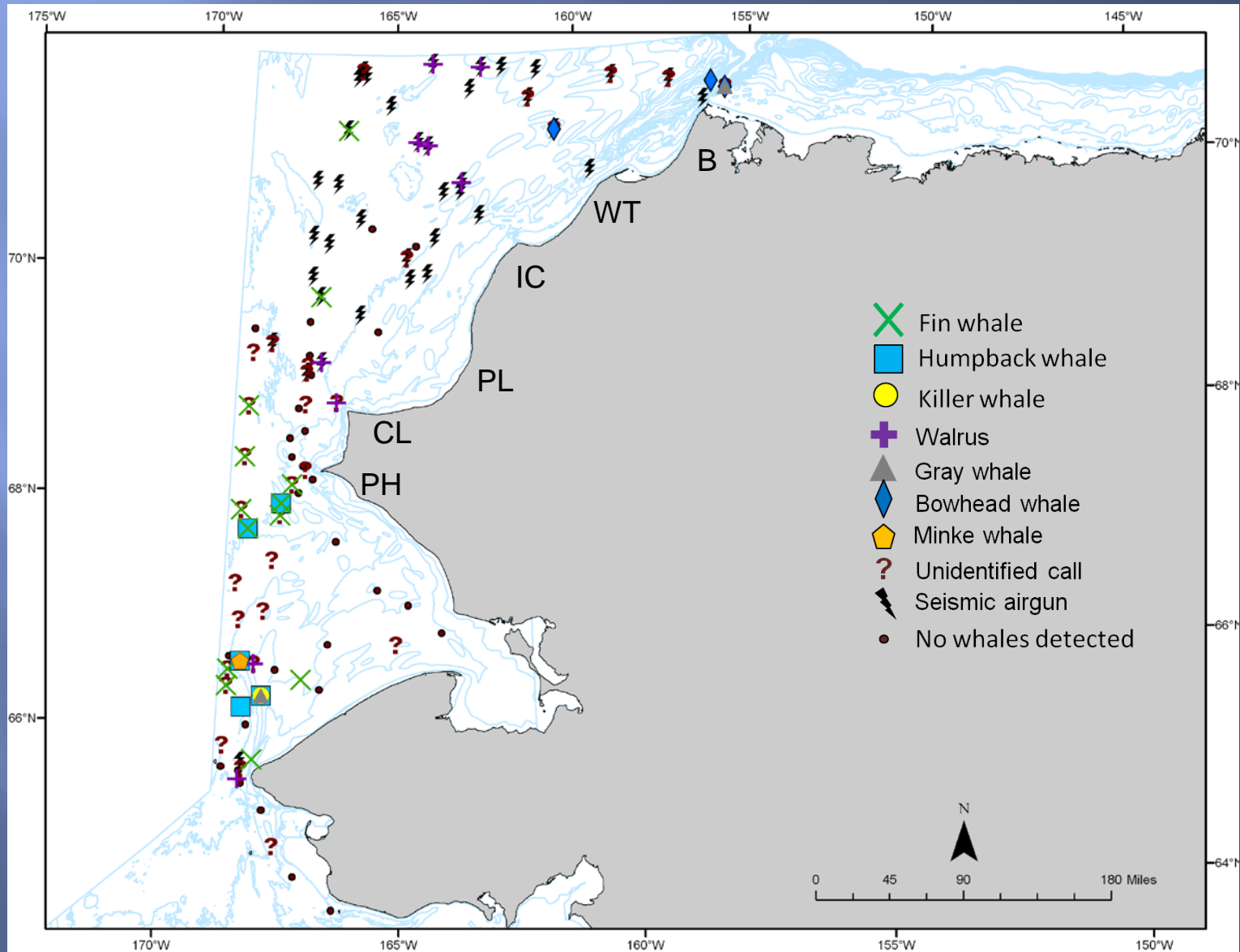
- 139 sightings (40% cetacean, 60% pinniped) of 12 confirmed species
- 96 sightings (20% cetacean, 80% pinniped) of unidentified marine mammals
- *Gray, Bowhead, Harbor Porpoise, Bearded and Spotted seals*



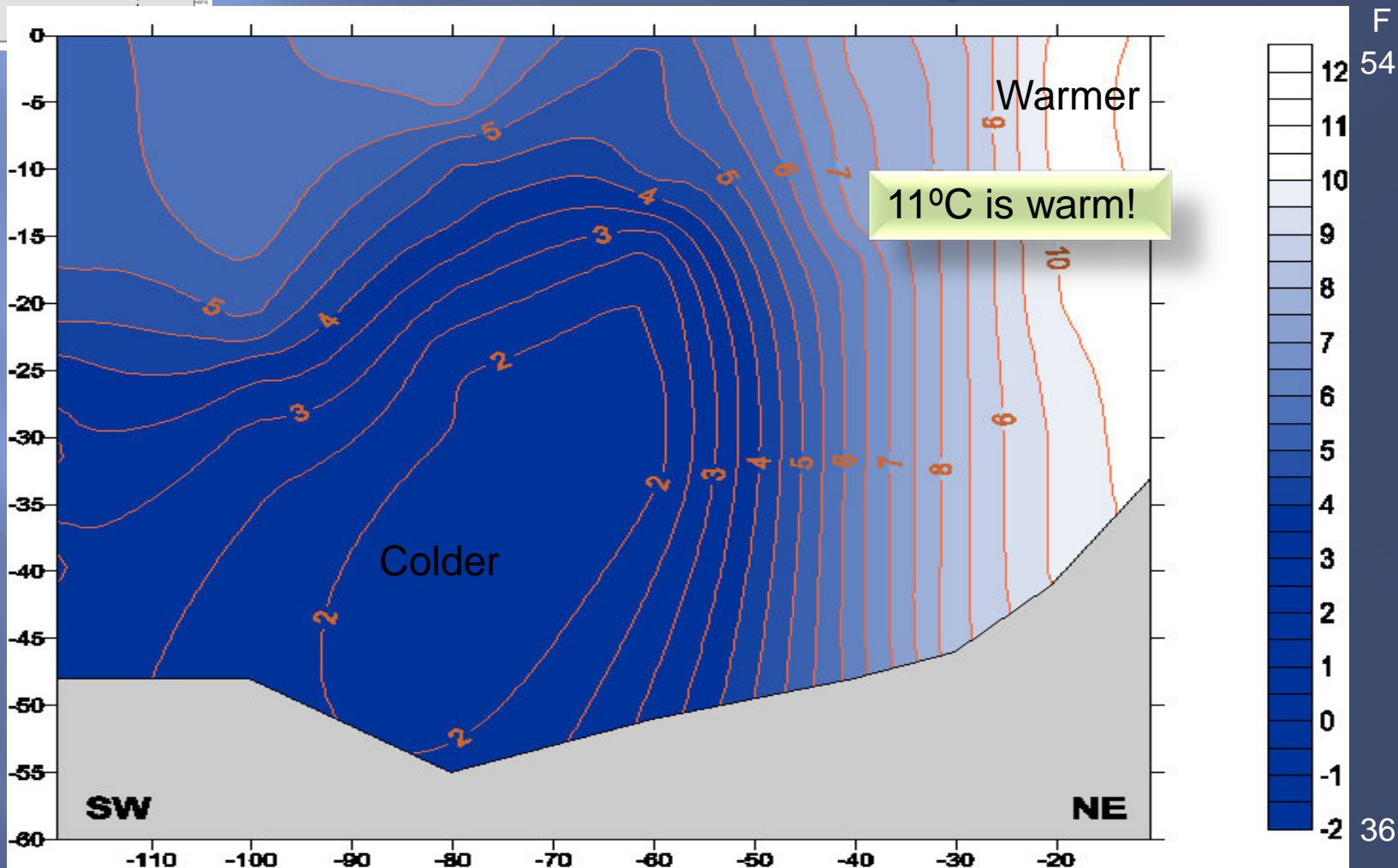
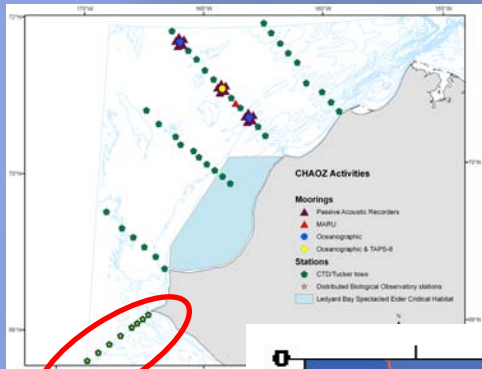
# Visual Observations



