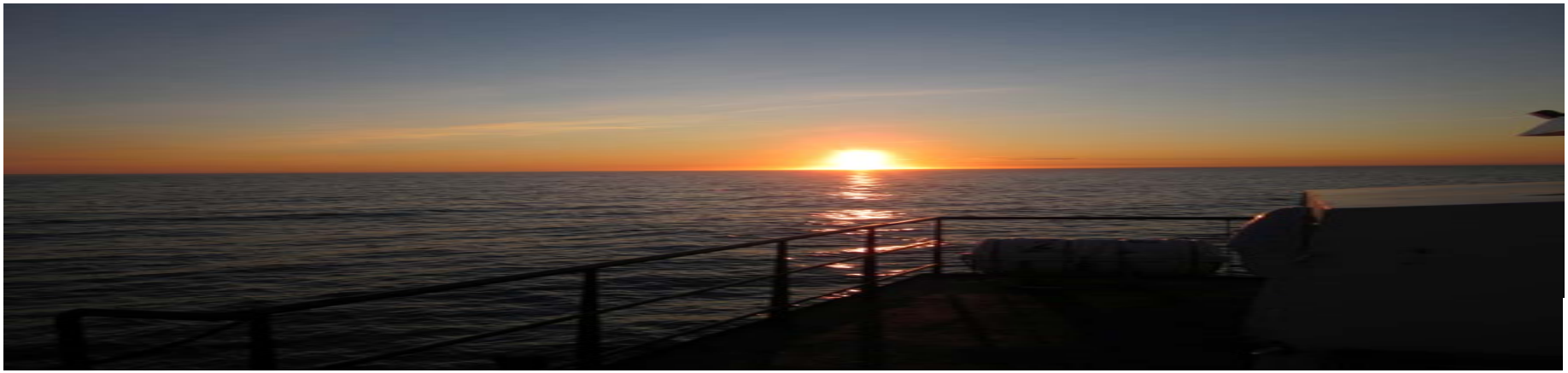
Devils Paw Exploration Program 2014



Mike Faust

Chukchi Exploration Project Manager

March 7, 2013

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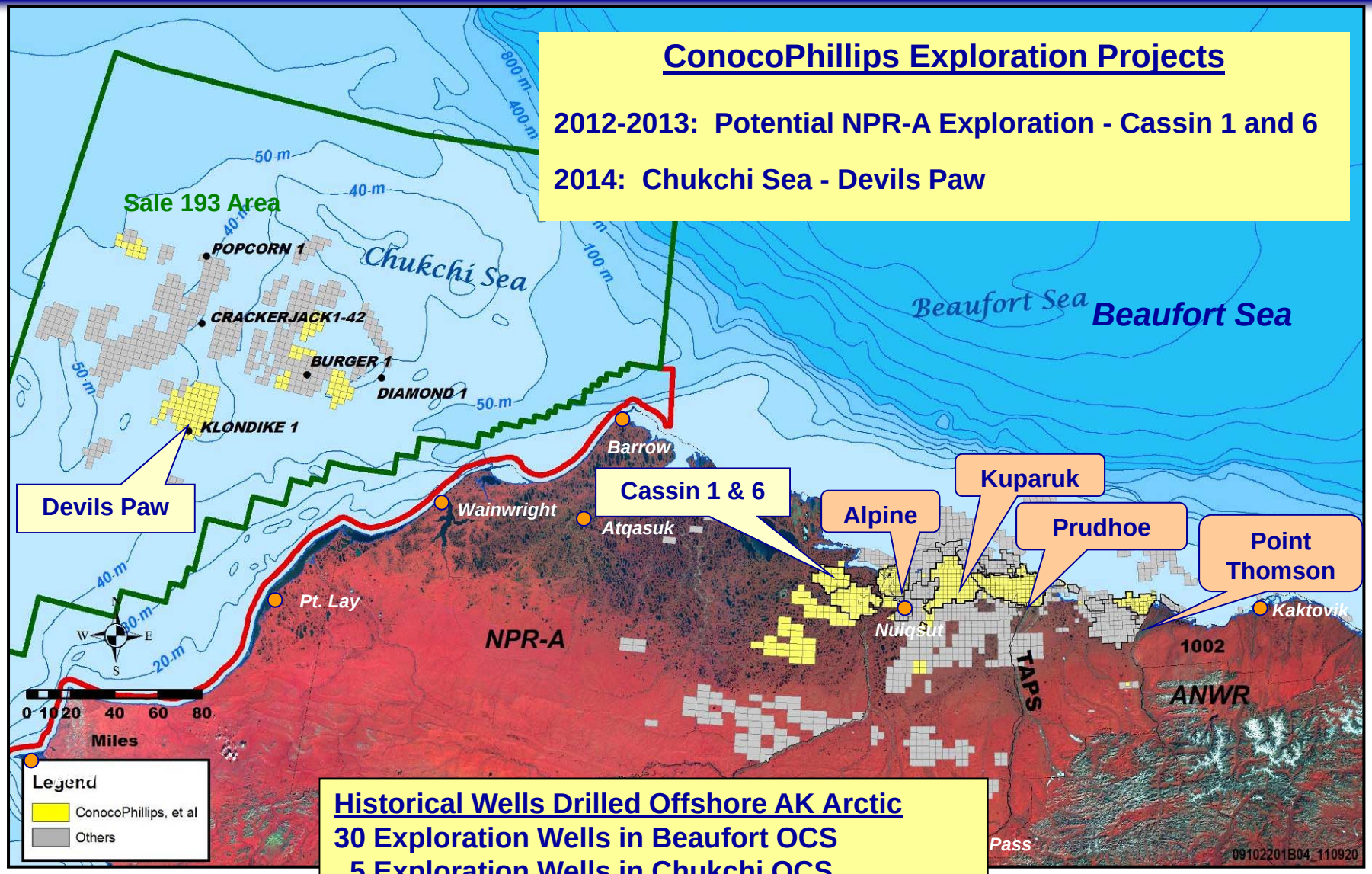
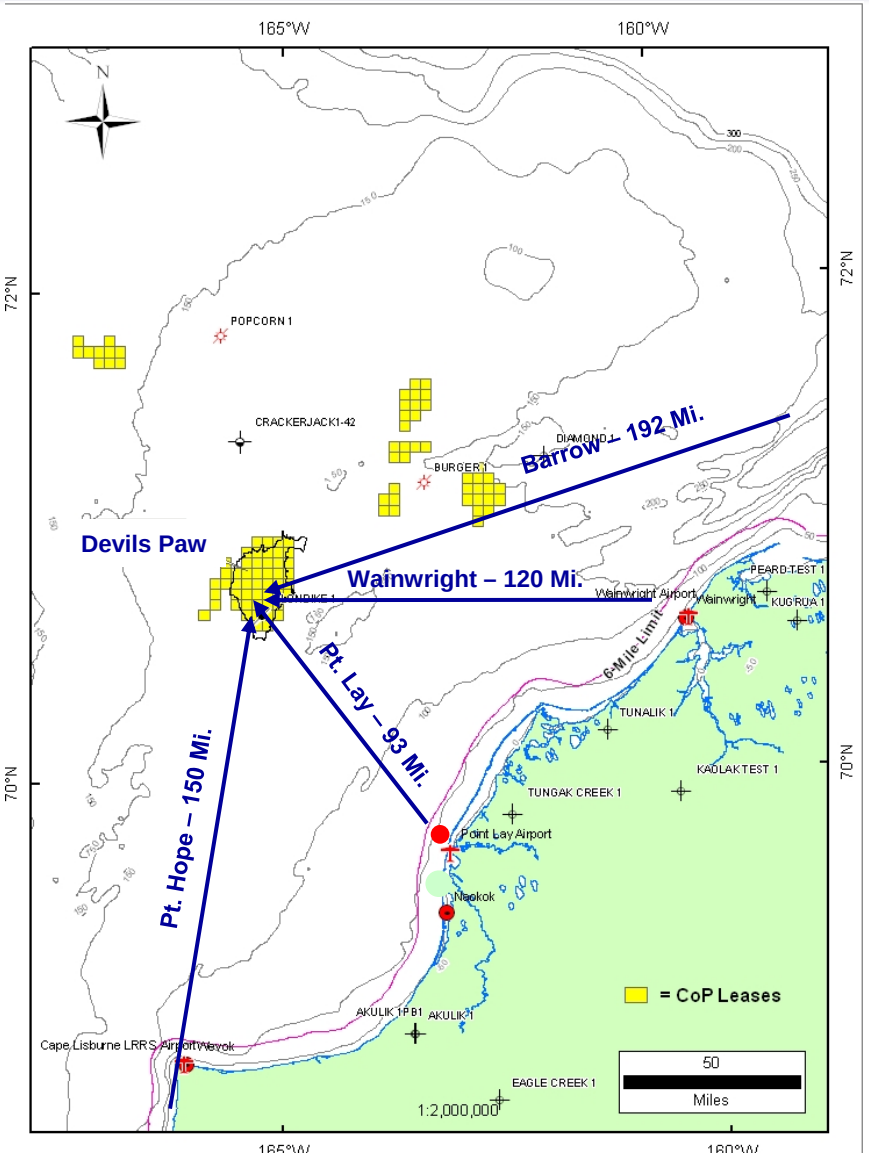
ConocoPhillips North Slope Operations

