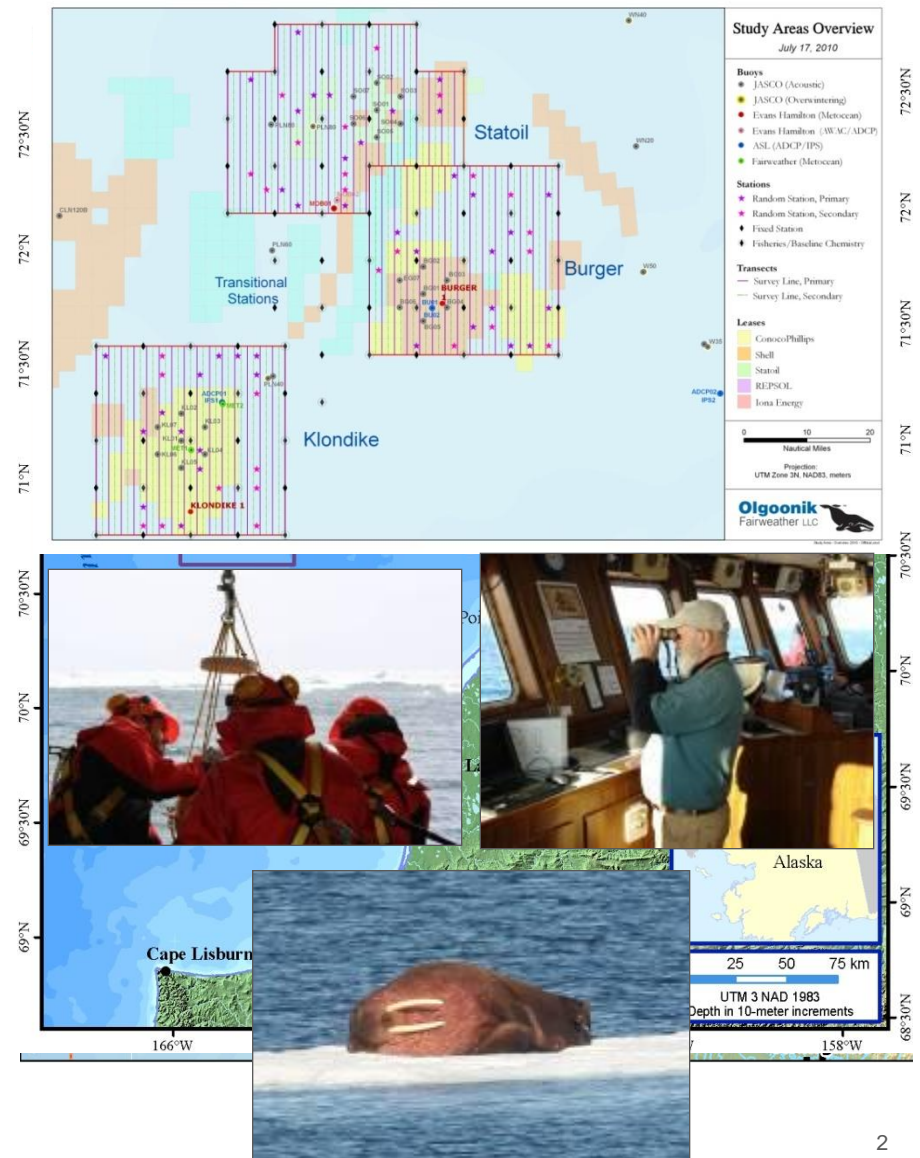




Industry Sponsored Programs and Collaborations

Chukchi Sea Lease Areas and Baseline Studies

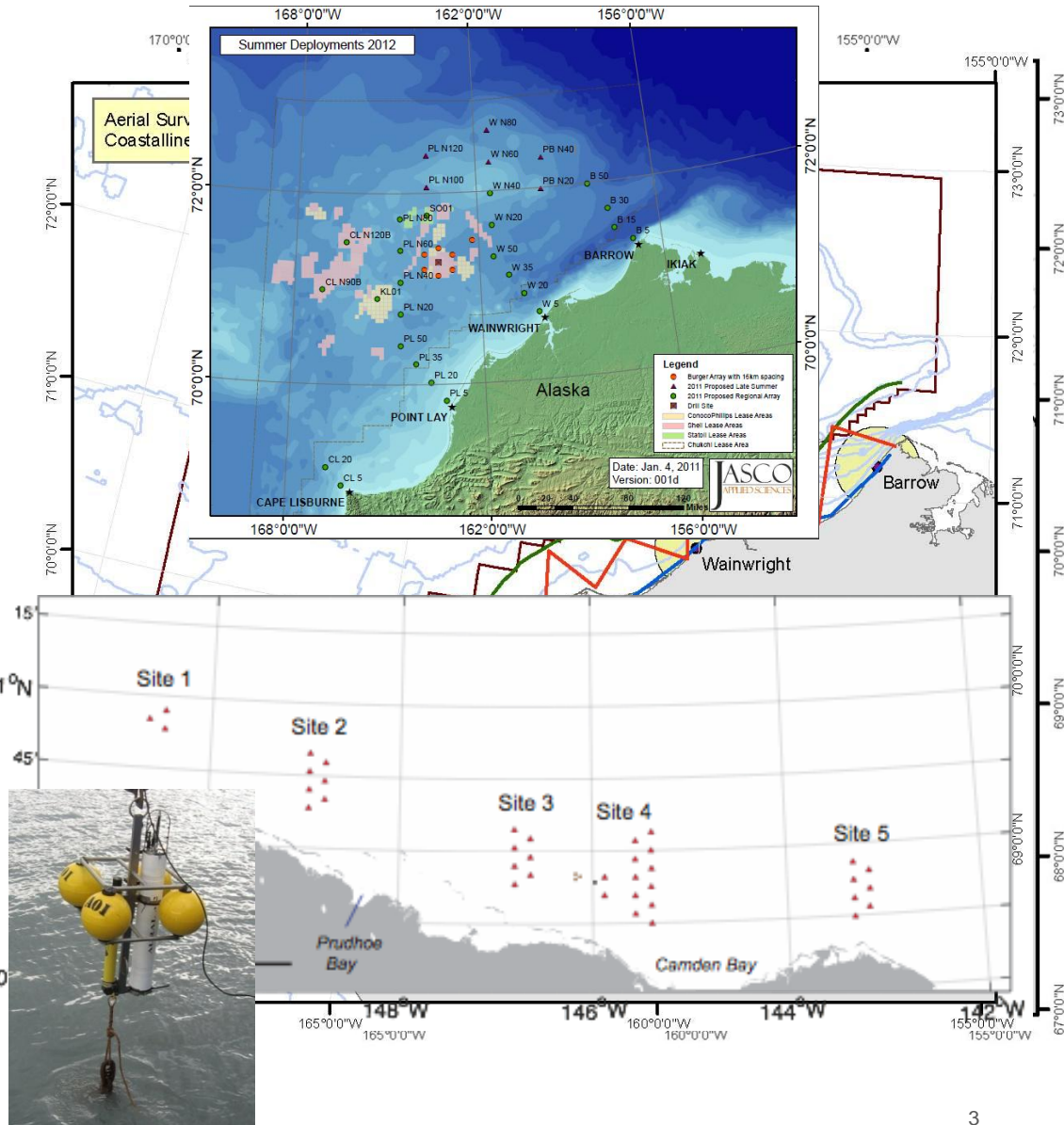
- Jointly funded by ConocoPhillips & Statoil
- Operated by native corporation
- Three areas of top priority
- Subject to intensive interdisciplinary study each year since 2008
- Physical oceanography
- Benthos
- Plankton
- Acoustics
- Fishes
- Marine Mammals
- Marine Birds