# Sonobuoy detections

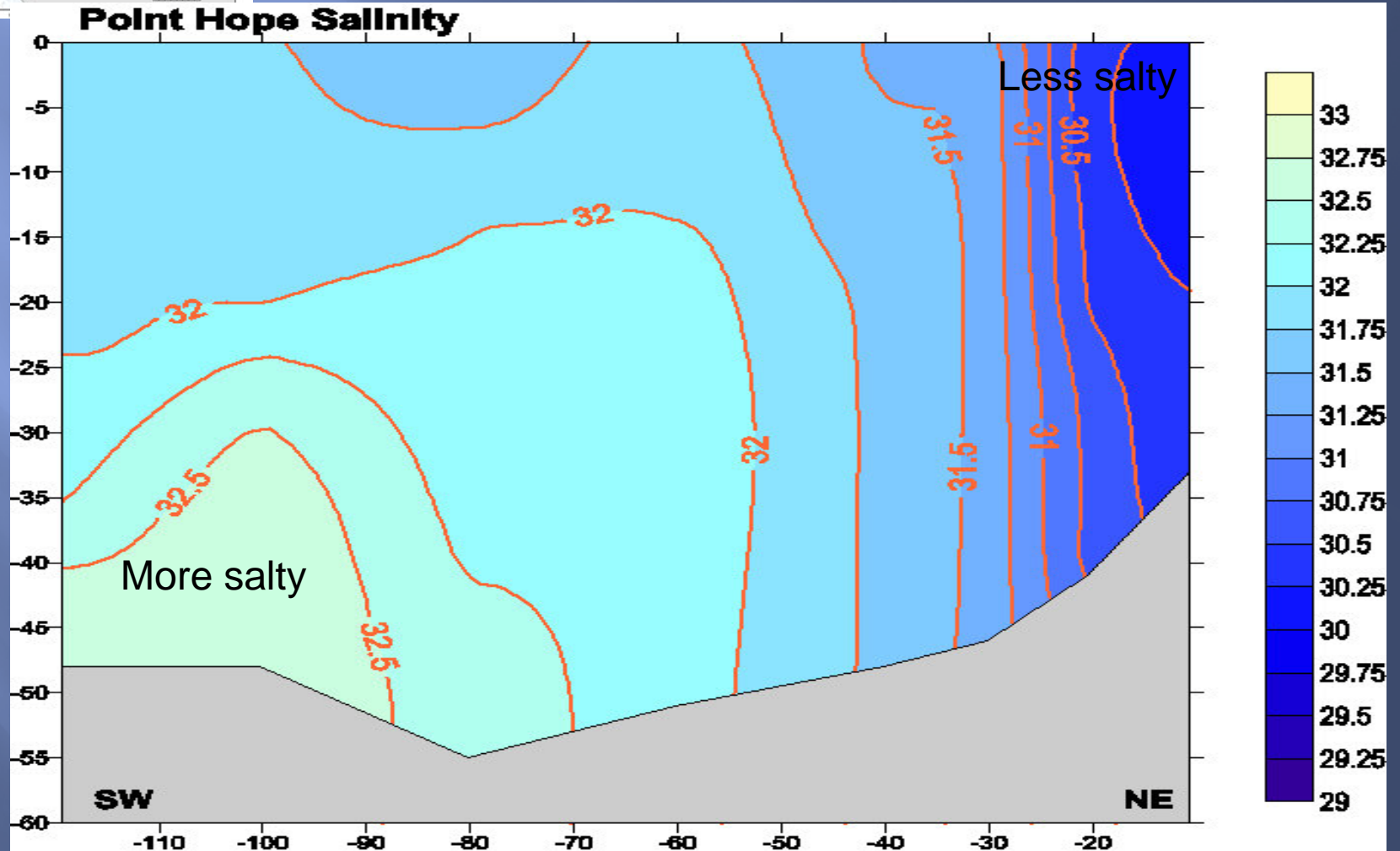
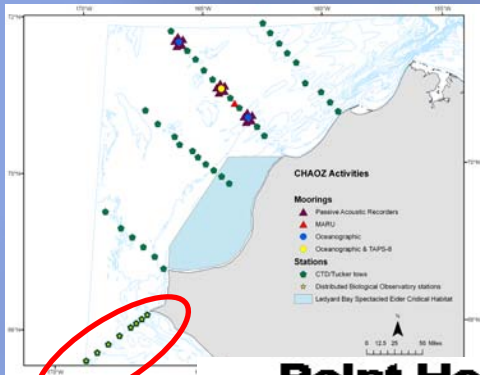


# Temperature (°C) Point Hope

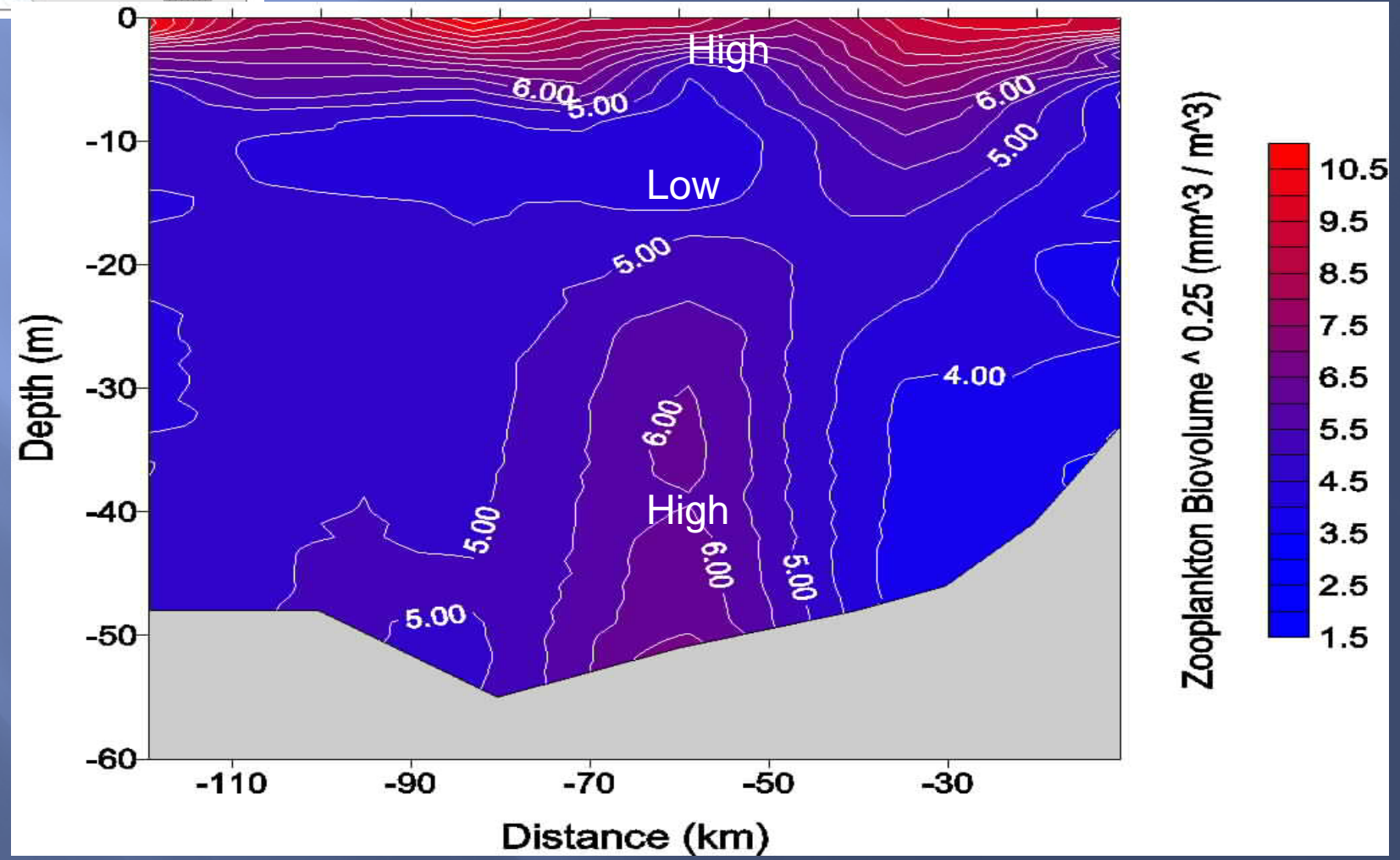
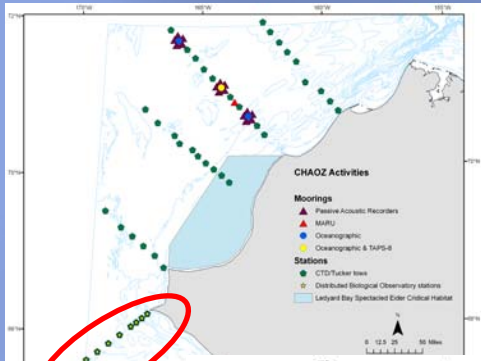