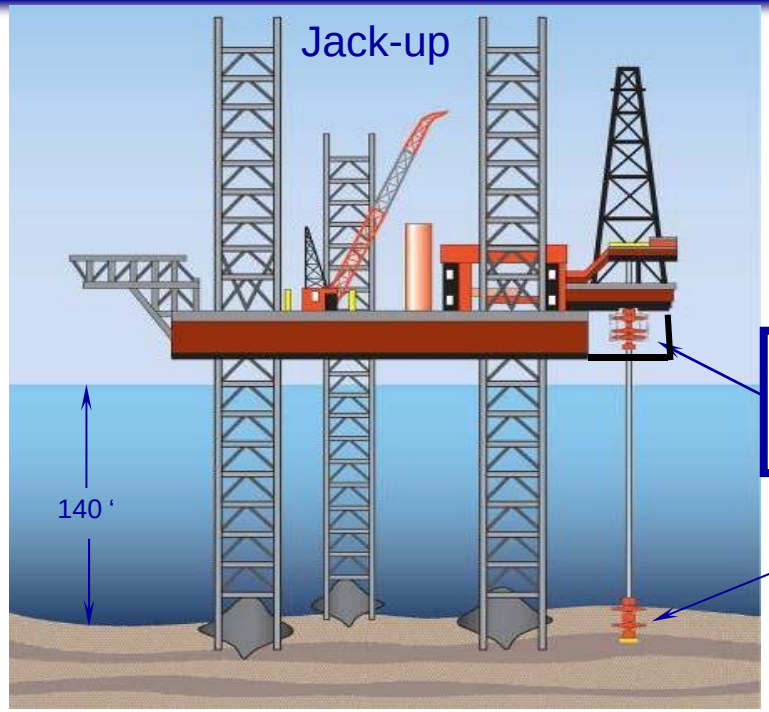


Chukchi Drilling Plans - Location and Timing

- First well planned in 2014
- Well located ~90 miles from closest community
- Plan to drill in open water season
  - During period of little or no ice
- Duration one well ~40 days
- No more than two wells in one season (most likely one)

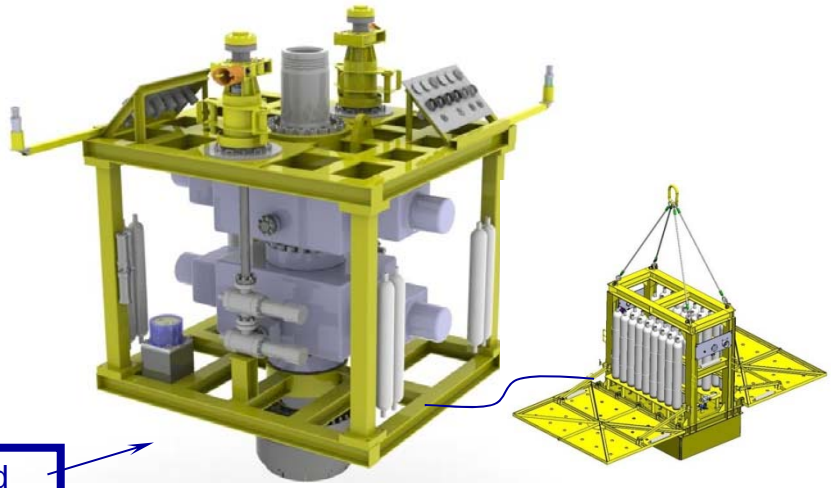


Jack Up Rig – Cap and Contain System



Surface Blowout Preventer

Pre-positioned Capping Device



- **Jack-up rigs can operate in open water (<3/10 ice coverage) conditions**
  - **Jack-ups have been used in Cook Inlet, Norton Sound, Norway and Canada for exploration**
  - **Jack-up rigs are not being proposed for year round development drilling in the Chukchi**
- **Surface BOP stack with high pressure riser**
  - **Allows surface shut-in and intervention**
- **Pre-positioned capping device installed at sea floor**