Marine Mammal Observations

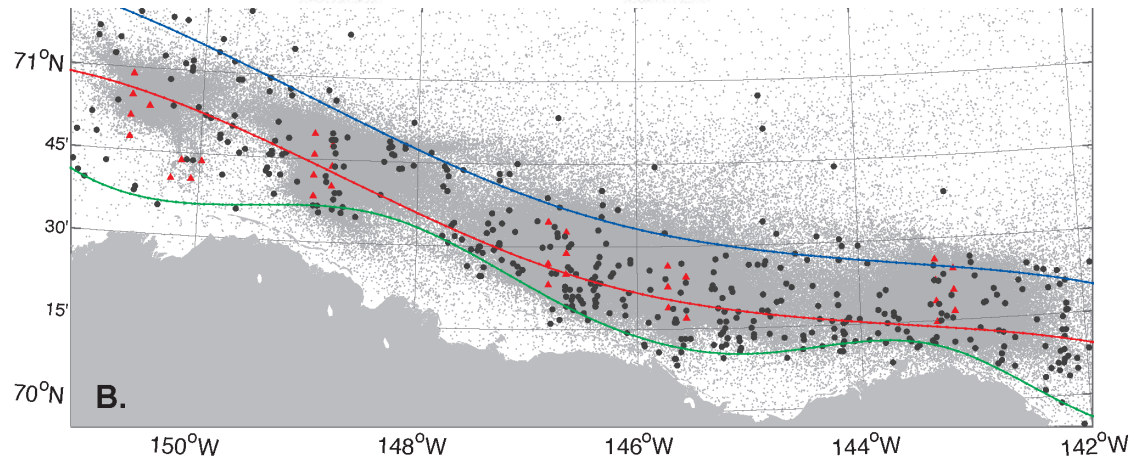
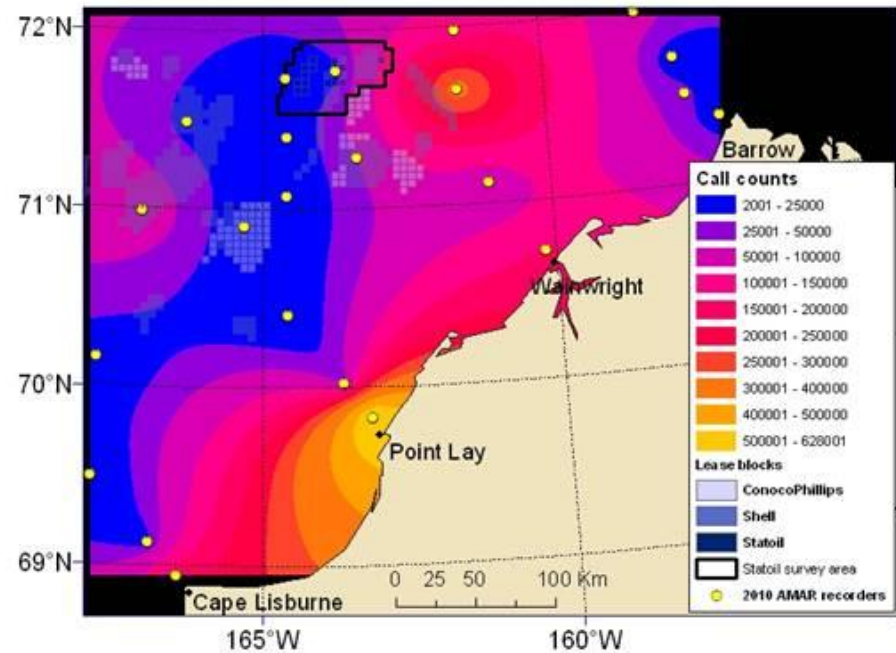
Triad of Information

- Vessel based observations
 - Thousands of km of observation in Chukchi
- Aerial observations
- Acoustics
 - Open water since 2006
 - Year around since 2007



Acoustics – Bowheads, migration, and vocalization

- Acoustic recorders deployed in the Chukchi & Beaufort
- Localization capability
- Goals
 - Understand effects of industry sound on the distribution and behavior of marine mammals.
 - Understand patterns of distribution and movement