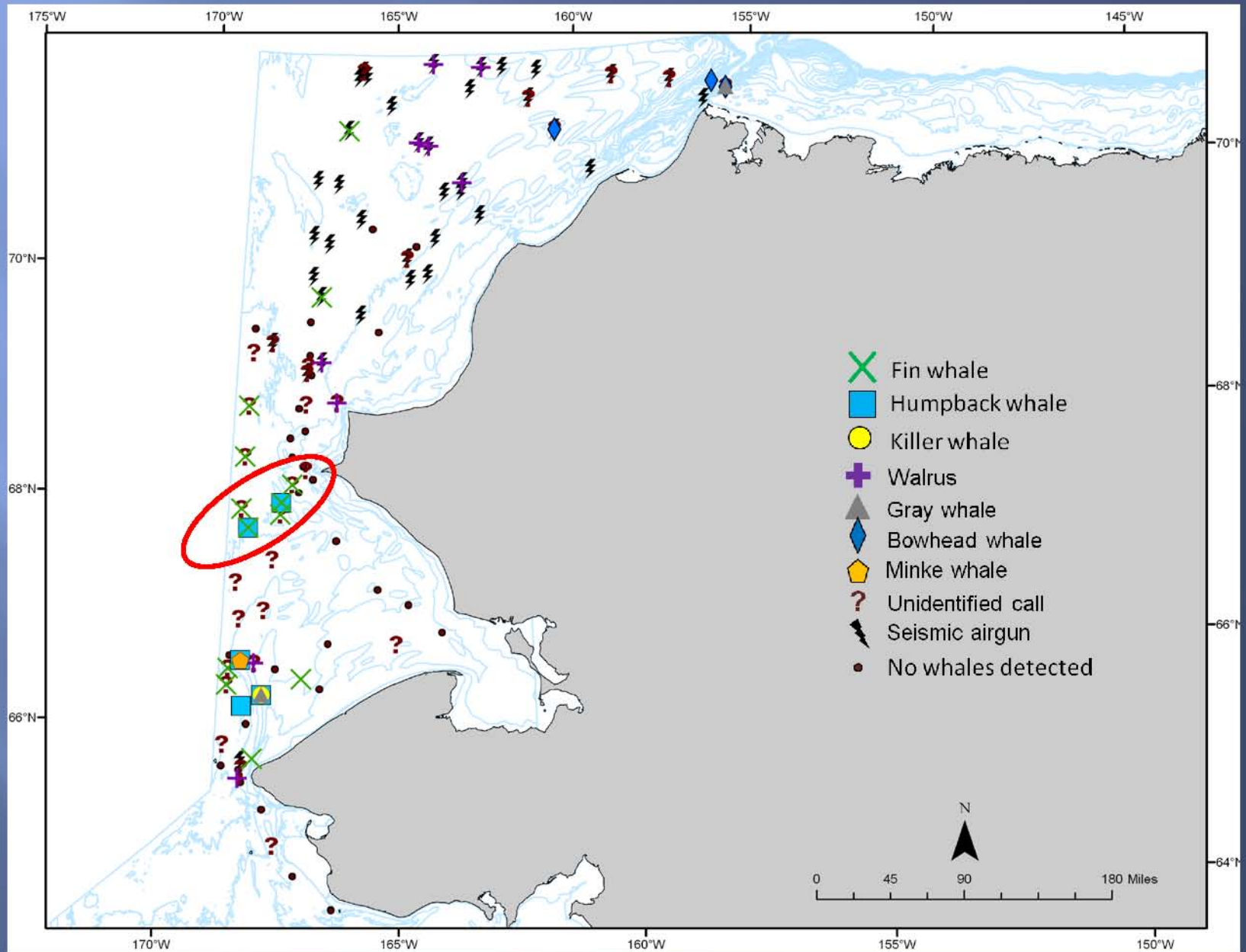
# Salinity (psu) Point Hope



# Zooplankton Biovolume Point Hope

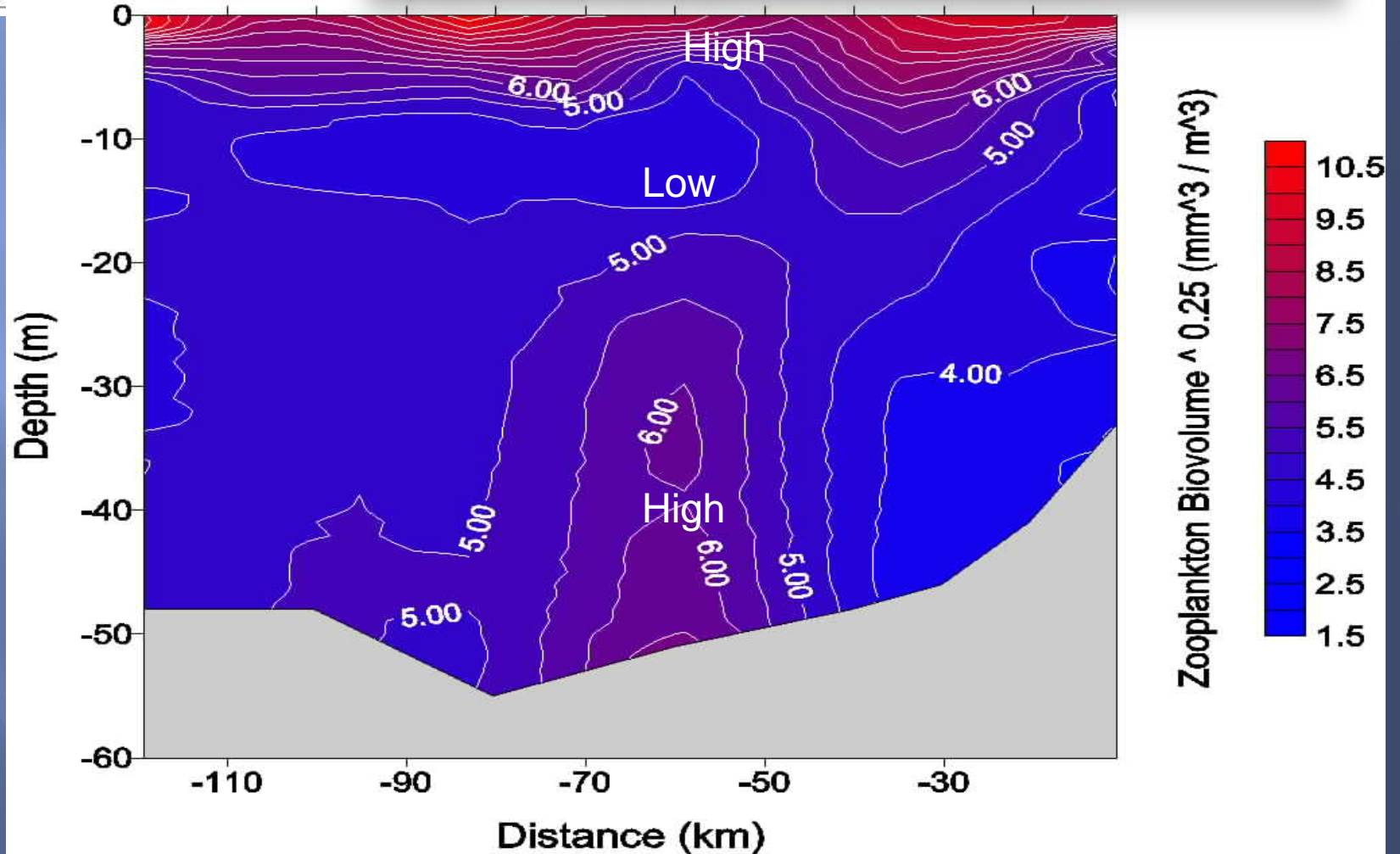
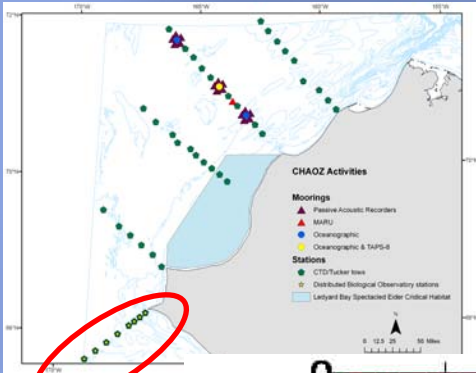


# Marine Mammal Calls – Point Hope



# Zooplankton Biovolume

Each transect was different, but all had more zooplankton at depth and at the surface.