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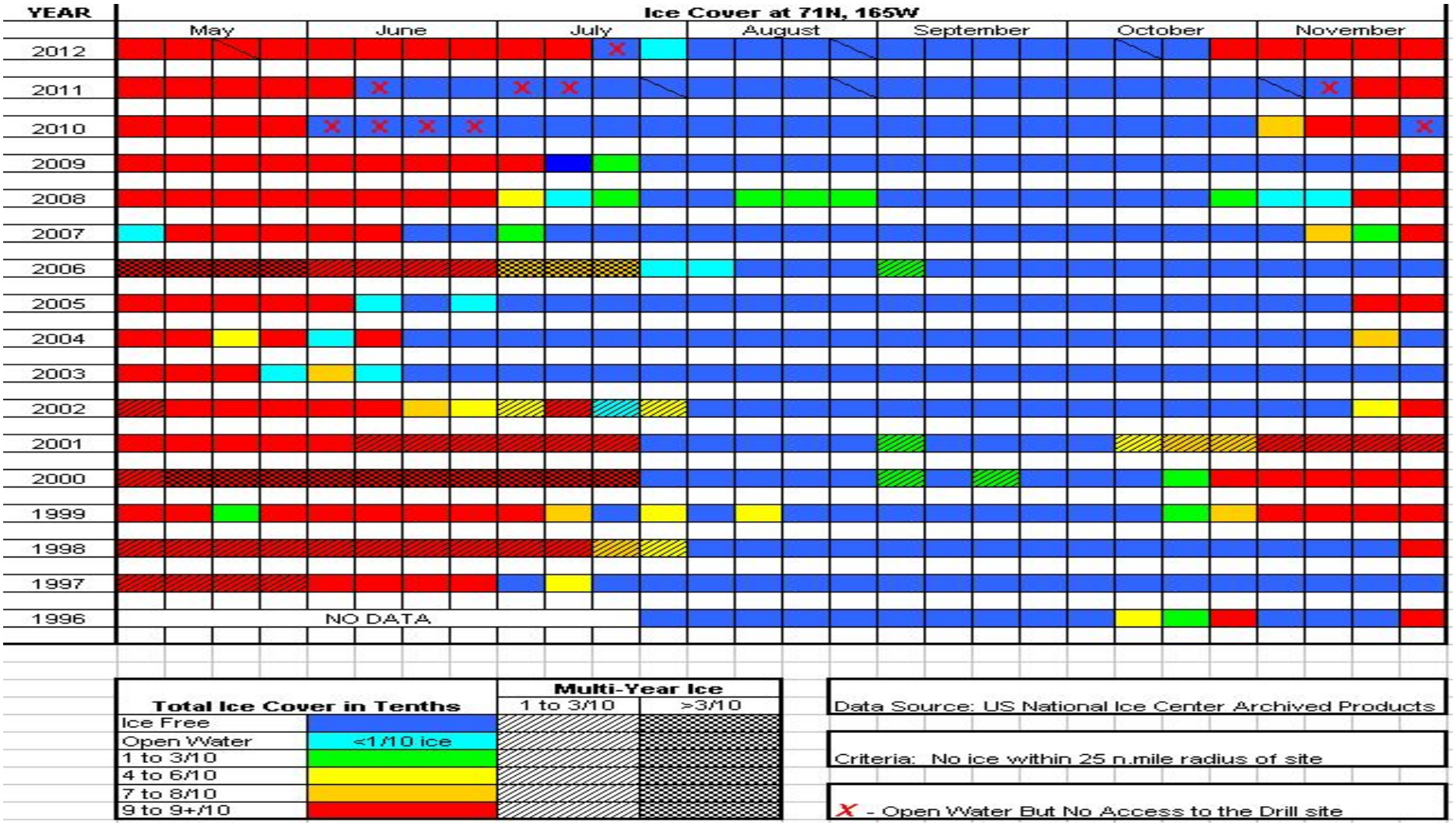
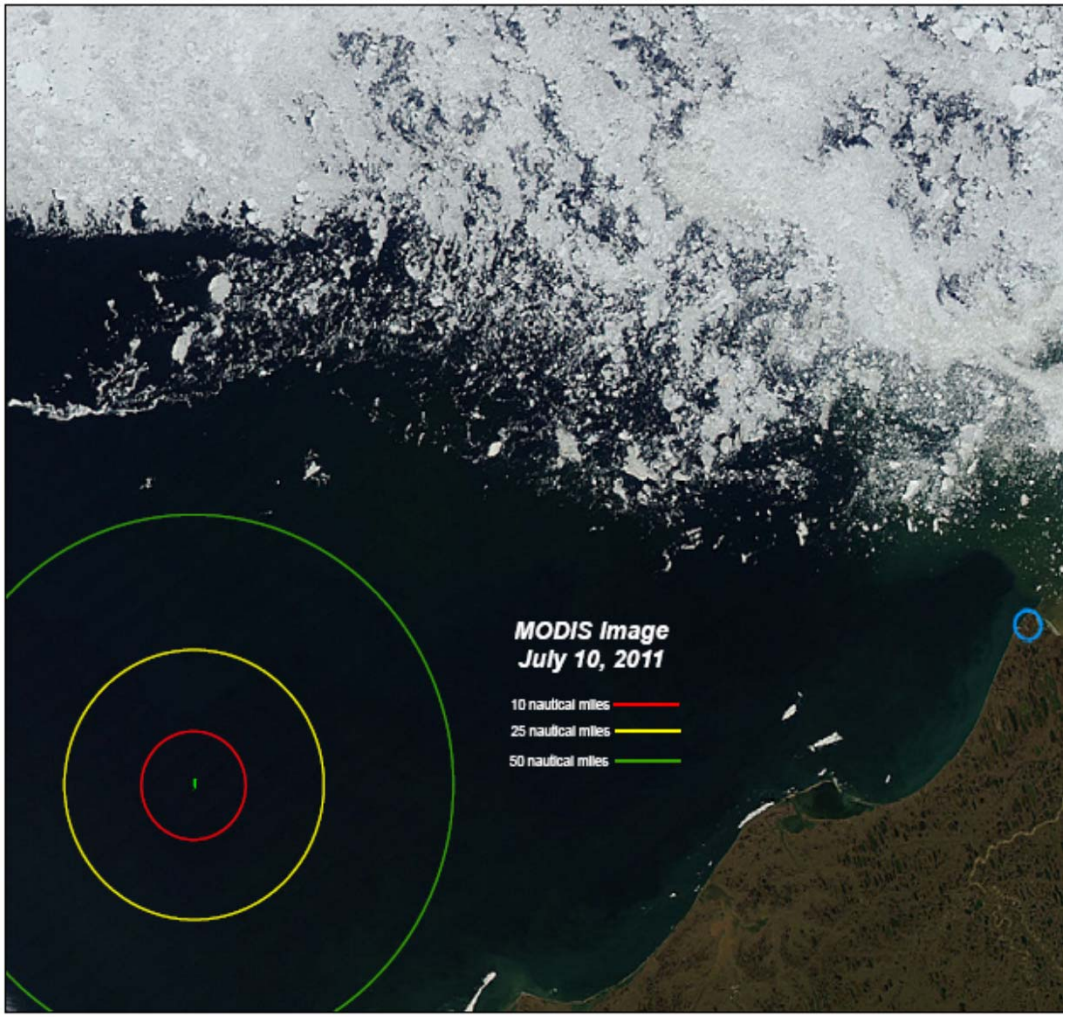
Historical Ice Cover



Ice Considerations for Jack Up Rig in Chukchi Sea

- **Robust ice alerts plan ensures timely departure**
- **Ice management vessel protects against a low probability event**



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Virtual Drill Exercise

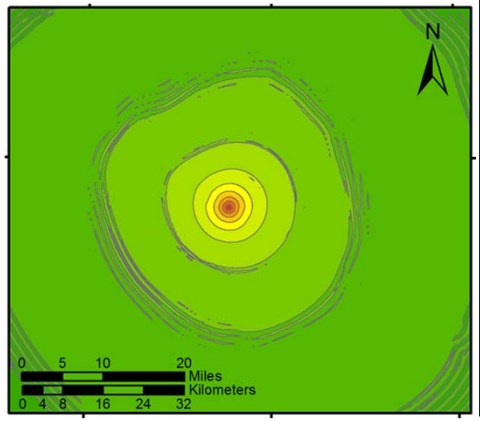
- **Synthetic Aperture Radar from satellites were used to determine ice conditions – coupled with vessel observation**
- **Responded to actual ice/weather conditions, satellite/buoy data**
- **Simulation exercise summary:**
  - **Actual ice and weather conditions allowed 2 "virtual" wells drilled in 2010, 2011, and 2012.**
  - **Due to late ice in 2012, "virtual" drill started 30 July, 2 weeks later than prior years**
  - **Each year there were significant learnings, and improvement of procedures and tools**

Chukchi Exploration Program - Current Activities

- **Chukchi Sea Environmental Studies Program (CSESP) ongoing for 2013**
  - **Ecosystem-Based Program managed and operated by Olgoonik/Fairweather Science since 2010**
  - **Five consecutive years (2008-2012) of studies with no recordable injuries or incidents**
  - **Technical manuscripts in various stages of peer review**
  - **Involvement with NPRB-NSF Data Synthesis Project.**
- **Involvement with Regulatory Process**
  - **Applications are in different stages of review by agencies.**

Monitoring and Mitigation Program

- **Activities with potential for disturbance**
  - **Drilling**
  - **Support Vessel on DP**
  - **VSP Airguns**
  - **Physical Ice Management**



- **Acoustic Modeling**
- **Acoustic Monitoring**
- **Estimated Exposures (IHA Application)**
- **Marine Mammal Monitoring (PSO)**

