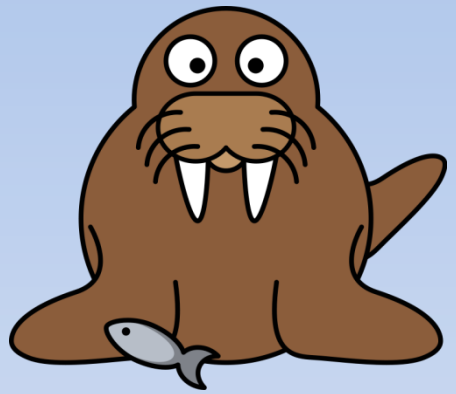
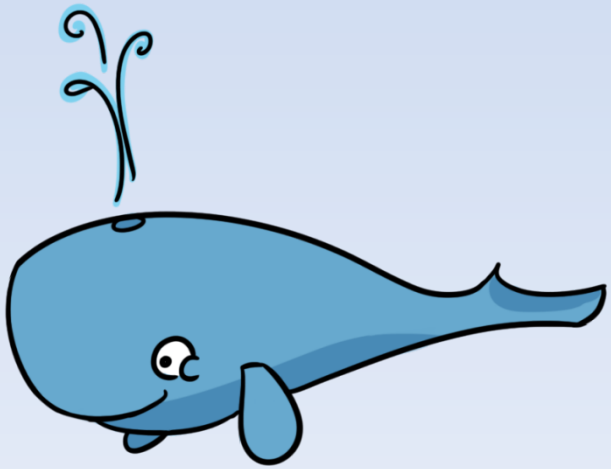
Upper Trophics



Catherine Berchok
Yoko Mitani
Sue Moore
Janet Clarke
Kathy Kuletz
Cathy Coon



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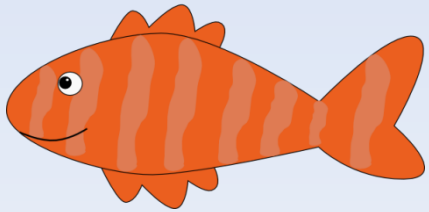
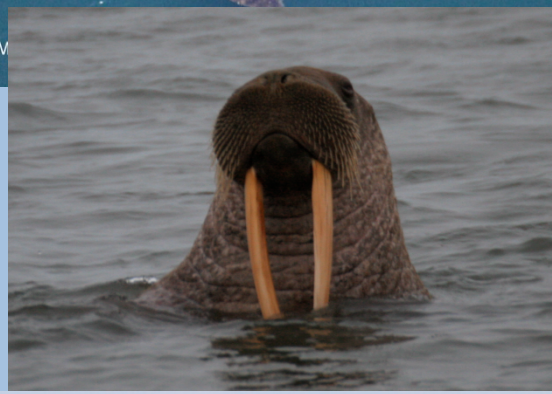
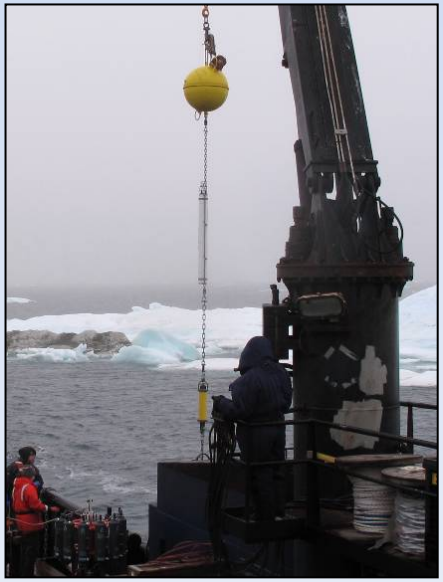


Marine Mammals



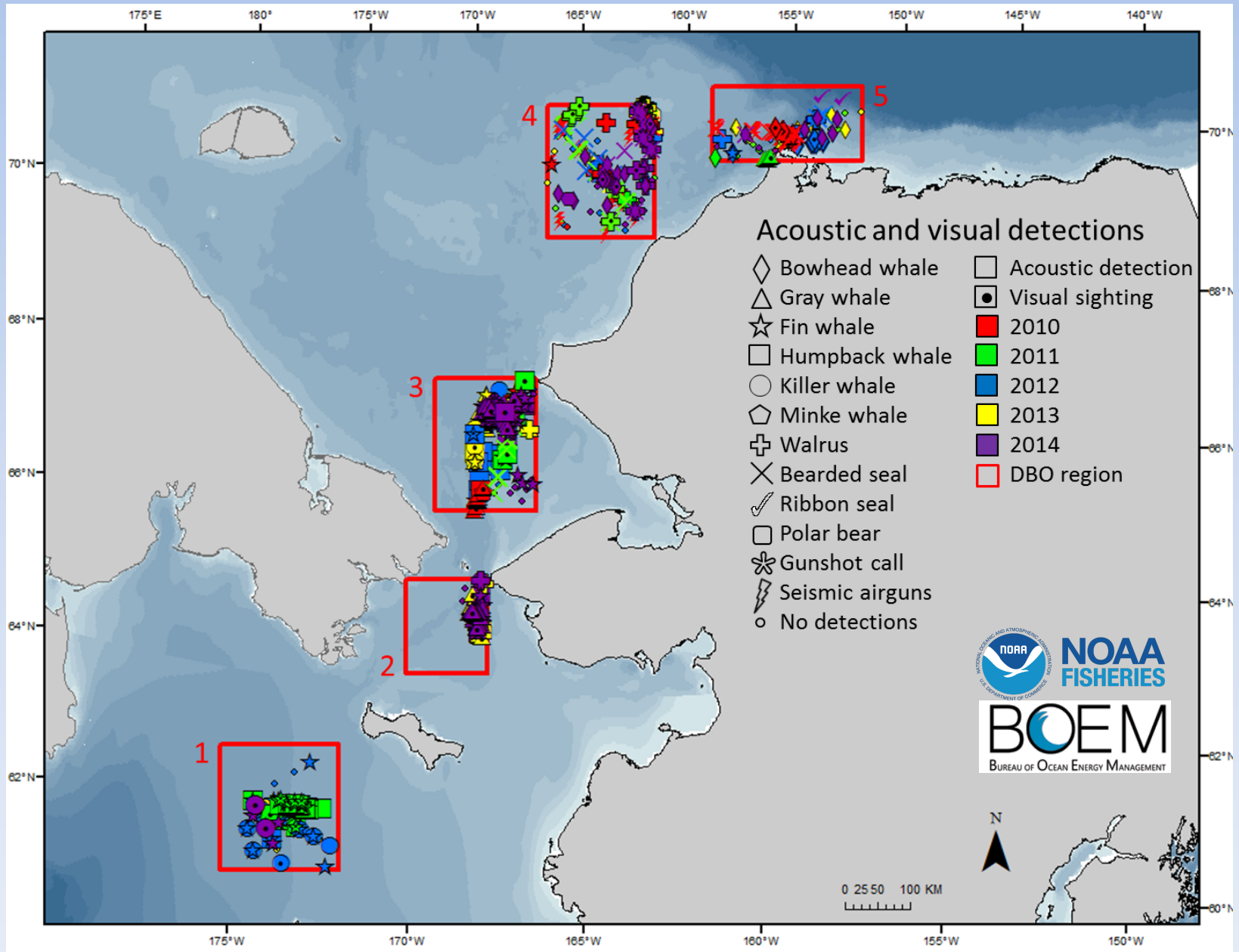
Methods

- Visual
  - Vessel-based (binos/25x big-eyes)
  - Aerial
- Tagging
- Passive Acoustics
  - Sonobuoys
  - Long-term moorings