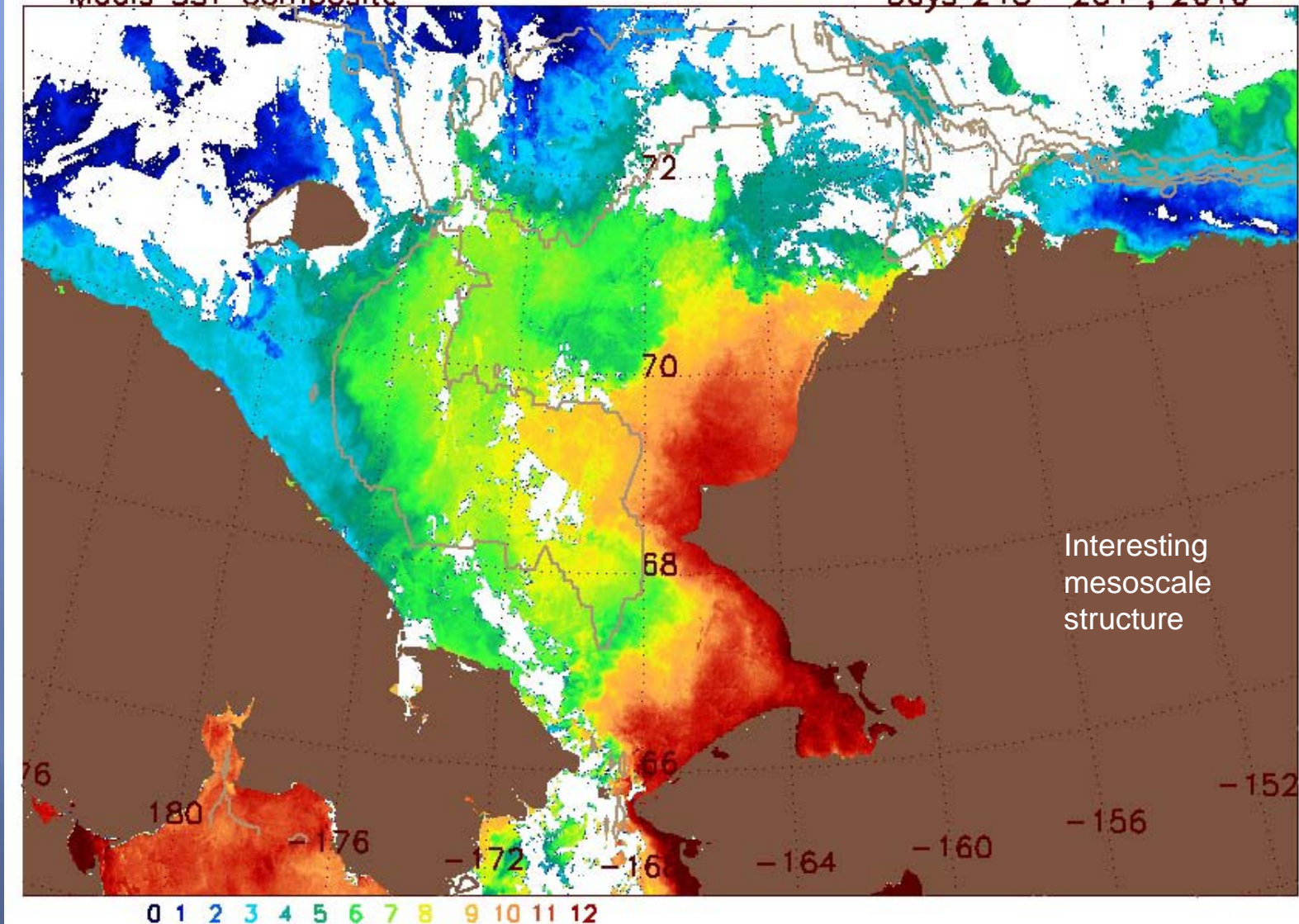


# Sea Surface Temperature

September 2-11, 2010

Days 245- 254 , 2010

Modis SST Composite

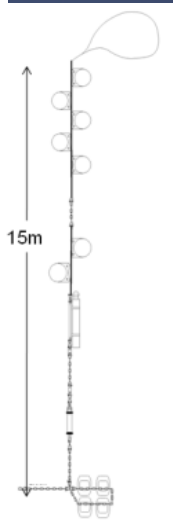
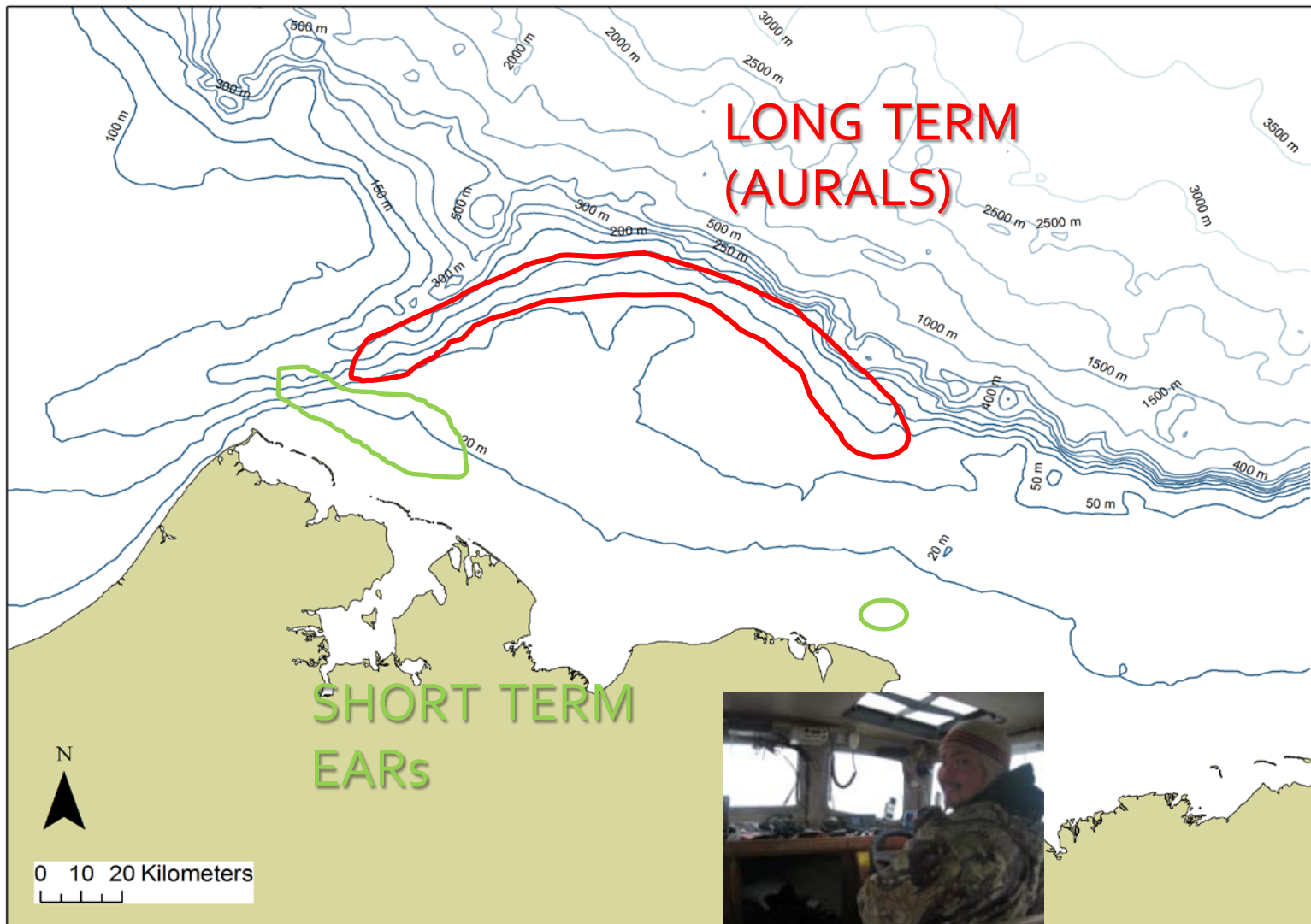


# BOWFEST

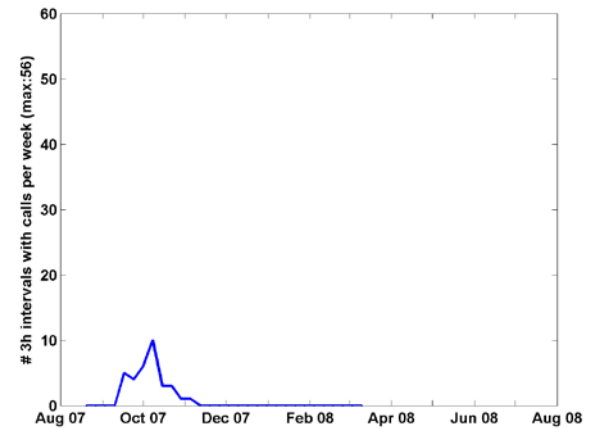
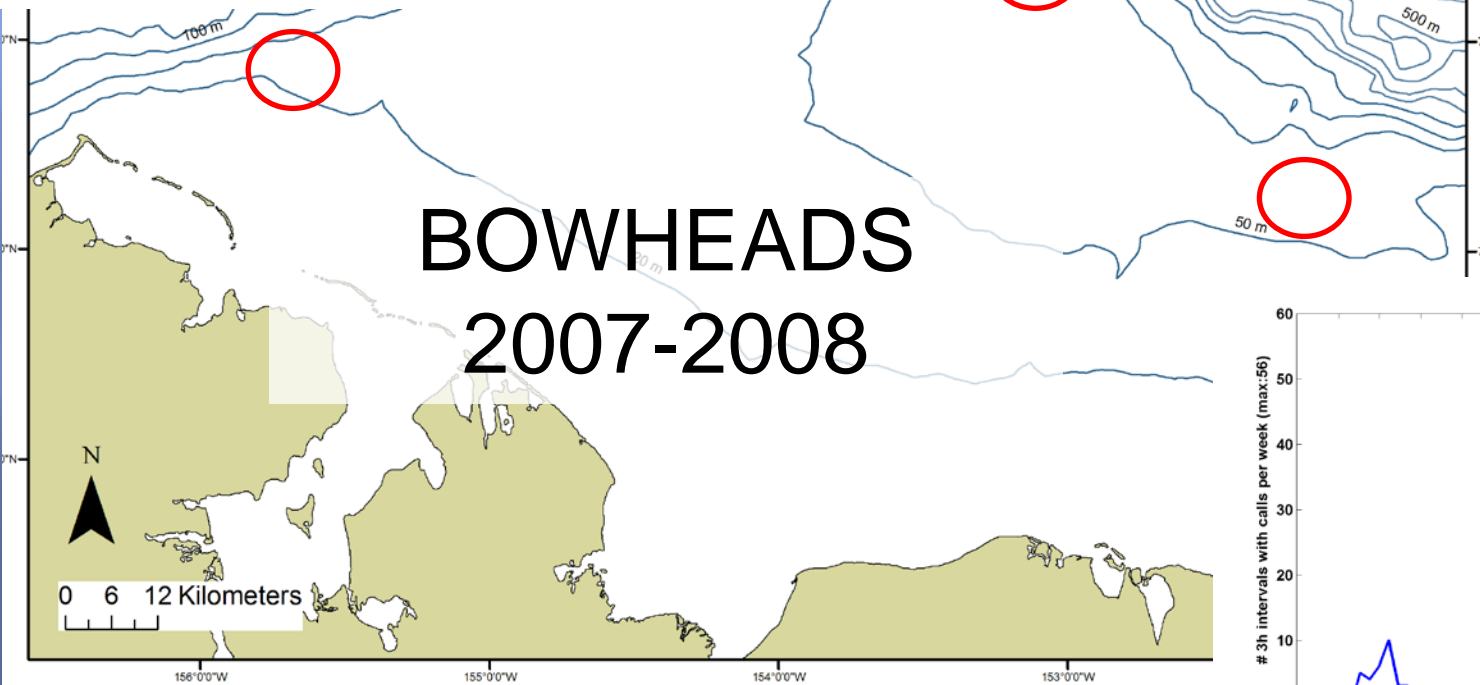
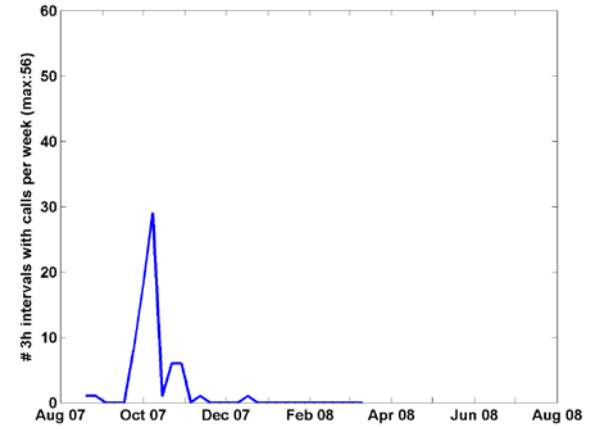
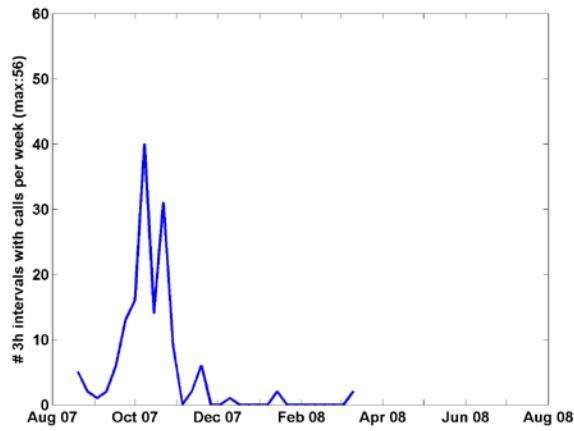
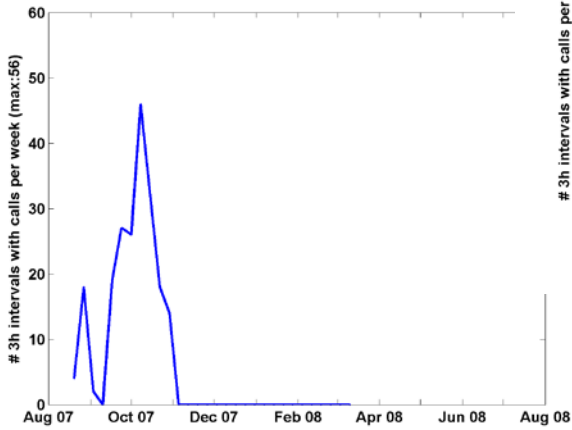
## BOWhead Feeding Ecology Study