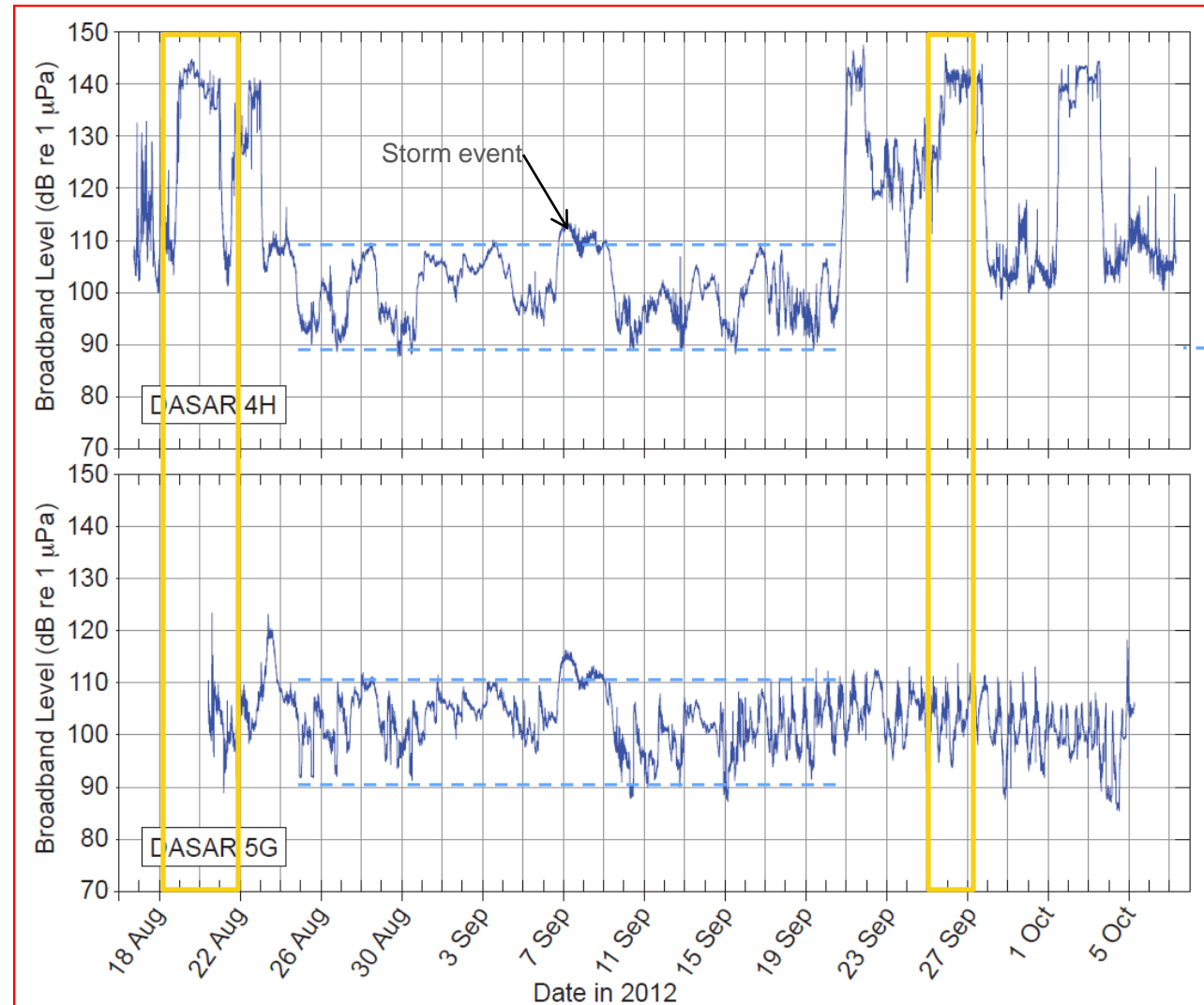


Case Study – the Bowhead Whale & Industry Activity

- Baseline 90-110 dB
- Elevated levels L-4 during anchor setting, anchor attachment, & mudline cellar
- Vessel activity can also be fairly loud
- Industry activity elevated sound levels at L-5 (Kaktovik) primarily during anchor setting