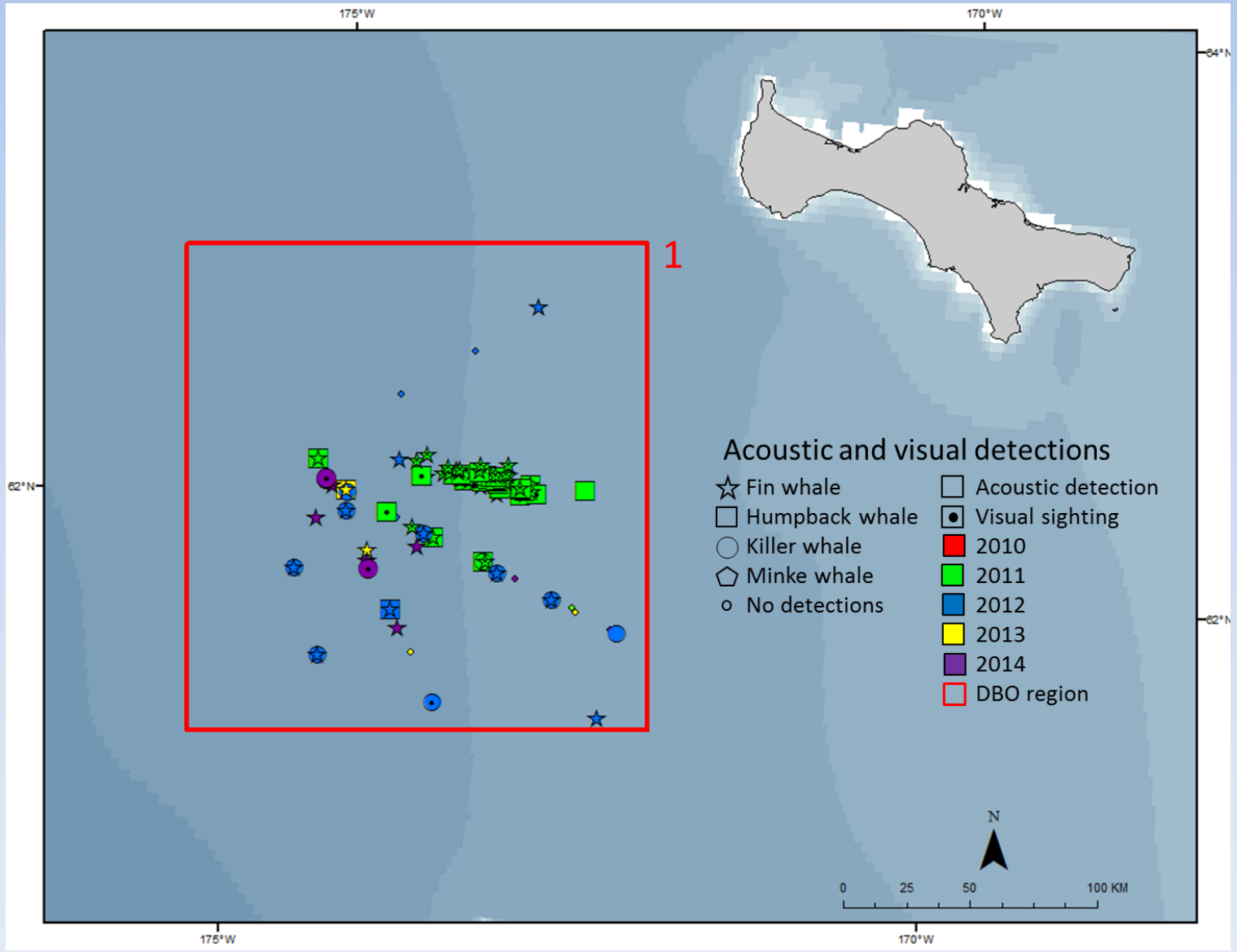


Berchok

CHAOZ/CHAOZ-X/ARCWEST 2010-2014

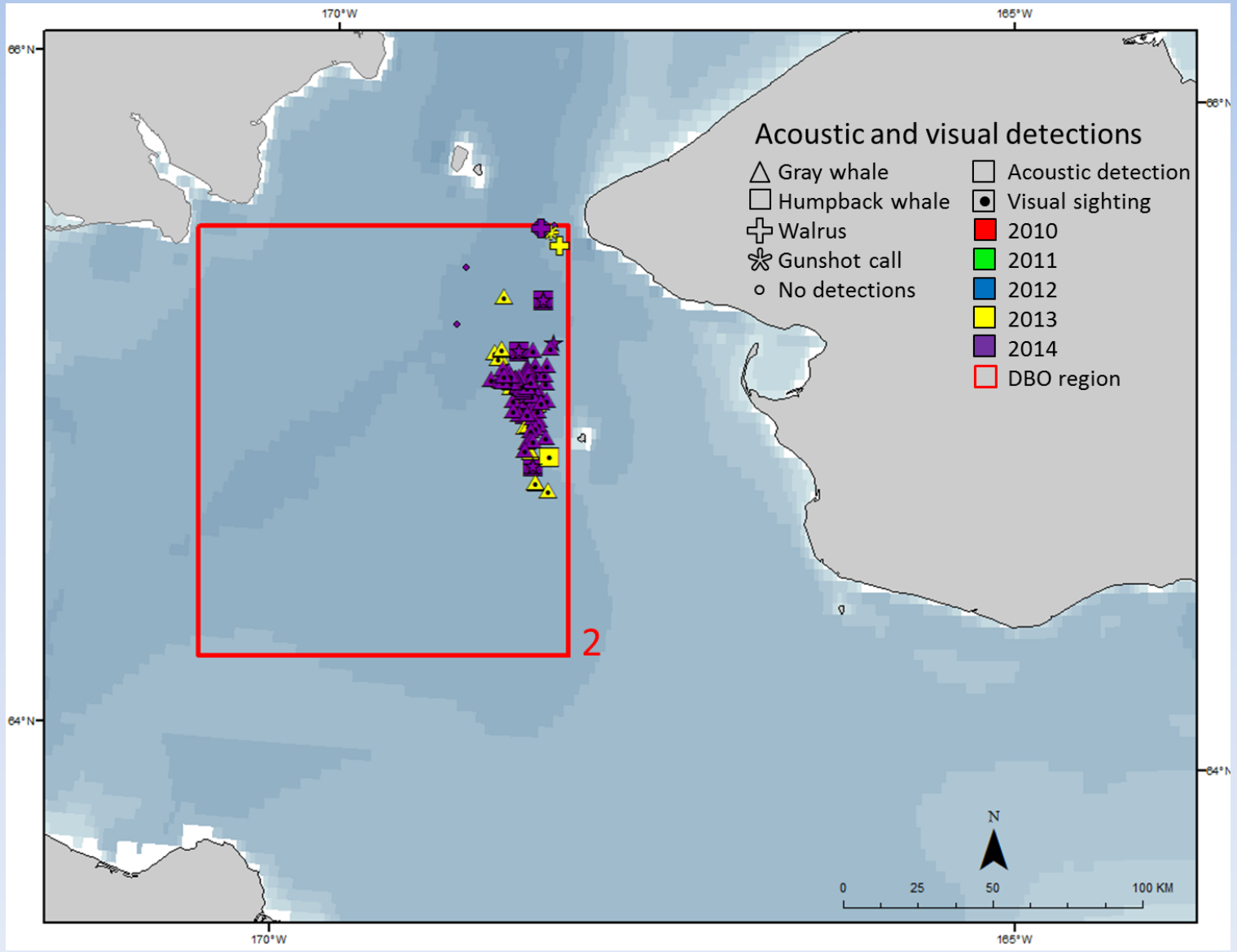


CHAOZ/CHAOZ-X/ARCWEST 2010-2014