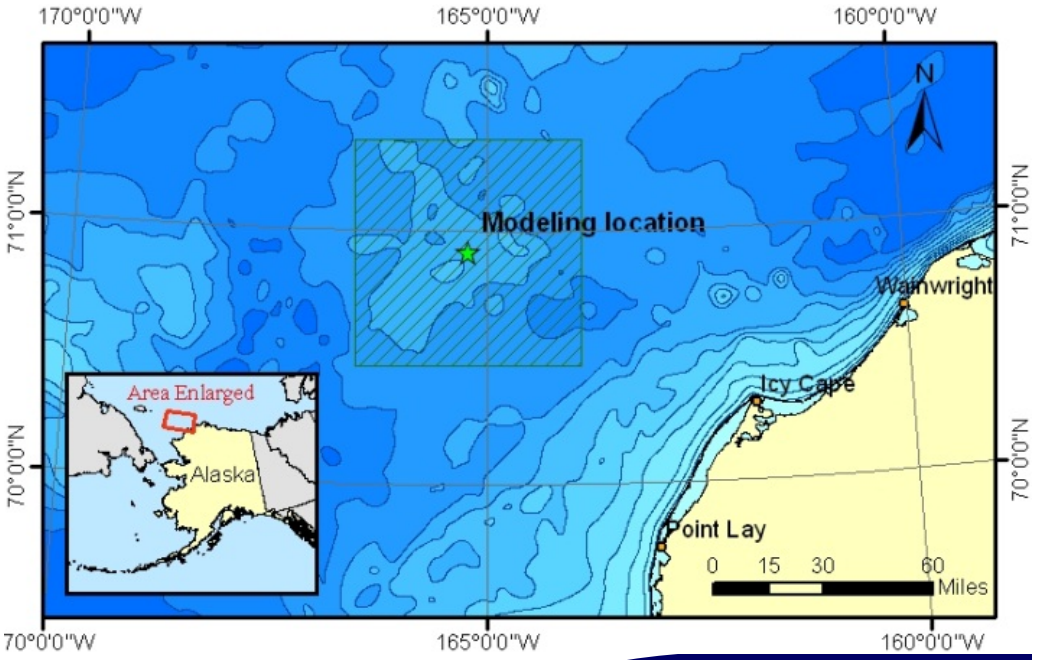
Acoustic Modeling

Objectives

- Quantify underwater sound levels as a function of range and direction from project noise sources
- Compute ranges to specific sound level thresholds

Noise Sources Considered

- Drill rig
- Support Vessel on DP
- VSP Airguns



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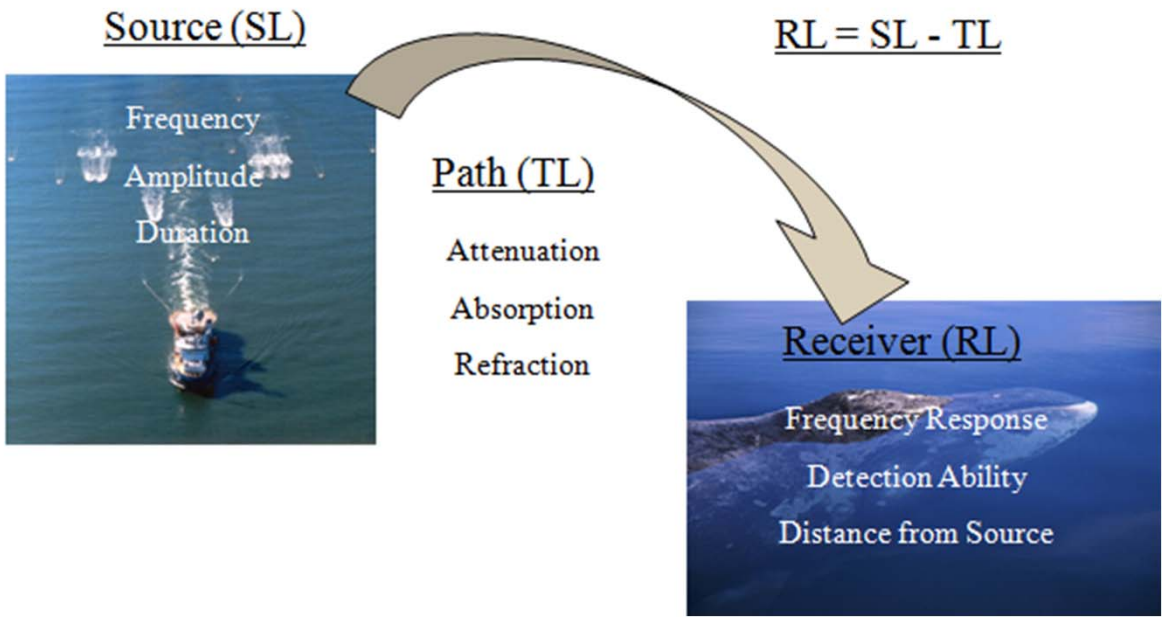
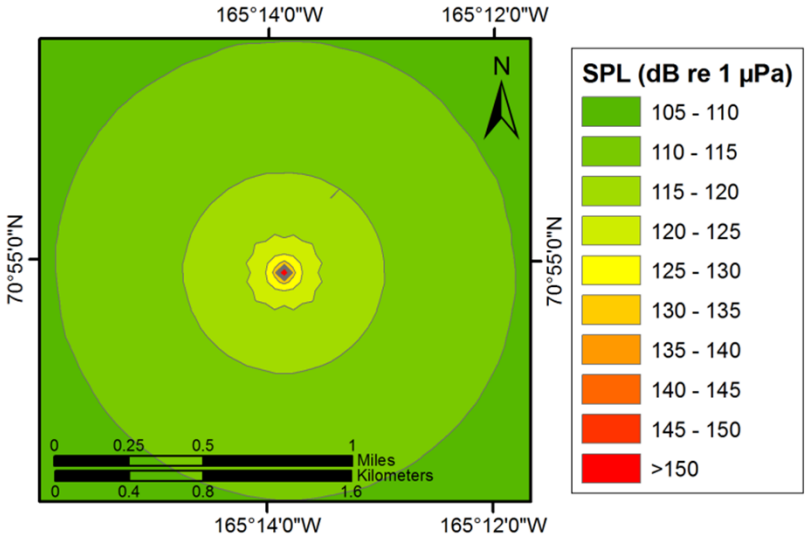
Acoustic Modeling – Approach

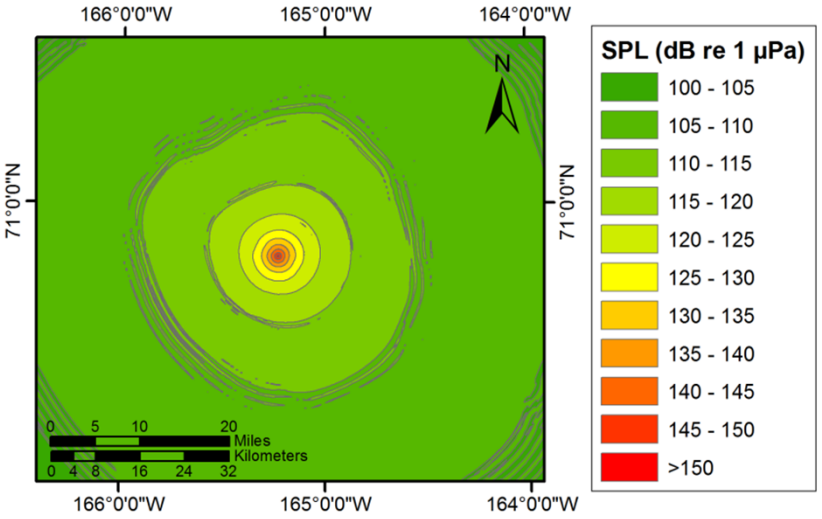
- **Computer sound propagation model:**
  - Source-path-receiver approach to estimate sound levels around specific noise sources.