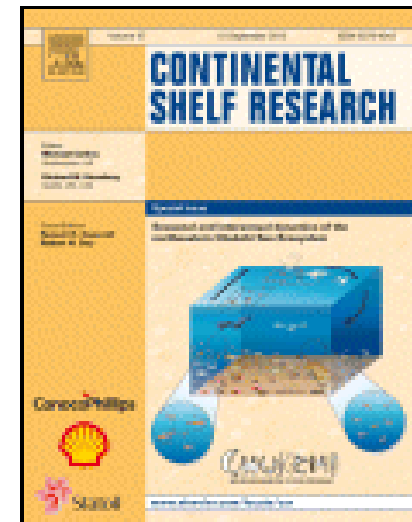
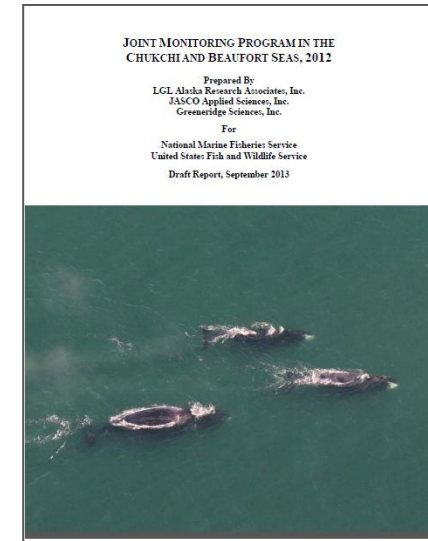
Periods of vessel noise ———

Acoustic baseline range - - -



Significant Publications and Reports

- Comprehensive Report
- CSESP Reports
- Continental Shelf Research



Alaska OCS Science Collaboration

- Majority of Shell science is through collaboration
 - ConocoPhillips key along with Statoil, GXT, Pioneer, & ENI
 - Universities (UAF, UT, UMD) and Government including USGS, BOEM, NOAA
 - Research entities including NFWF, NOPP, Northern Forum, SINTEF
- 60 % of Shell Alaska science is leveraged
- Shell - North Slope Borough Science Agreement to fund local community directed priorities w/ \$5 million/5 years
- Shell/ConocoPhillips/Statoil – NOAA agreement on sharing scientific studies data and ice and weather monitoring/forecasting



Key Current Collaborations

- CSESP – Shell, CPAI, Statoil
 - Seven years of integrated ecological investigation
- North Slope Borough / Northwest Arctic Borough
 - Community based study program to address baseline needs and answer questions of stakeholders
 - Camden Bay Study
- NOAA data sharing
 - Share data from our studies and monitoring programs through AOOS
 - Direct delivery of met/ocean data to NDBC

Key Current Collaborations

- PACMARs – Shell, CPAI, NPRB
 - NPRB administered effort to catalogue existing information, synthesize what is known, and identify data gaps.
- Synthesis of Arctic Research (SOAR)
 - BOEM funded, NOAA administered industry data incorporated
- Others
 - AKMAP
 - NFWF
 - Marine Sound JIP
 - Arctic Spill JIP

Key Opportunities for Collaboration

- NSB/NWAB collaboration – NOAA fisheries
- NPRB Arctic Integrated Ecological Research Program (Pages?)
- Arctic Marine Biodiversity Observation (BON)
- UAF Unmanned Aerial System proof of concept
- Advancing use of photography for collection of marine mammal data
- Marine Arctic Ecosystem Study (MARES)
- Marine Mammal Co-management Commissions
- Others
 - Arctic Land Conservation Cooperative
 - Western Arctic Caribou Working Group