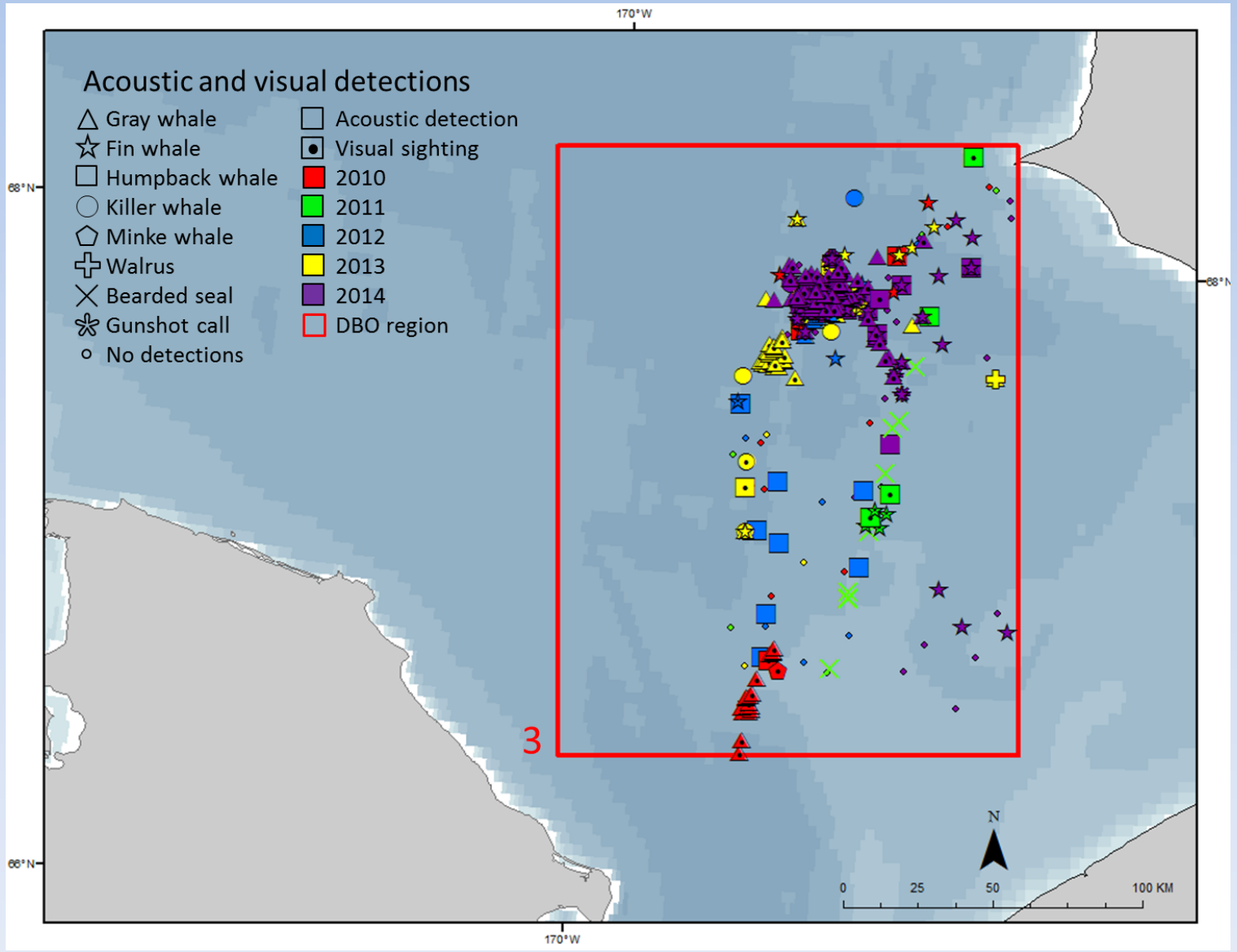
Fins!
Humpbacks!

CHAOZ/CHAOZ-X/ARCWEST 2010-2014



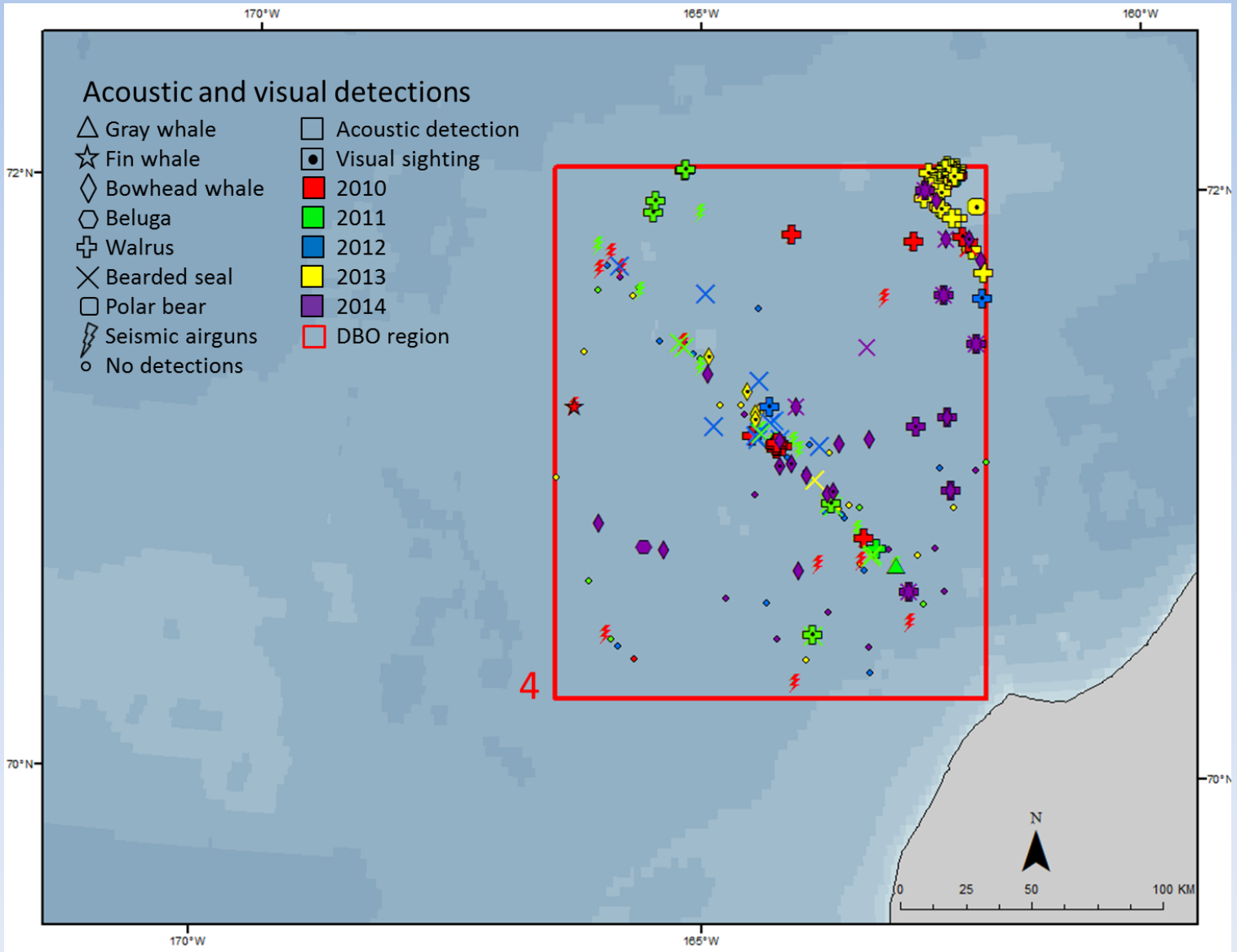
Grays!