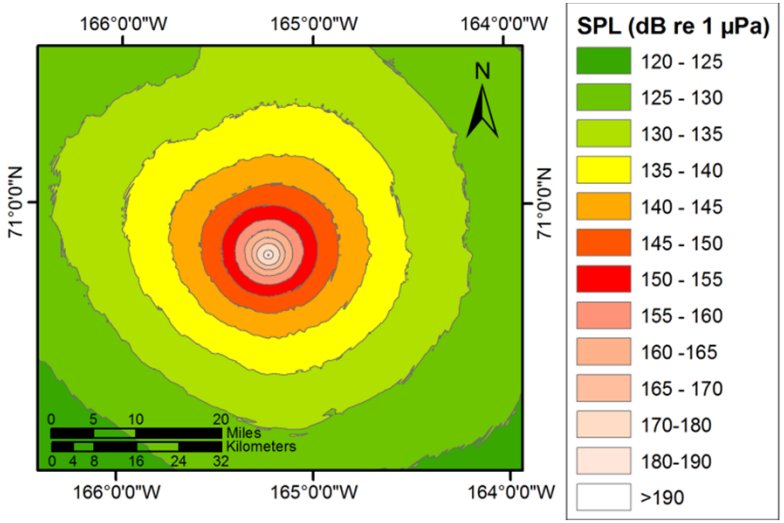
Acoustic Modeling - Results



Drilling



Drilling with Support Vessel



VSP Airguns

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Acoustic Modeling - Results

Maximum distance (in meters) from the source to various received sound levels			
SPL (dB re 1 µPa)	**Drilling (continuous sound)**	**Drilling + Support vessel (continuous sound)**	**VSP Airguns (pulsed sound)**
190	**--**	**--**	**160**
180	**--**	**--**	**920**
160	**<10**	**71**	**4900**
120	**210**	**7900**	**71000***

*** Distance extends beyond edge of modeling area, resulting in underestimation of radii.**

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Acoustic Monitoring - Objectives

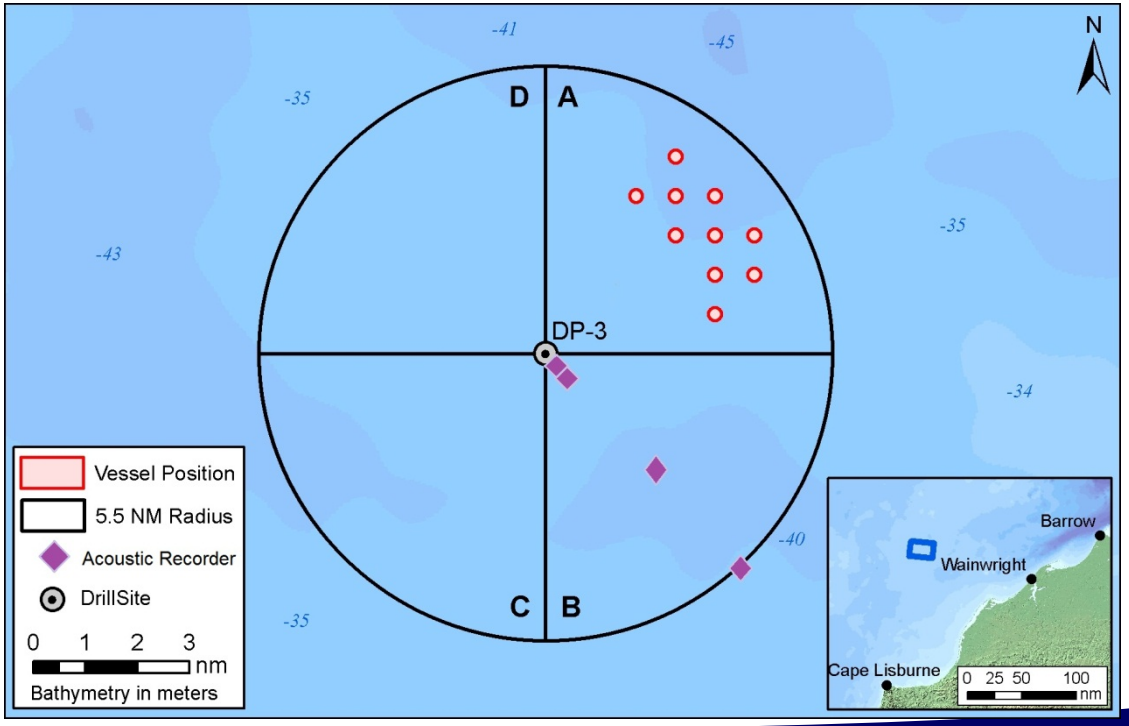
- **Verify pre-season modeling results of distances to received VSP airgun sounds of 190, 180, 160 dB re 1µPa rms**
  - **once between 1st and 2nd VSP runs + post season analyses**
- **Characterize acoustic footprint of drilling and support activity with bottom mounted recorders**
  - **once between 1st and 2nd VSP runs + post-season analyses**
- **Record marine mammal vocalizations to complement visual observations**
  - **post-season analyses**

Acoustic Monitoring – Recorder Layout

- **At least four recorders will be deployed at approximate distances of**

  0.5 – 1 – 4 – 10 km

  (0.3 – 0.5 – 2.3 – 5.4 nm)



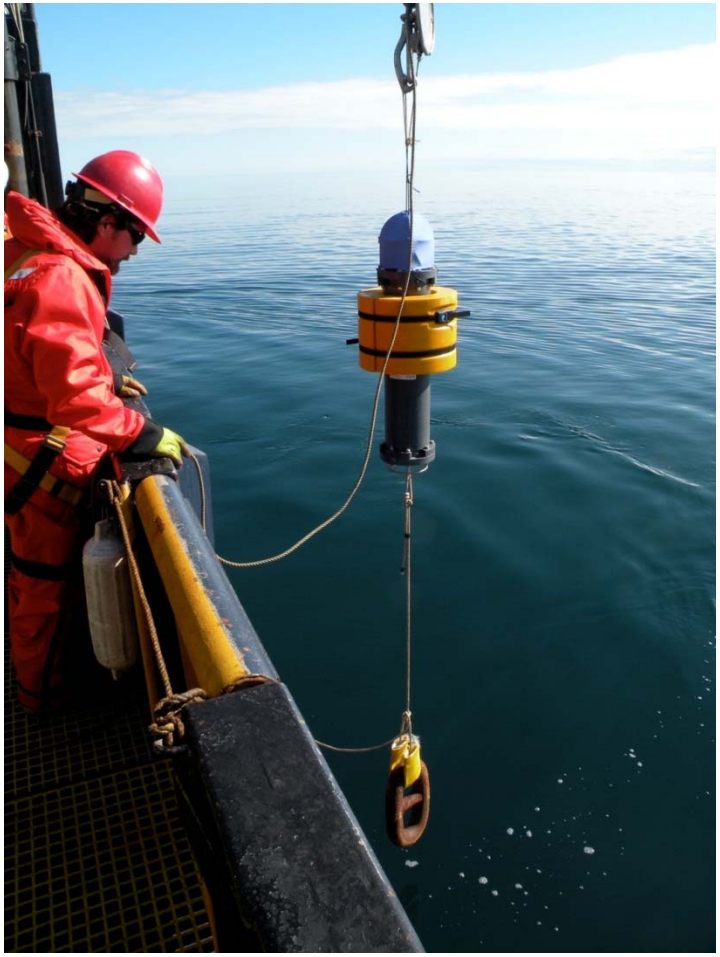


Photo: Deployment of AMAR recorder (JASCO) at Devils Paw for CSESP. Exact instruments to be used during drilling still to be determined

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Estimated Marine Mammal Exposures (IHA Application)

The expected (seasonal) species density

X

Estimated area ensonified by

- **160 dB (VSP airgun operations) ~5 km**
- **120 dB (Drilling + Support vessel in DP + Ice mgmt) ~210 m, 8 km**

X

Estimated total duration of each activity in days (24 hrs)

Estimated Marine Mammal Exposures (IHA Application)

Estimated Number of Exposures to Pulsed Underwater Sound Levels of ≥160 dB (VSP airguns)

Species	Number of Individuals Exposed to ≥160 dB					
	July/August		September/October		Total	
	Avg	Max	Avg	Max	Avg	Max
Beluga whale	0	0	0	0	0	0
Killer whale	0	0	0	0	0	0
Harbor porpoise	0	0	0	0	0	0
Bowhead whale	0	0	2	5	2	5
Gray whale	0	1	0	0	0	1
Humpback whale	0	0	0	0	0	0
Fin whale	0	0	0	0	0	0
Minke whale	0	0	0	0	0	0
Bearded seal	1	1	1	1	1	2
Ringed seal	2	5	2	5	4	10
Spotted seal	1	1	1	1	2	3
Ribbon seal	0	0	0	0	0	0