- *NMML, NOAA S&T-PMEL, Woods Hole, U. Alaska Fairbanks, U. Rhode Island, U. Washington, Oregon State Univ., Alaska Department of Fish & Game, North Slope Borough*
- *Oceanography, zooplankton, passive acoustics, visual survey, aerial survey and photo-ID, stomach sampling, and energetics*
- *Just talking about passive acoustic results today.*
  - *Kate Stafford & Kalyn McIntyre (UW), Dave Mellinger, Sara Heimlich, & Sharon Nieukirk (PMEL/OSU), Sue Moore (NOAA S&T-PMEL)*

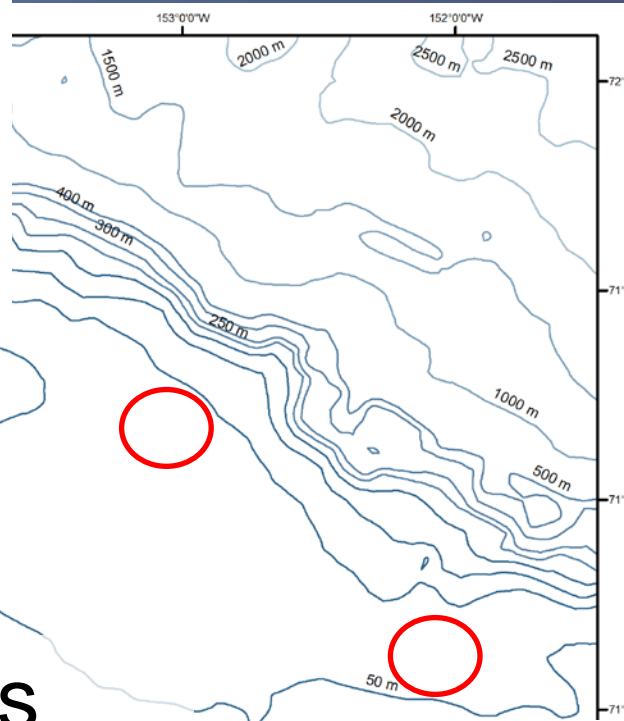
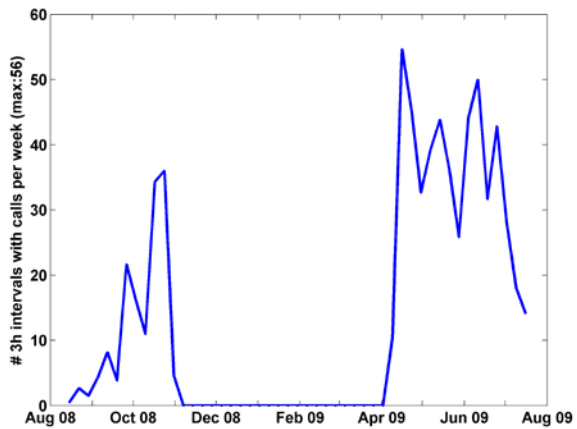
# Passive Acoustic Moorings



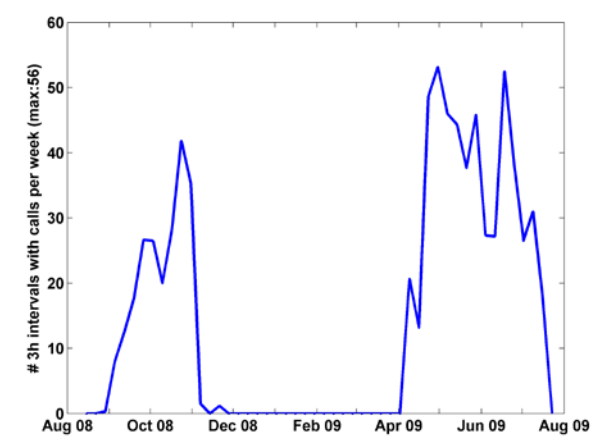
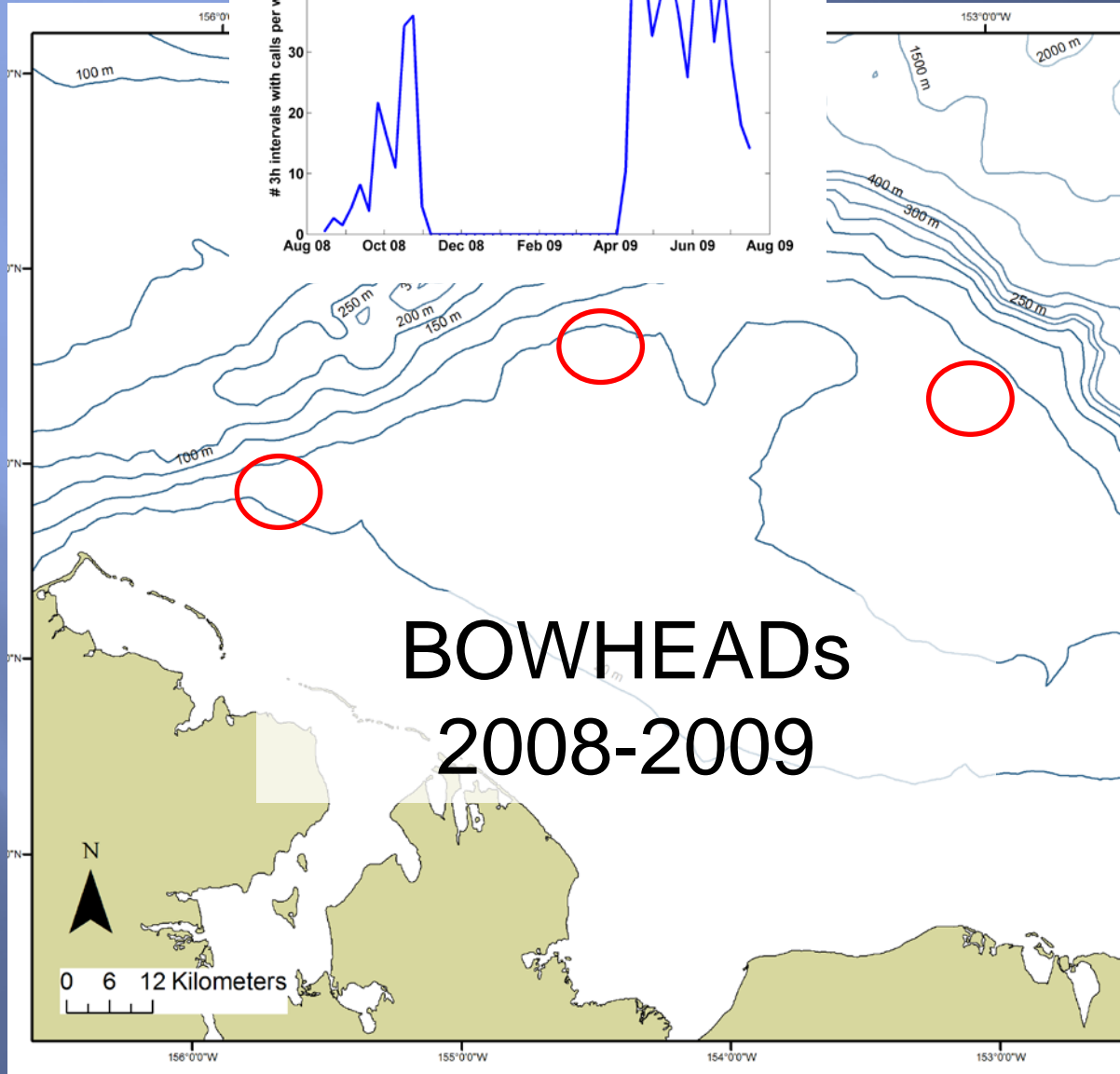