CHAOZ/CHAOZ-X/ARCWEST 2010-2014



Grays!
Humpbacks!
Killer whales!
Fins!
Pinnipeds!

CHAOZ/CHAOZ-X/ARCWEST 2010-2014

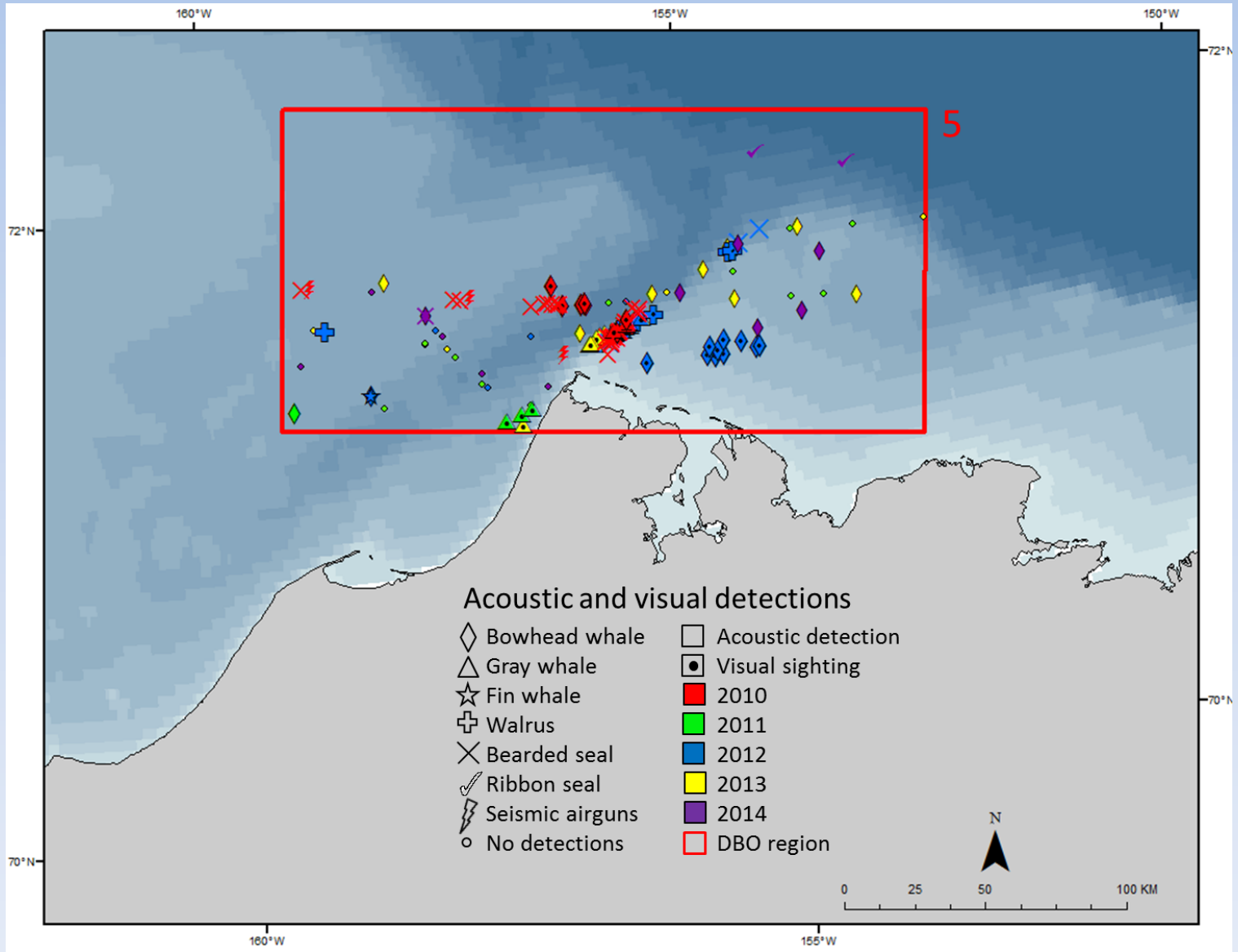


Bowheads!
Bearded seals!
Walrus!
Airguns!