Airguns will be operating for about 2 hours per well

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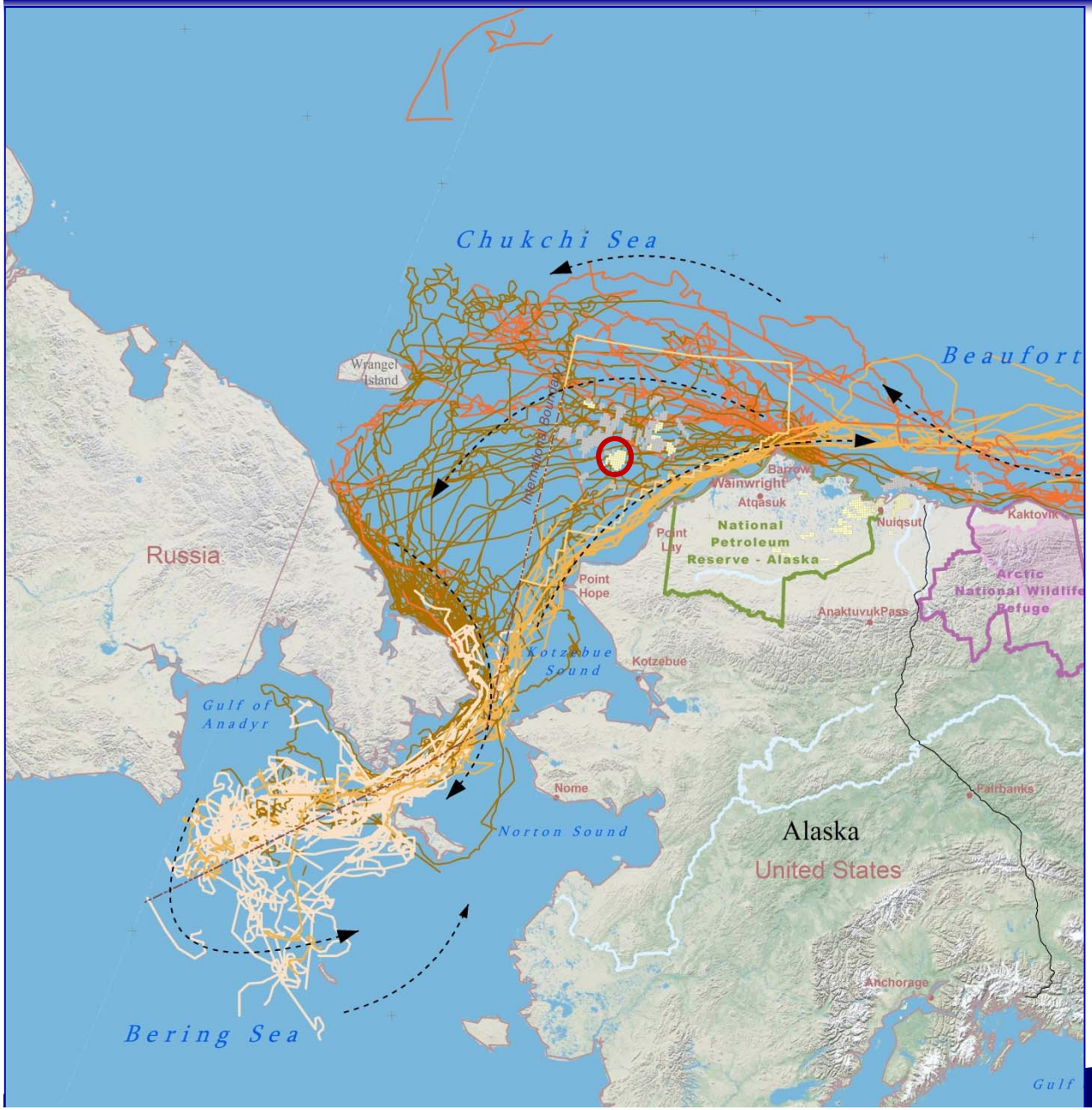
Estimated Marine Mammal Exposures (IHA Application)

Estimated Number of Exposures to Continuous Underwater Sound Levels of ≥120 dB

Species	Number of Individuals Exposed to ≥120 dB					
	July/August		September/October		Total	
	Avg	Max	Avg	Max	Avg	Max
Beluga whale	4	7	4	9	8	16
Killer whale	0	1	0	1	1	2
Harbor porpoise	4	7	0	3	4	10
Bowhead whale	4	8	62	187	66	**195**
Gray whale	28	56	7	14	35	71
Humpback whale	0	1	0	1	0	2
Fin whale	0	1	0	1	0	2
Minke whale	0	1	0	1	0	2
Bearded seal	48	87	39	72	87	**159**
Ringed seal	181	442	150	366	331	**808**
Spotted seal	86	125	71	103	157	**228**
Ribbon seal	7	21	6	17	13	38

Estimated Marine Mammal Exposures (IHA Application)



- **Bowhead satellite tagging**
  - **2008-2011**
  - **31 whales**

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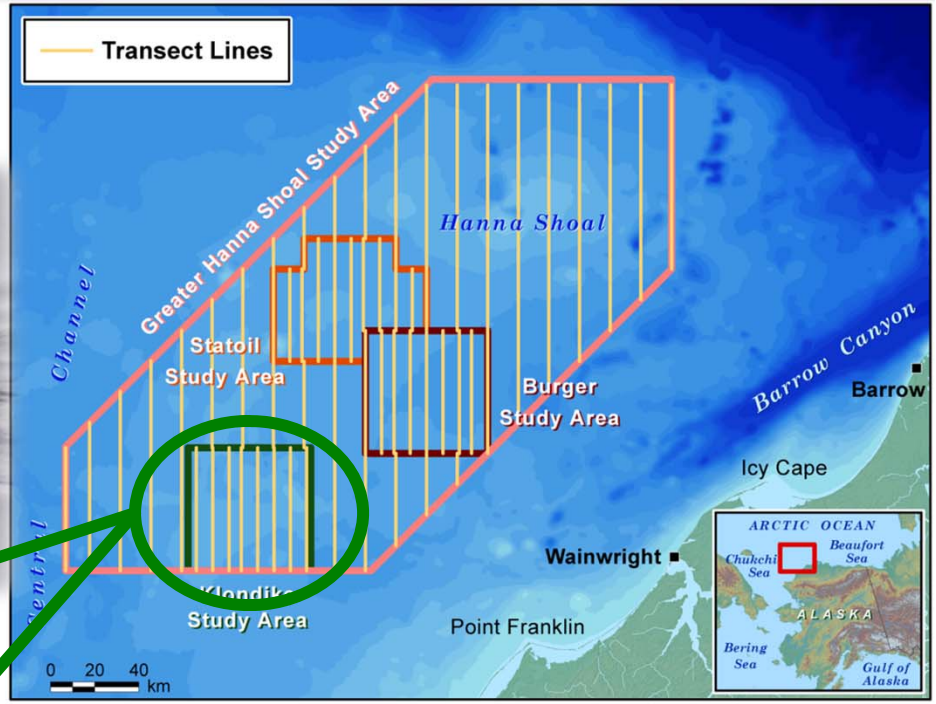
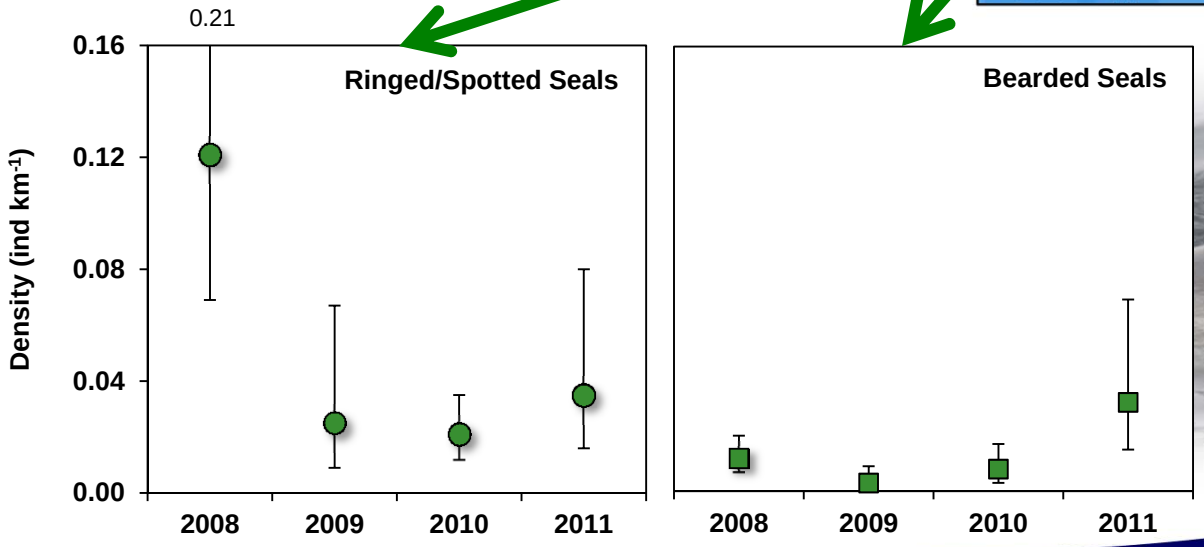
Estimated Marine Mammal Exposures (IHA Application)