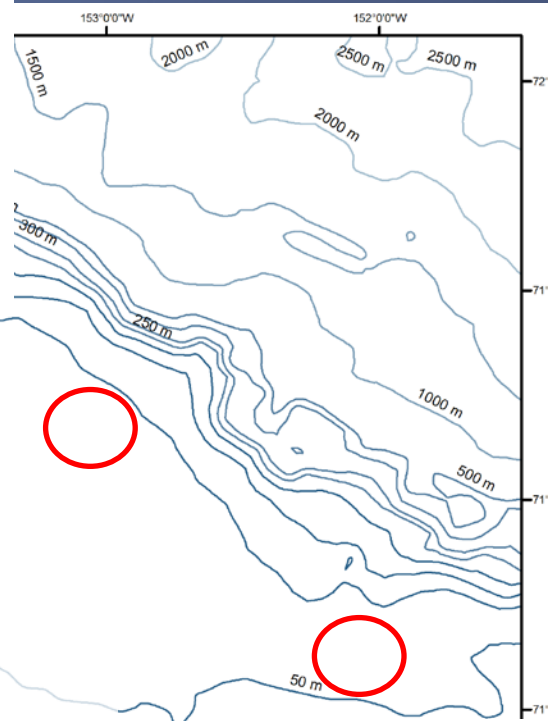
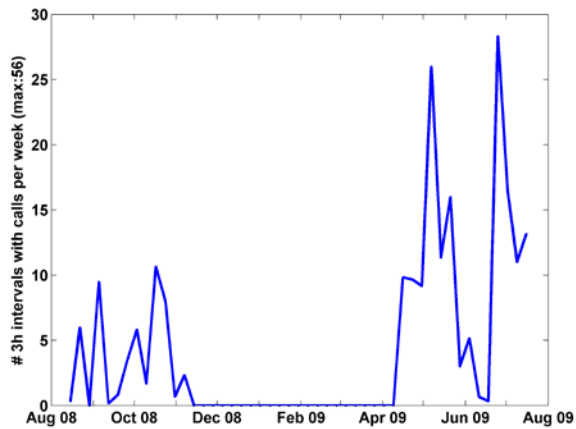




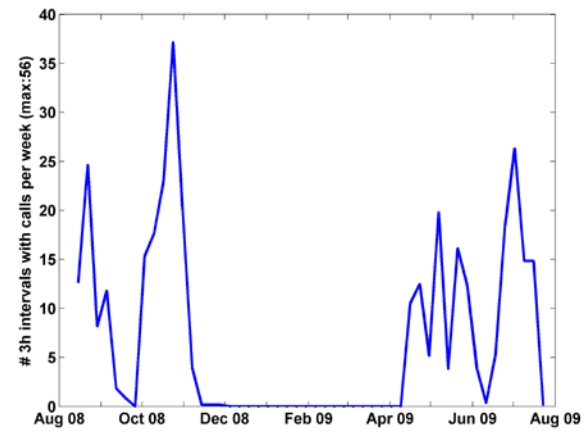
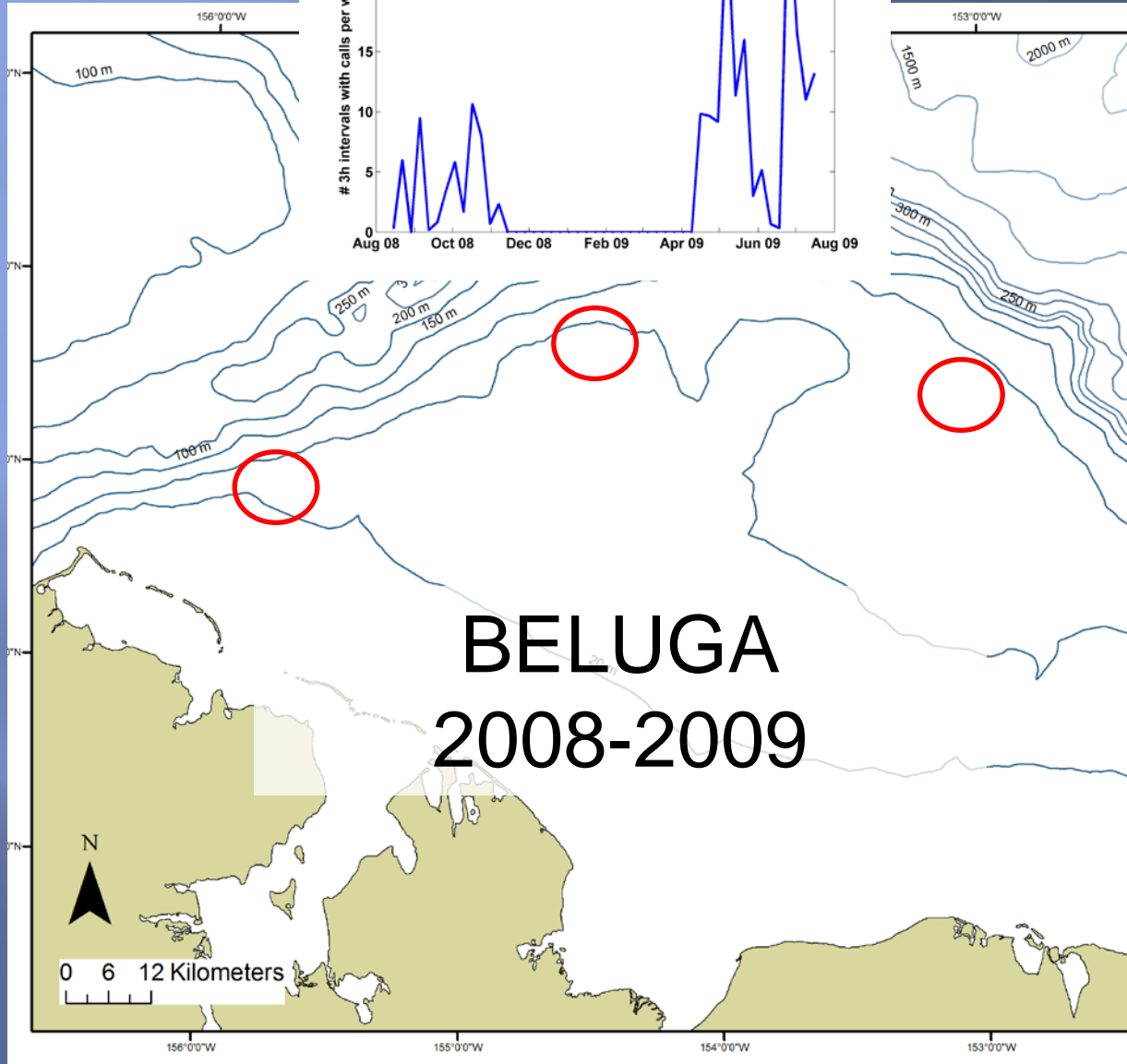


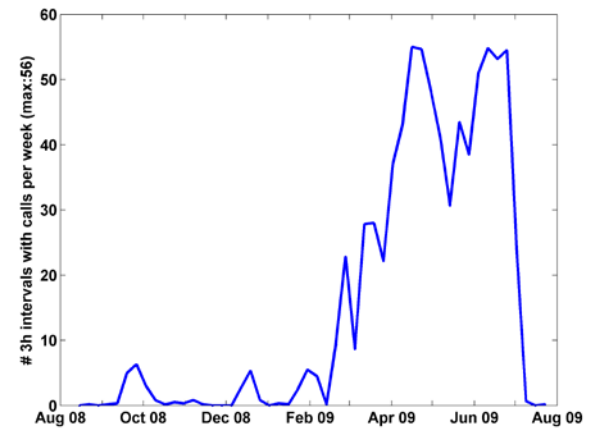
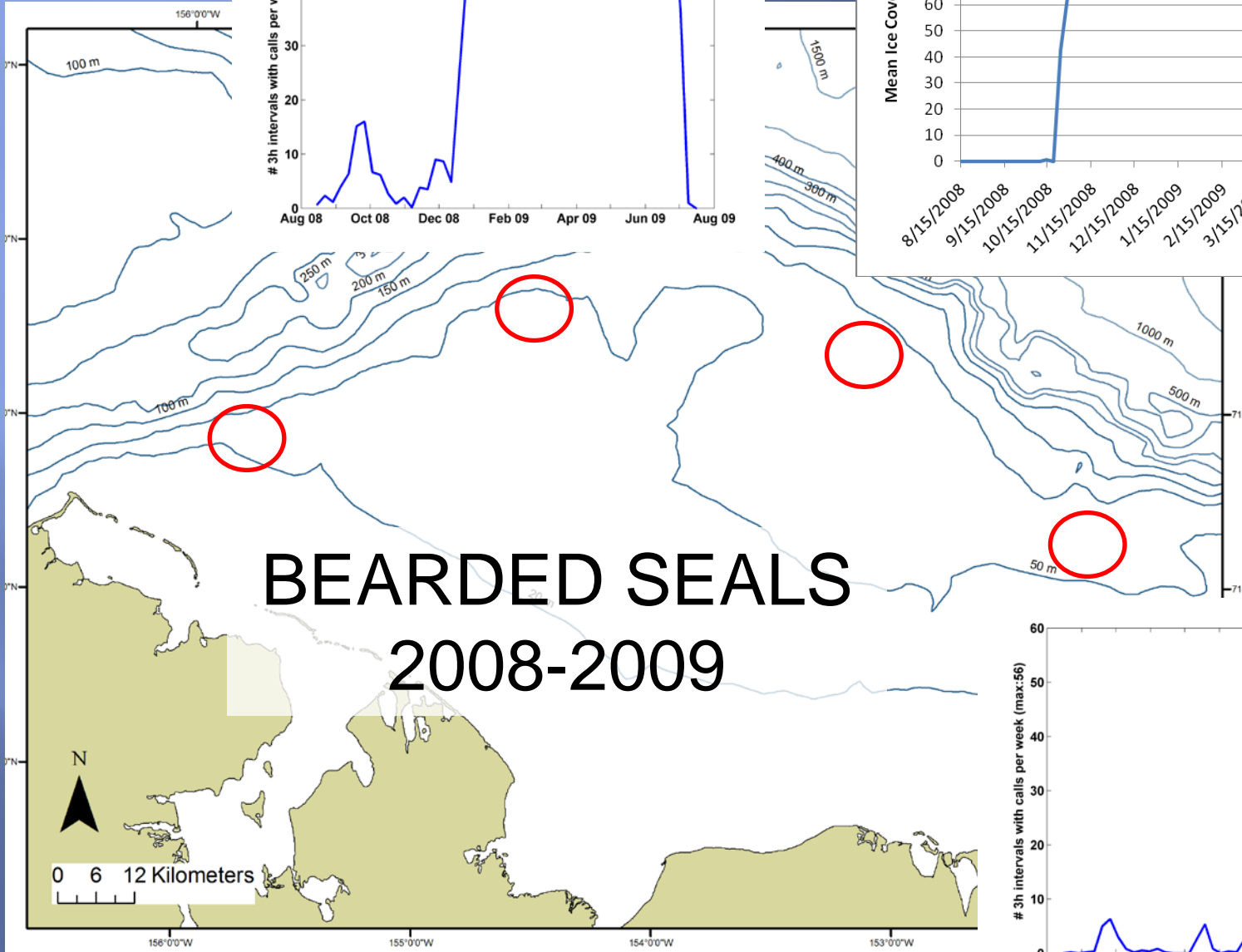
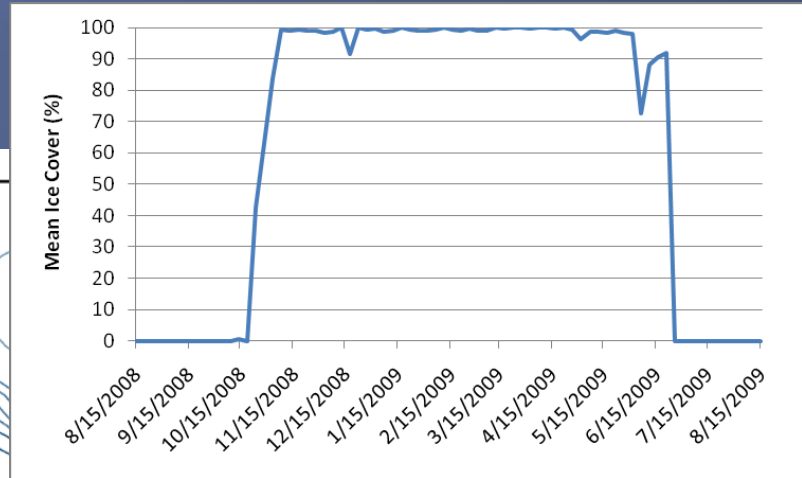
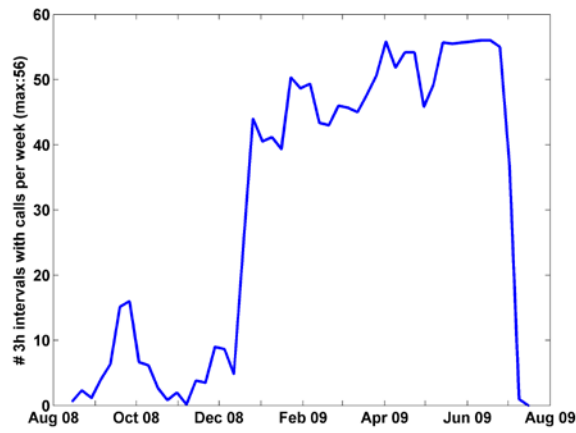
# BOWHEADS 2008-2009