First year to hear beluga – but no ice

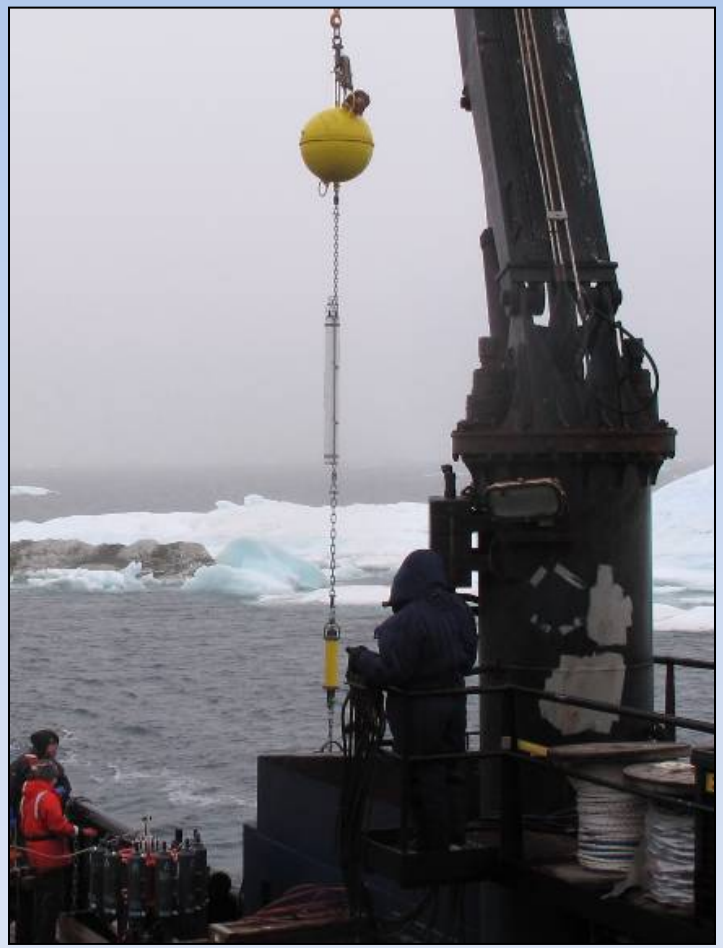
Best spatial coverage

CHAOZ/CHAOZ-X/ARCWEST 2010-2014

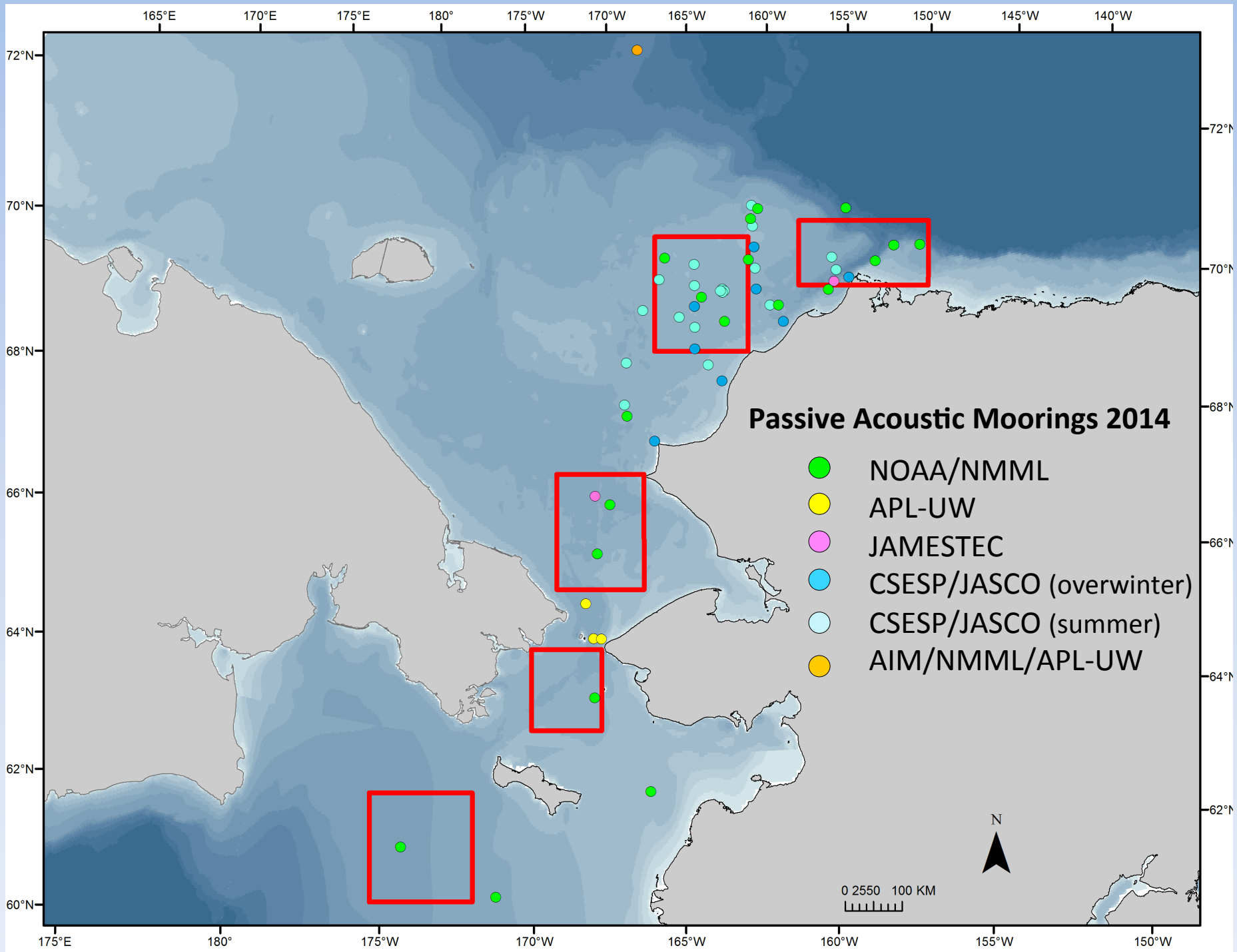


Bowheads!
Bearded seals!
Grays!

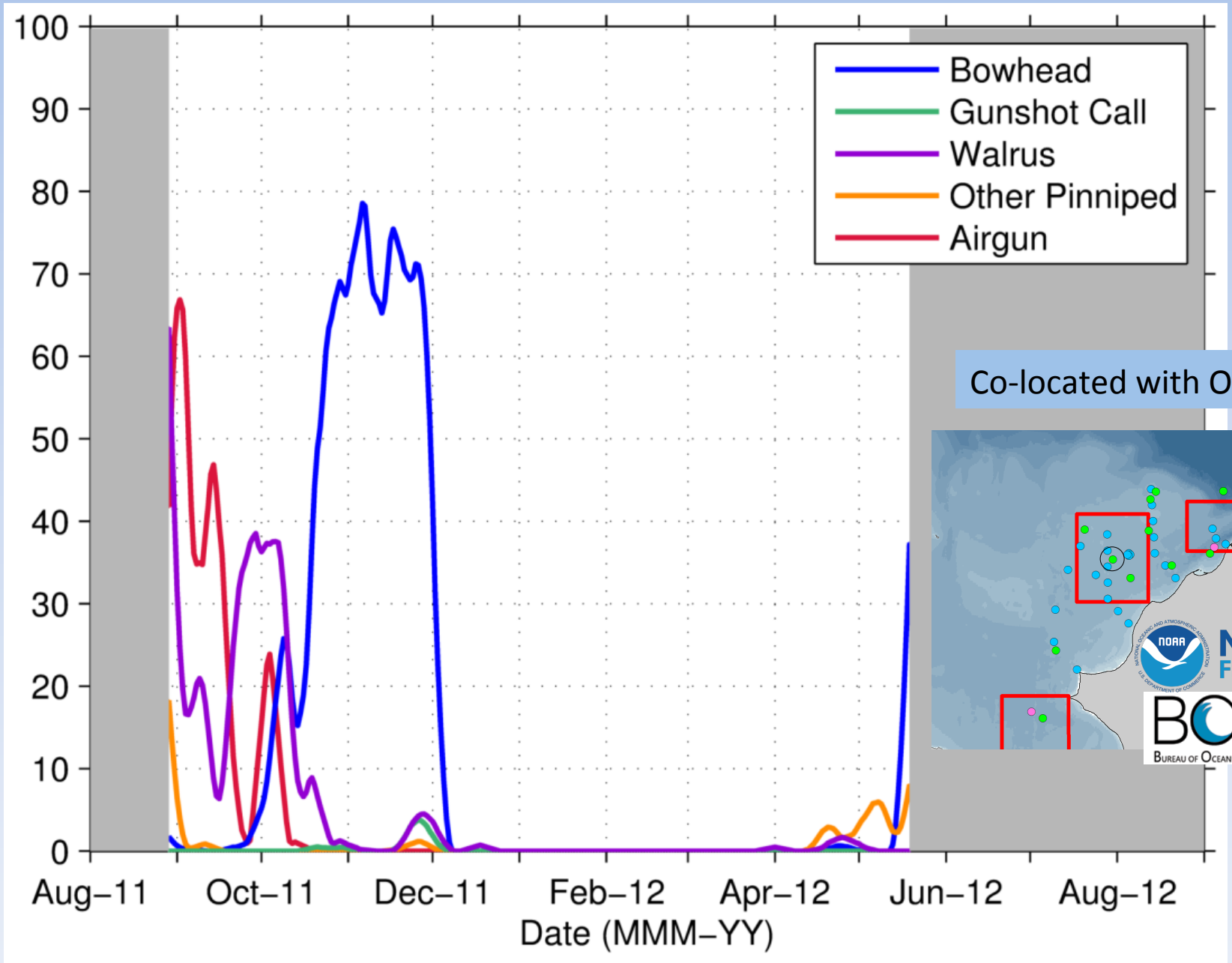
New for 2014
Ribbon seals!