- **Seal distribution (CSESP data)**

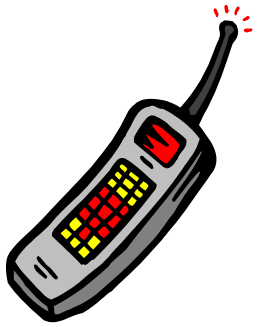




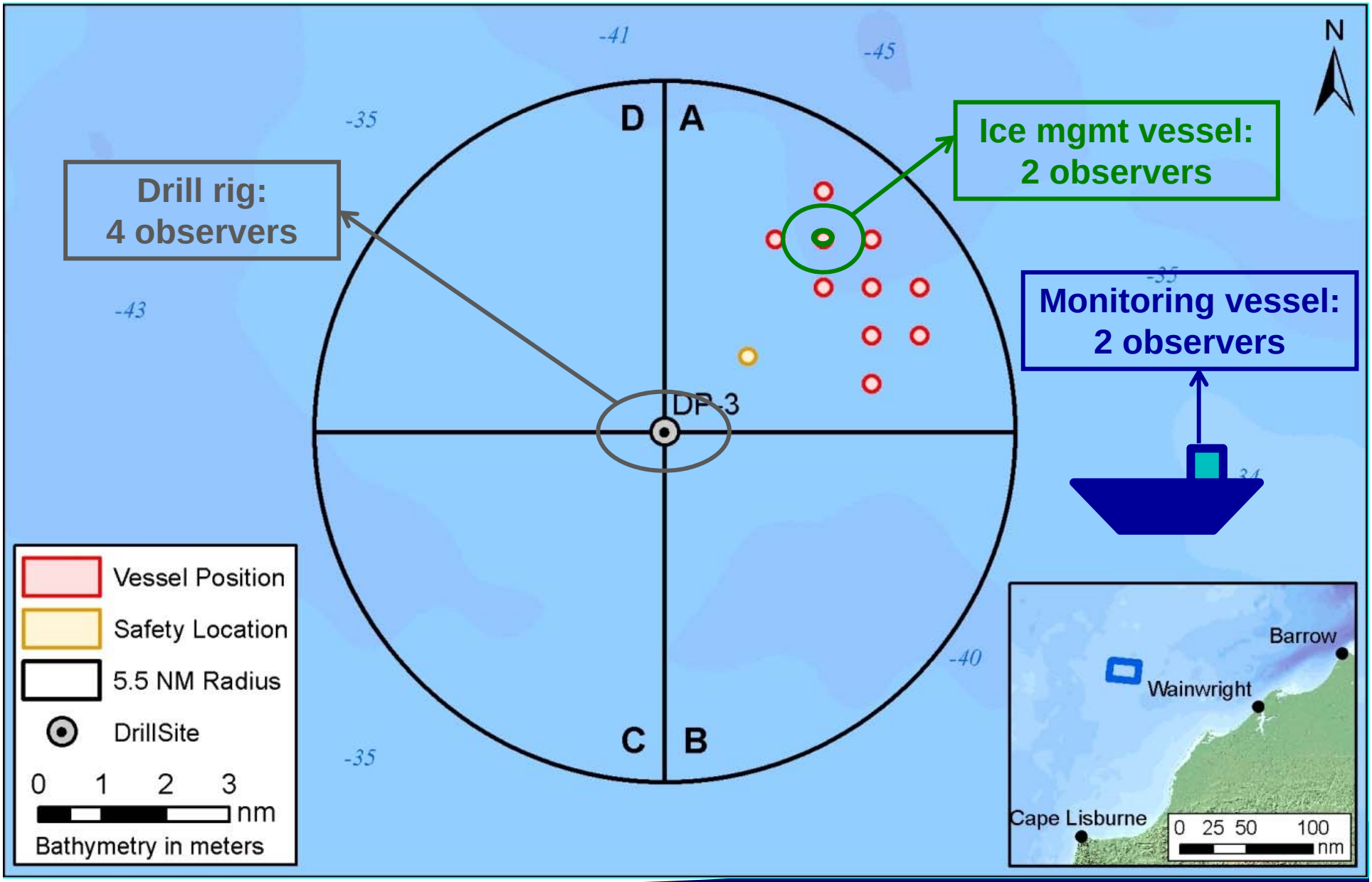
Marine Mammal Monitoring

Observers (PSOs) will:

- **Collect data on occurrence and distribution of marine mammals during project activities**
- **Communicate with coastal communities**
- **Implement mitigation during VSP tests: ramp up, power down, and shut down procedures**