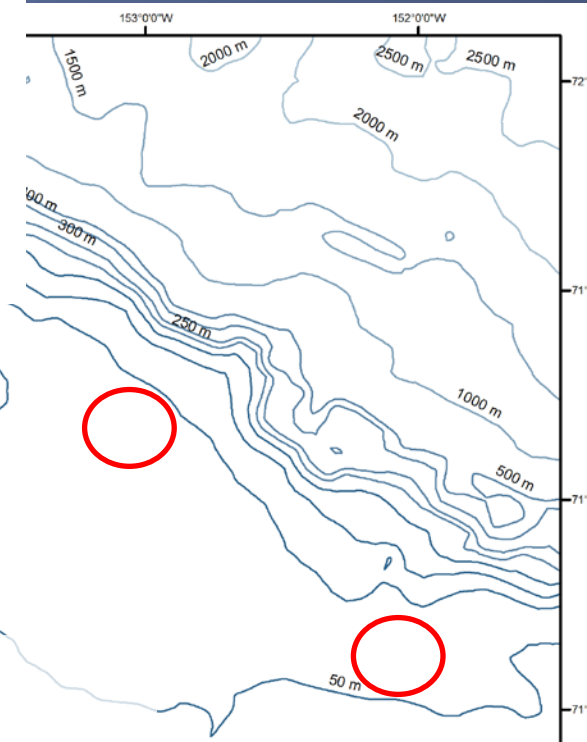
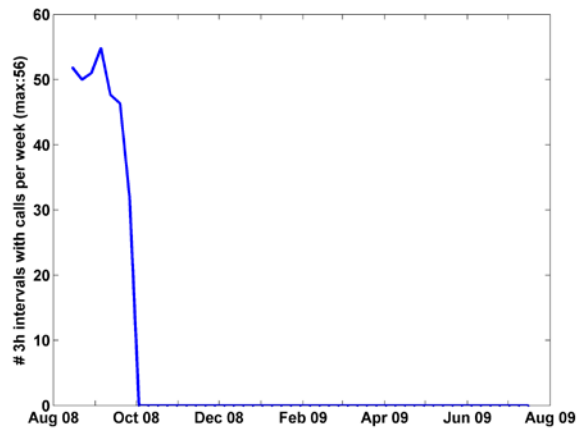




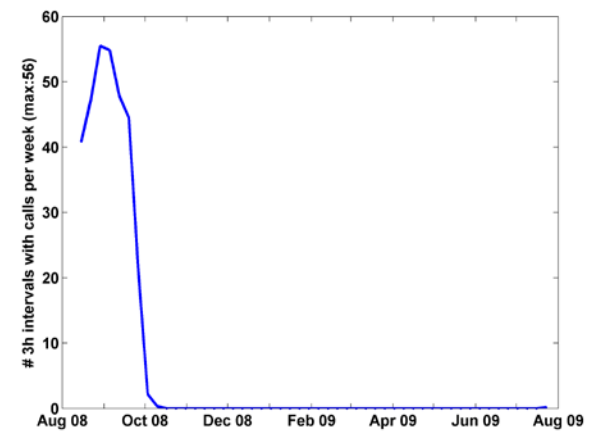
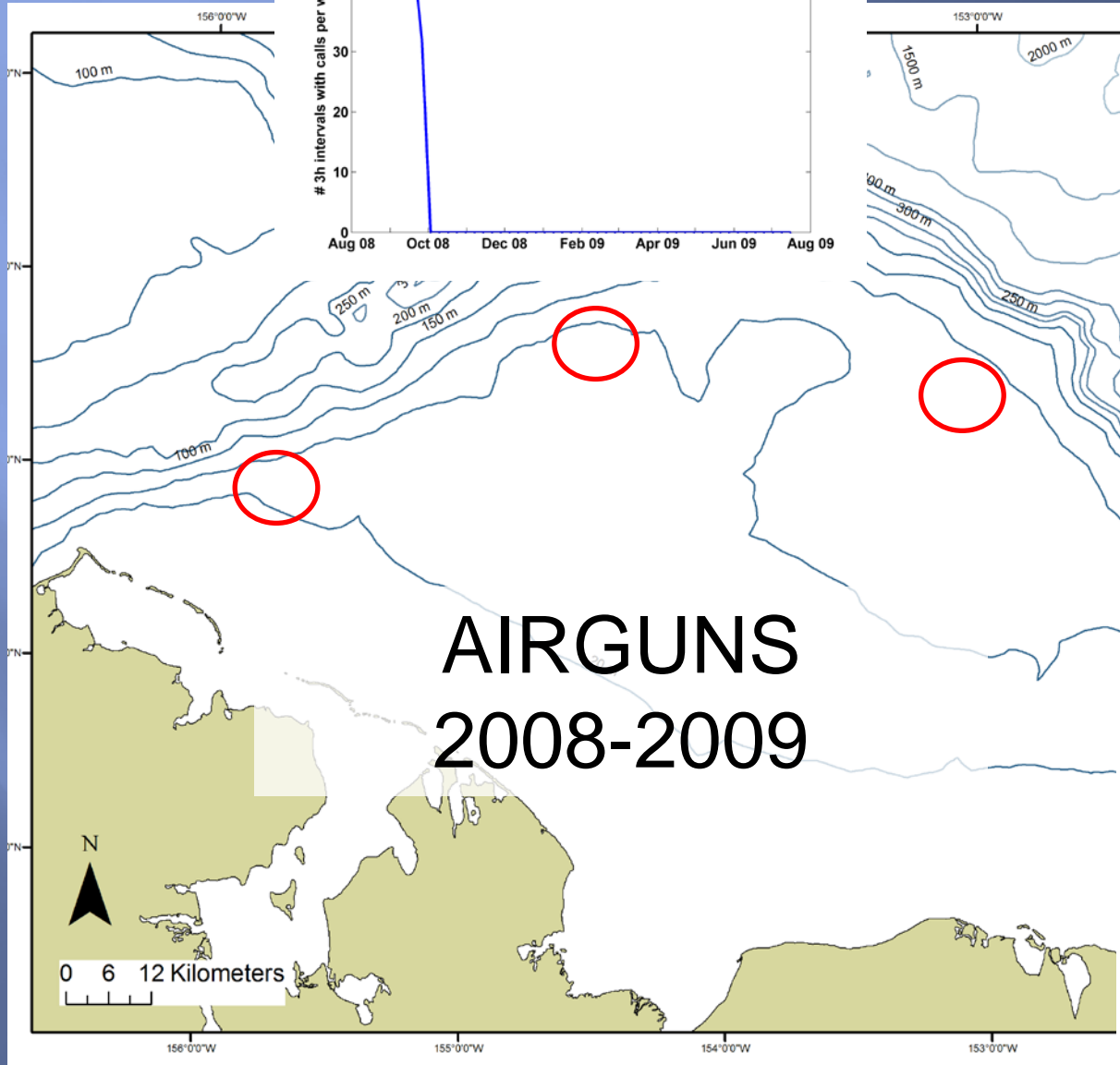
# BELUGA 2008-2009