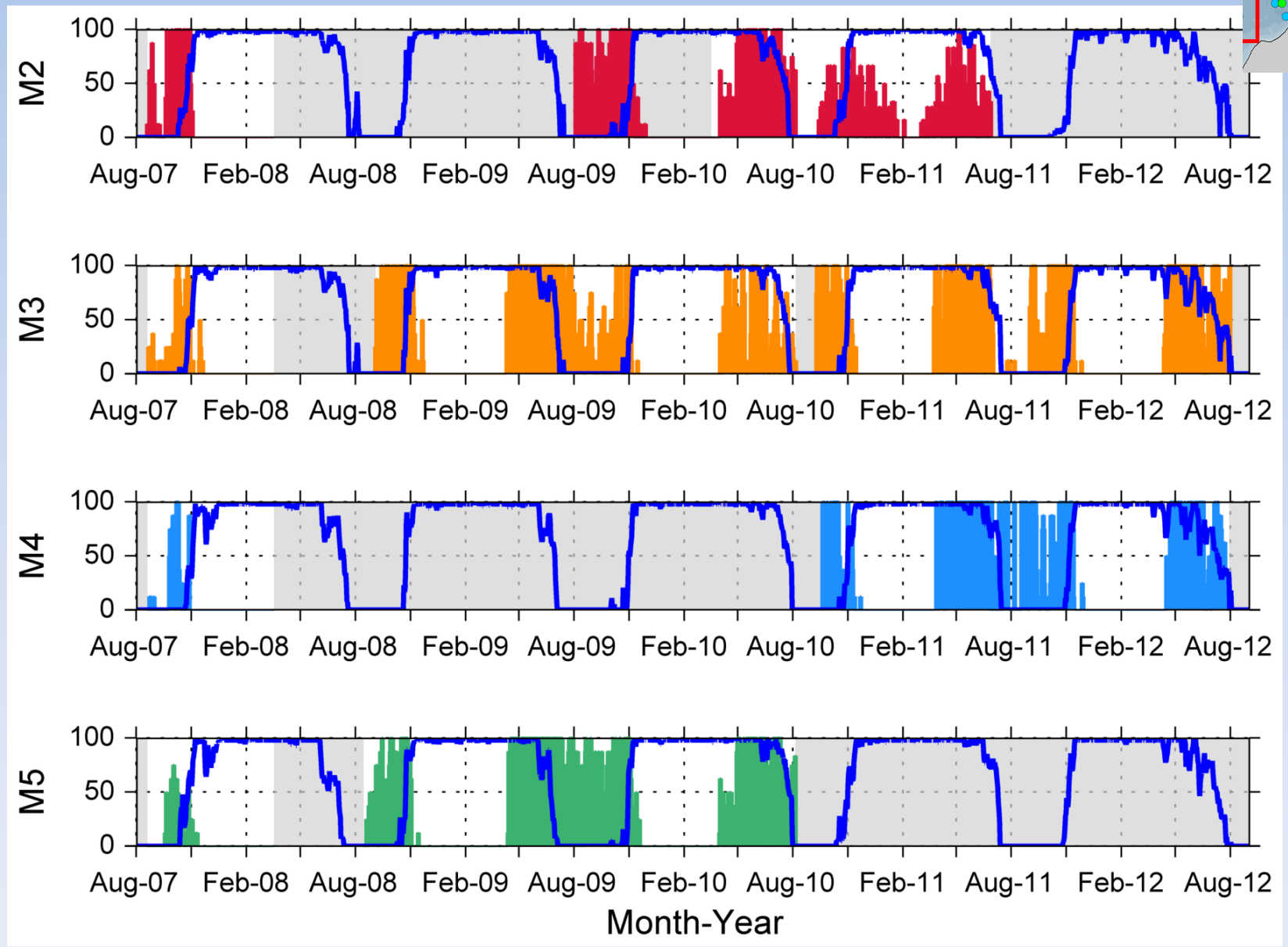
All Long-term passive acoustic recorders

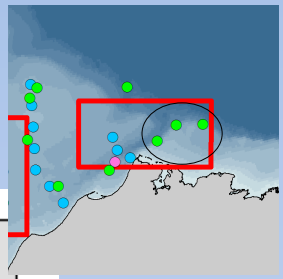

Passive Acoustic Moorings 2014
NOAA/NMML
APL-UW
JAMESTEC
CSESP/JASCO (overwinter)
CSESP/JASCO (summer)
AIM/NMML/APL-UW
N
0 2550 100 KM
165°E
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
72°N
70°N
68°N
66°N
64°N
62°N
60°N

CHAOZ 2011 Middle Icy Cape Mooring



BOWFEST 2007-2012





NOAA FISHERIES

BOEM
Bureau of Ocean Energy Management

Mitani

Acoustic monitoring and visual survey of marine mammals in the Chukuchi Sea and Barrow Canyon.

Yoko Mitani[1], Daisuke Mizuguchi[2], Mayuko Otsuki[3], Yuka Iwahara[3] , and Keiko Sekiguchi[4]

[1]Field Science Center for Northern Biosphere, Hokkaido University
[2]Wildlife Research Center of Kyoto University
[3]Graduate School of Environmental Science, Hokkaido University
[4]International Christian University

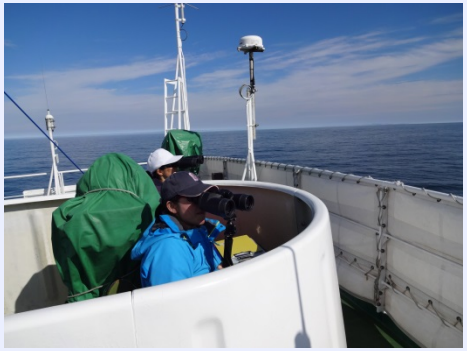
Marine Mammals Sighting Survey

Year	Date			Days	Distance (nmi)	ship name
2007	8.5	-	13	9	883.3	T/S Oshoro-maru
2008	7.6	-	14	9	1026	T/S Oshoro-maru
2012	9.13	-	10.4	22	963.3	R/V Mirai
2013	7.4	-	19	16	1399.6	T/S Oshoro-maru
2014	9.10	-	24	15	994.1	CCGS Amundsen