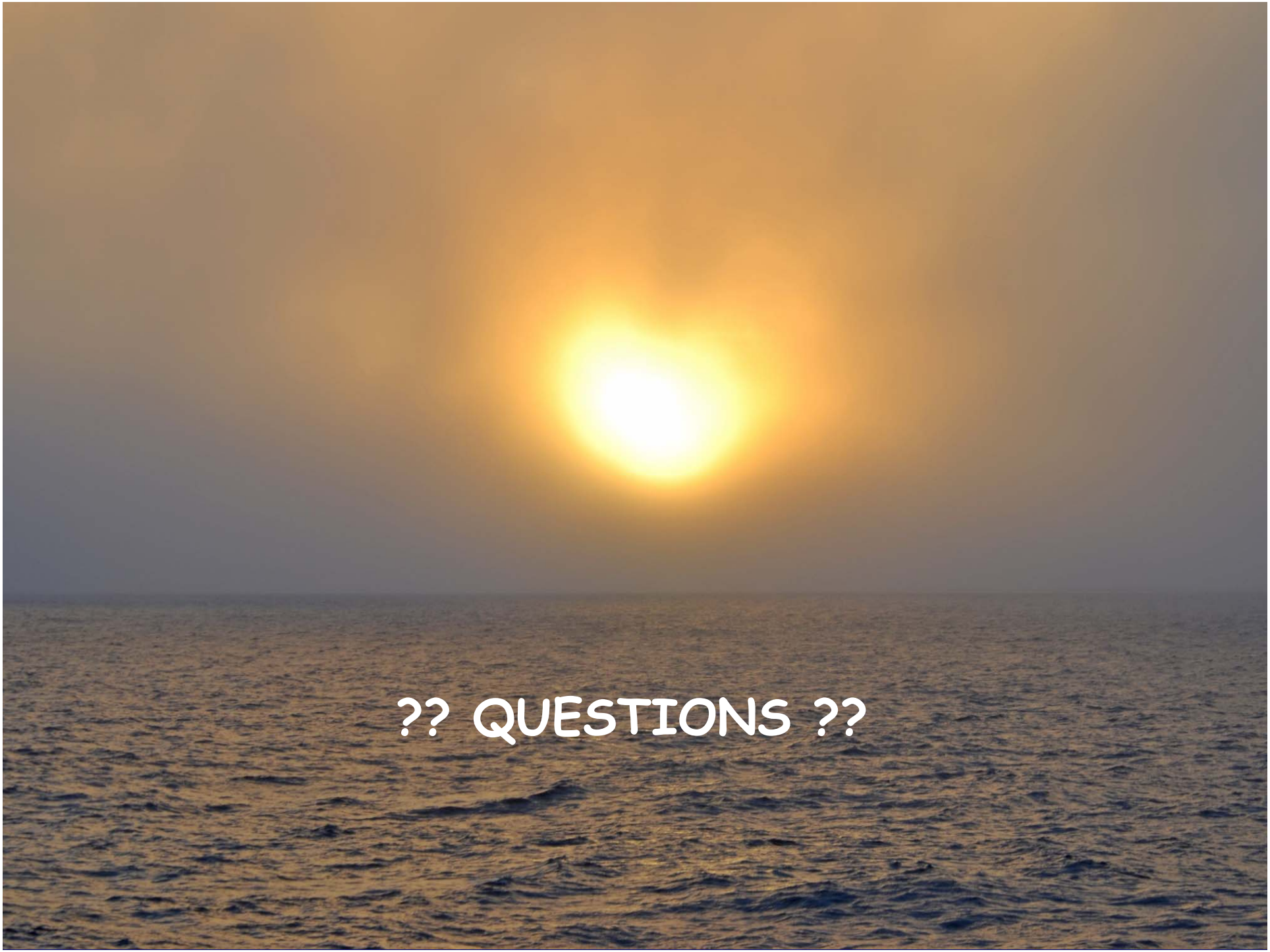


Marine Mammal Monitoring

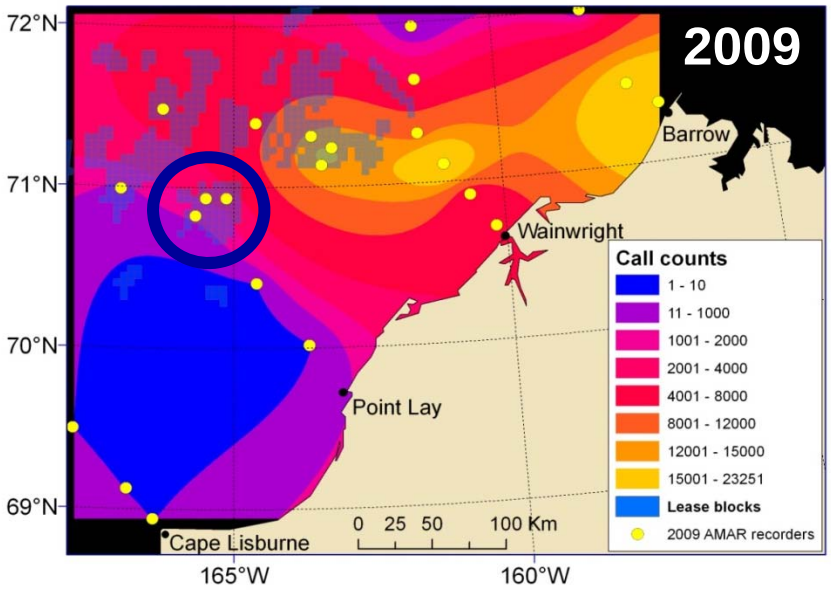


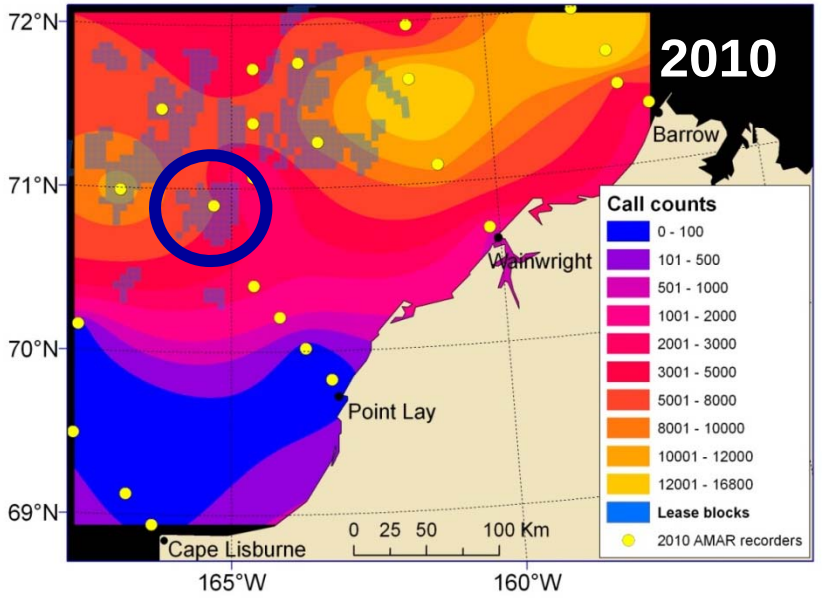
Monitoring Plans – Next Steps

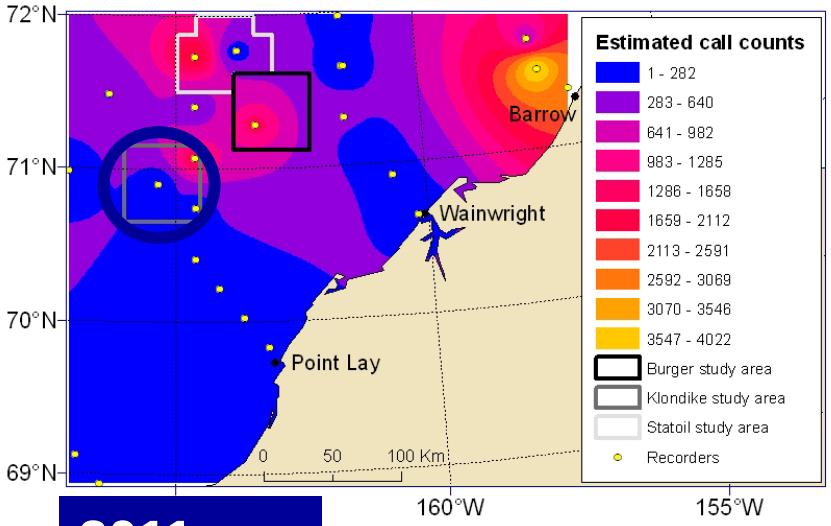
- Finalize marine mammal and acoustic monitoring plans:
  - recommendations from peer review panel
  - feedback from this meeting
  - community meetings
  - guidance by NMFS
- Continue logistics planning, resources, and other project aspects


?? QUESTIONS ??

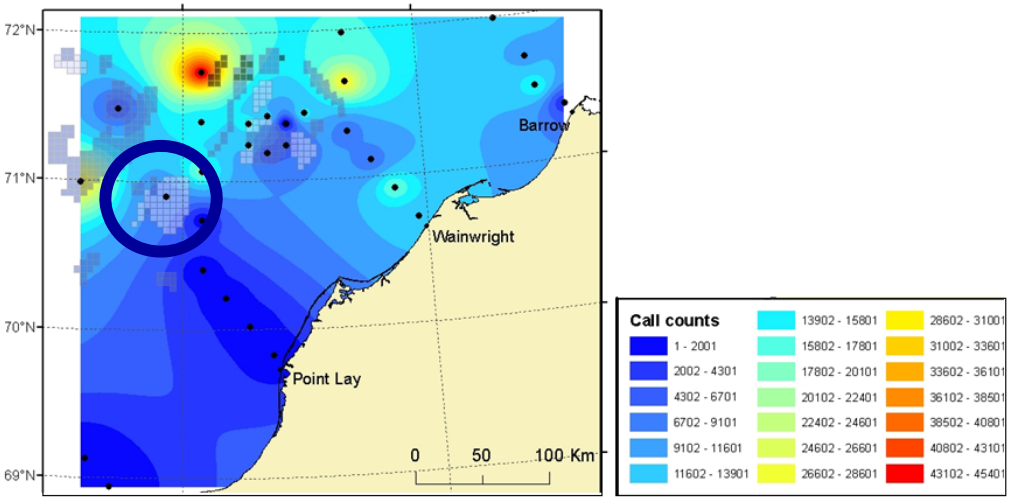
Bowhead migration (acoustics data)







2011



2012

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