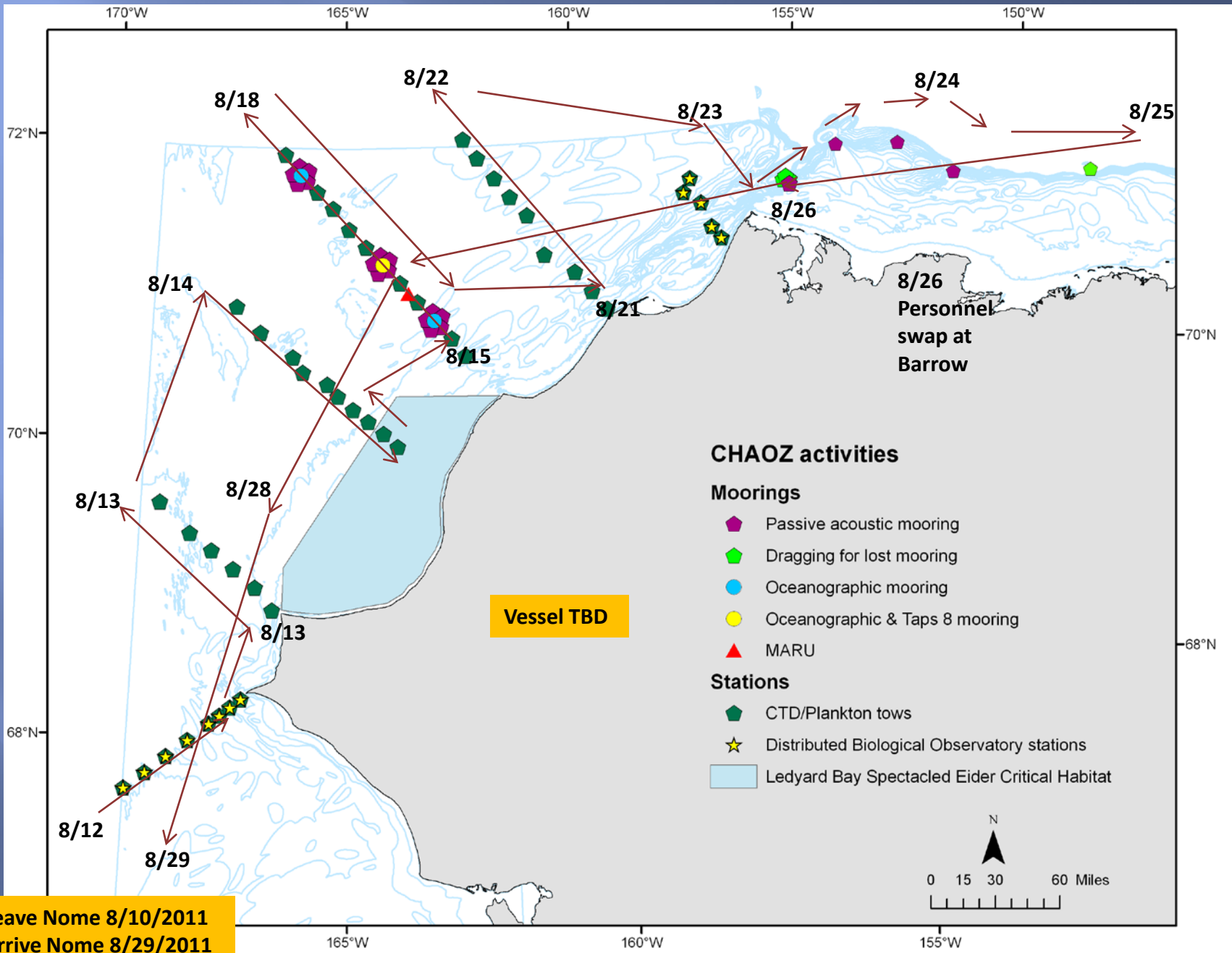
# AIRGUNS 2008-2009



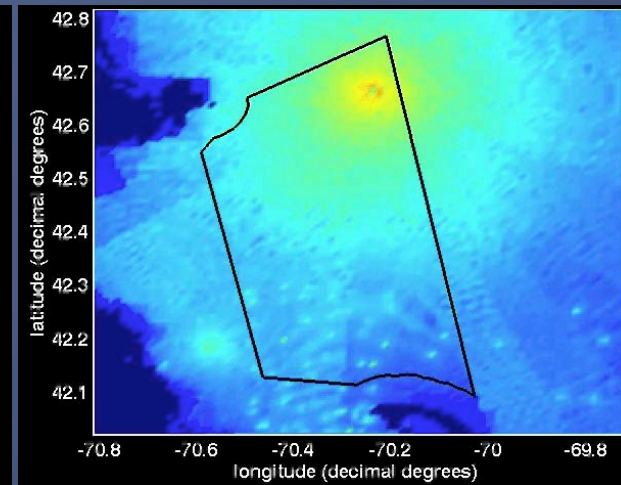
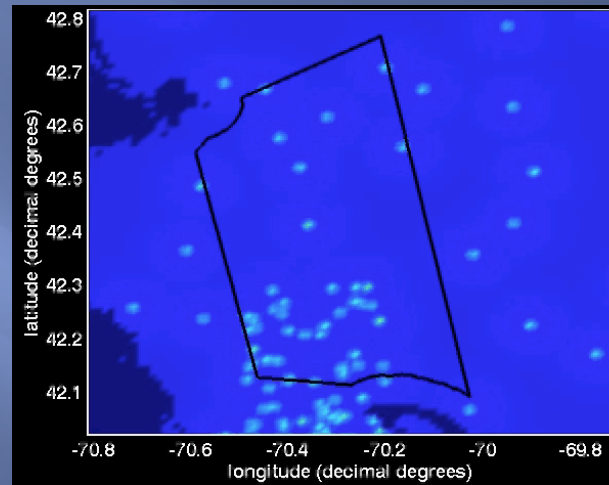


Plans for  
2011  
Field Season

... and beyond



- Cumulative noise effect modeling

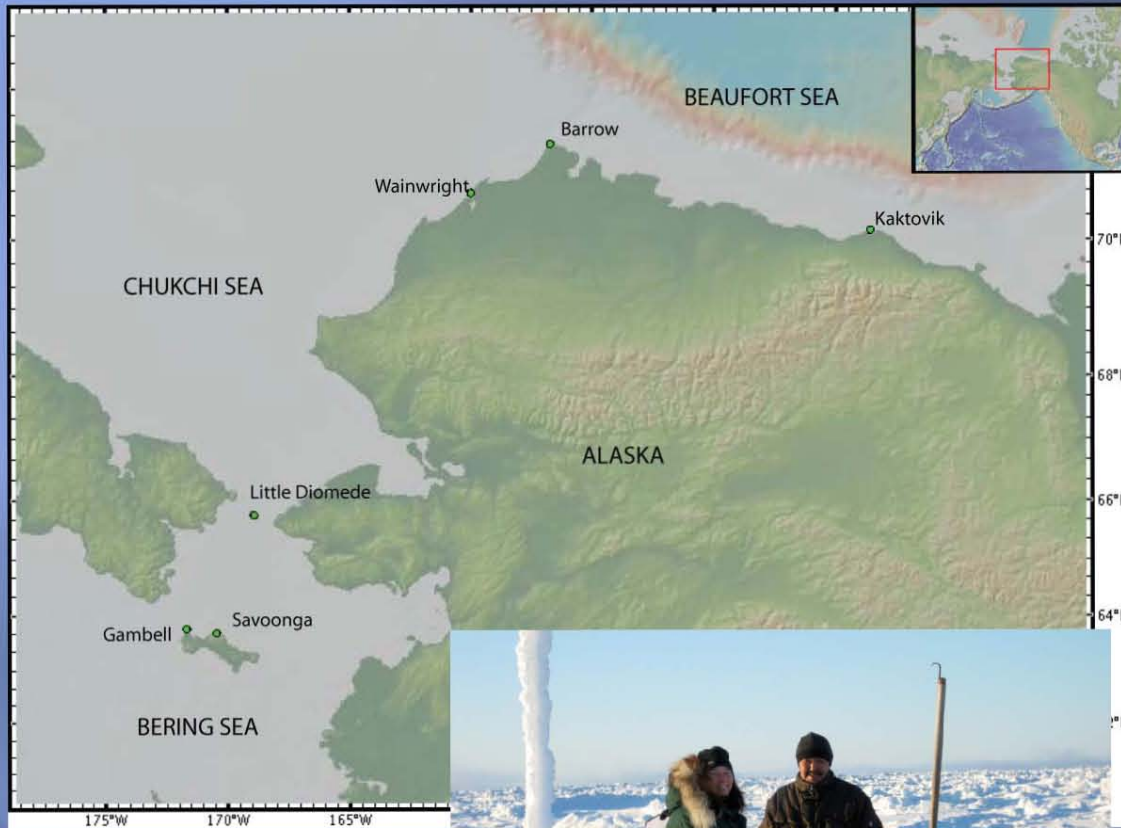


NOPP funded North Atlantic right whale work



- Near real-time autodetection buoy

# Hydrophones for Hunters





# Acknowledgments

- ▣ Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), through Inter-agency Agreement Nos. M09PG00016 & M08PG20021 (Charles Monnett)
- ▣ Jeff Leonhard (Naval Surface Warfare Center, Crane Division), Theresa Yost (Naval Operational Logistics Support Center), CAPT Robin Brake (I&E Director Marine Science, Office of the Assistant Secretary of the Navy) – Sonobuoys
- ▣ Frederick Brower & NSB
- ▣ Recordists in Gambell, Savoonga, and Little Diomedes, Gay Sheffield (ADFG), and Kate Stafford (UW)

# Questions?

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