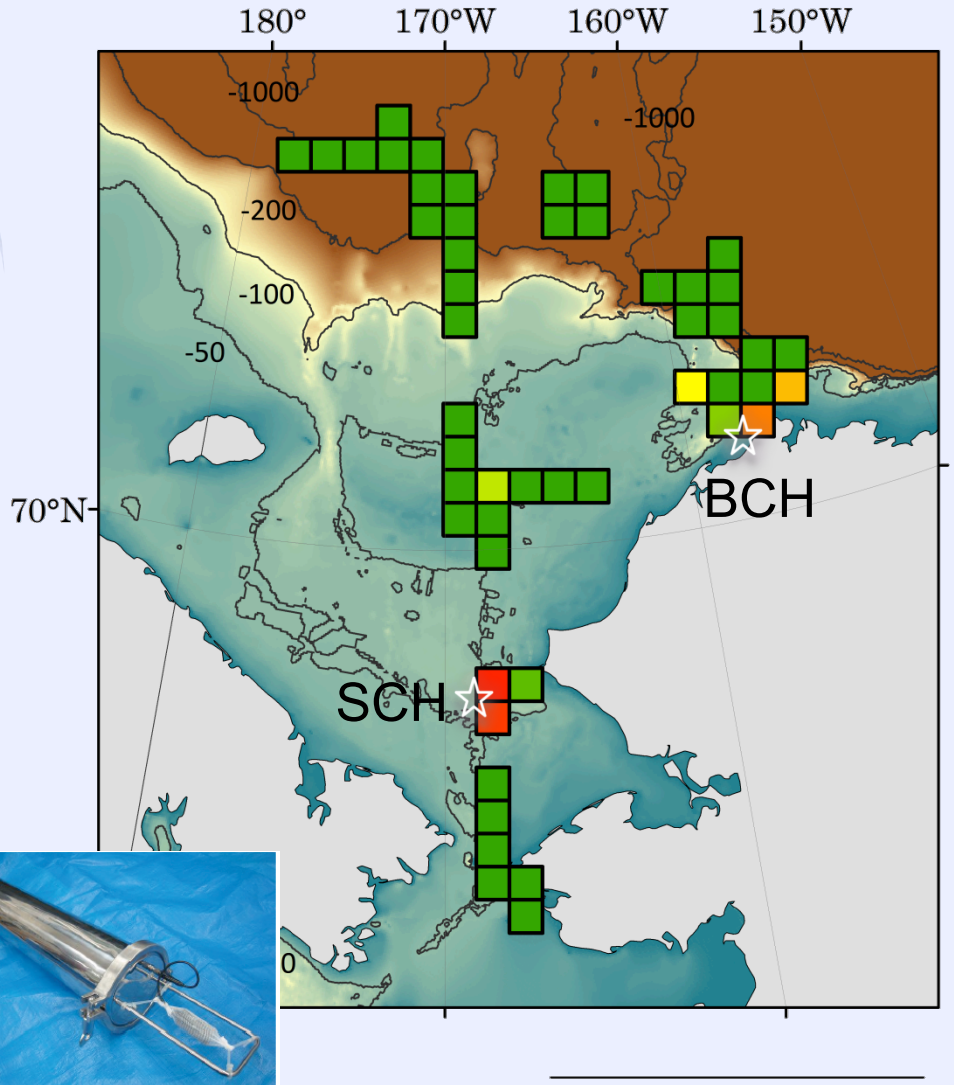
T/S Oshoromaru

Jamstec R/V Mirai

CCGS Amundsen

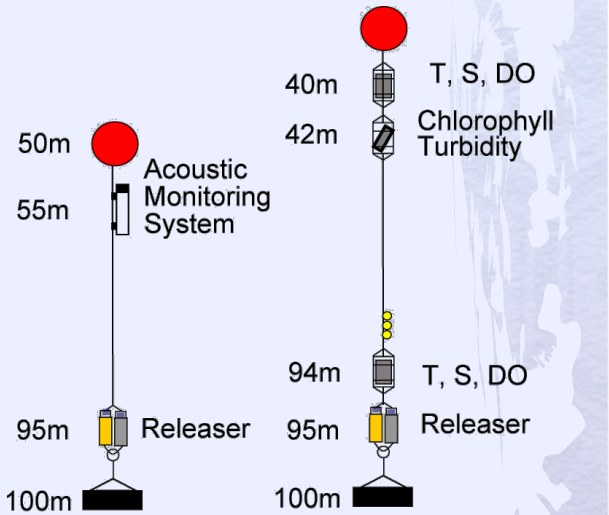


Passive acoustic monitoring

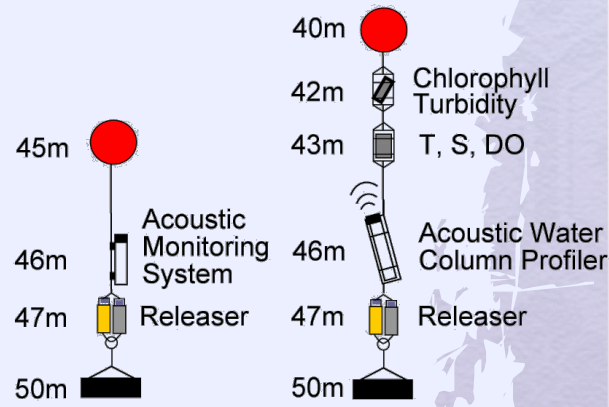


AUSOMS (Aqua-sound, Japan)

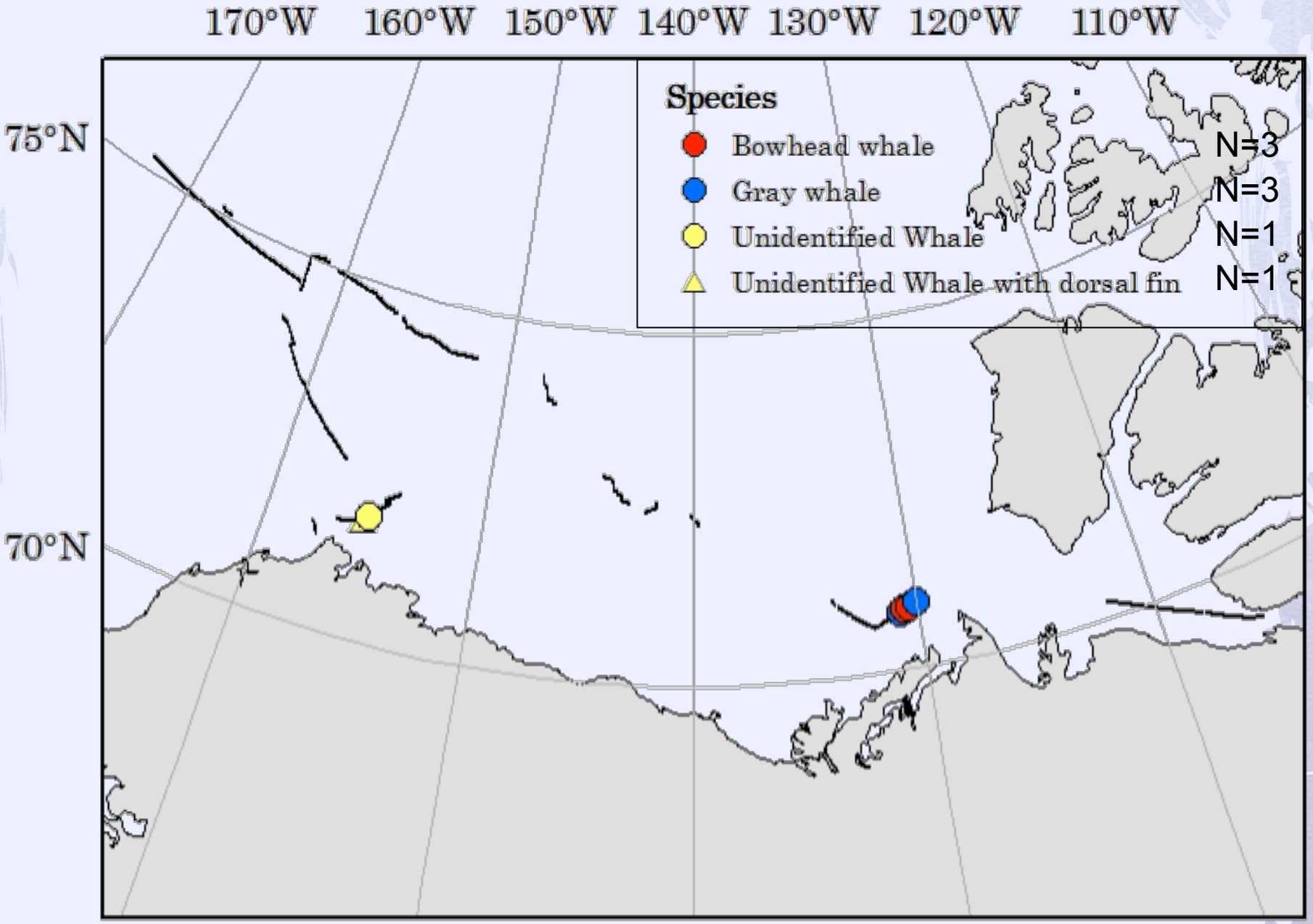
Barrow Canyon Hotspot (BCH)



Southern Chukchi sea Hotspot (SCH)

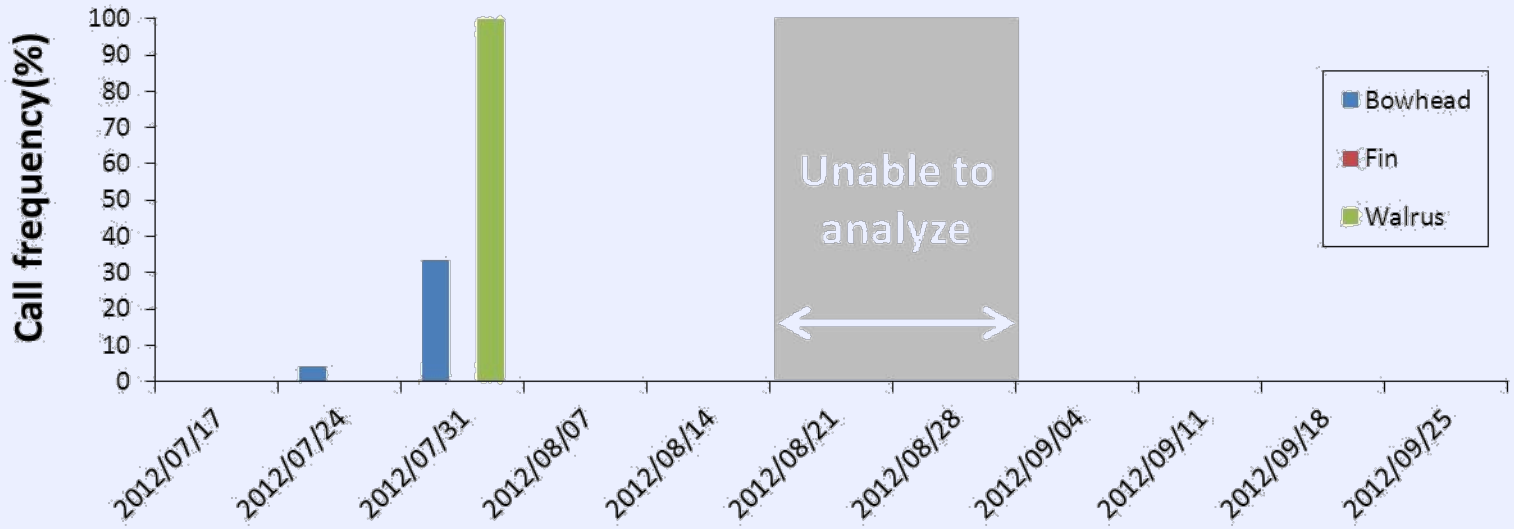


Result of sighting survey in 2014

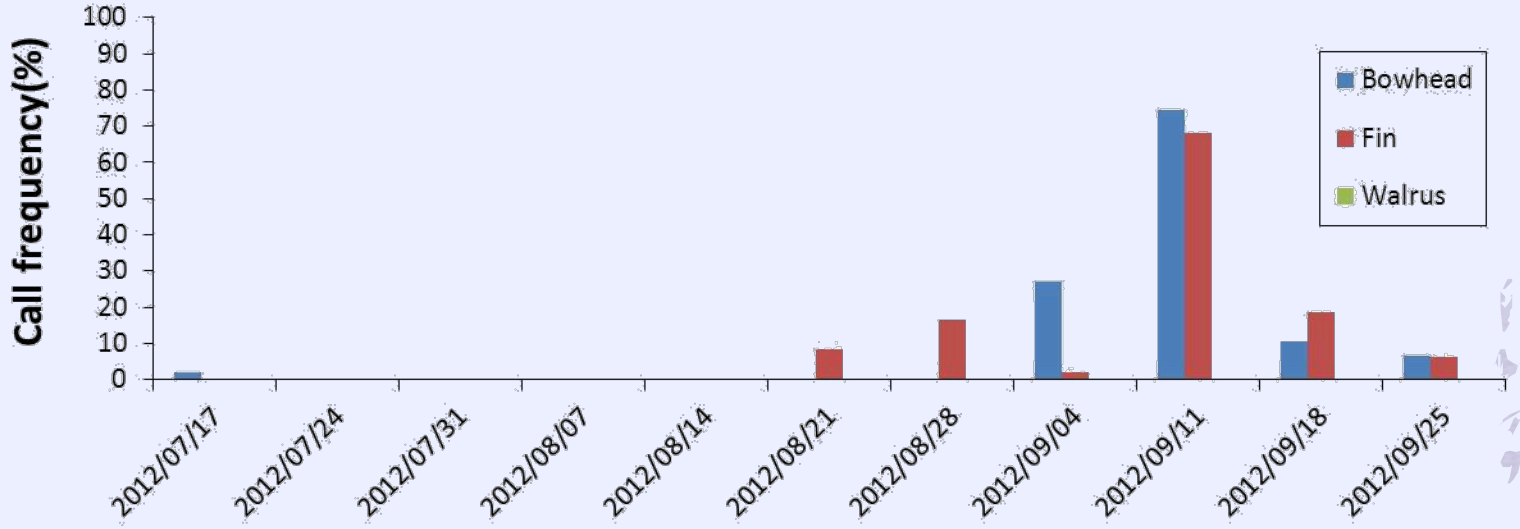


Result - Weekly presence of marine mammal calls

BCH

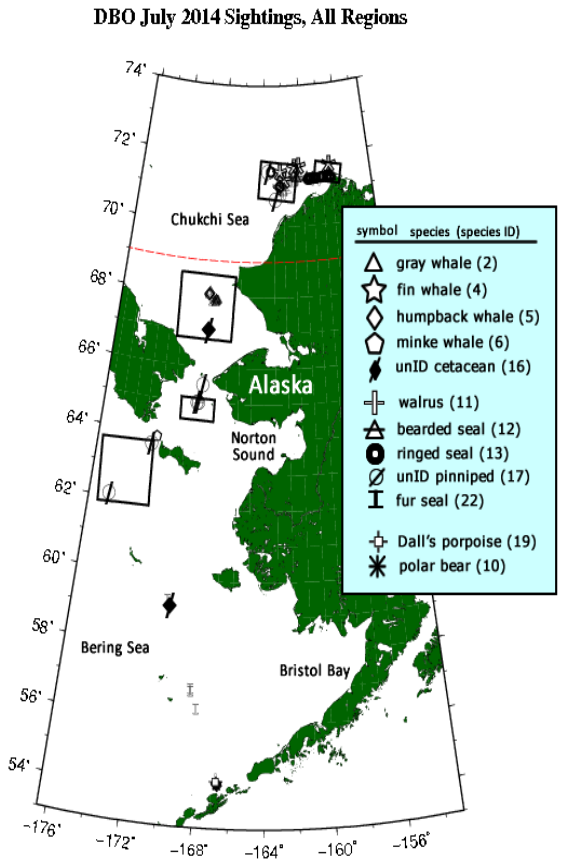


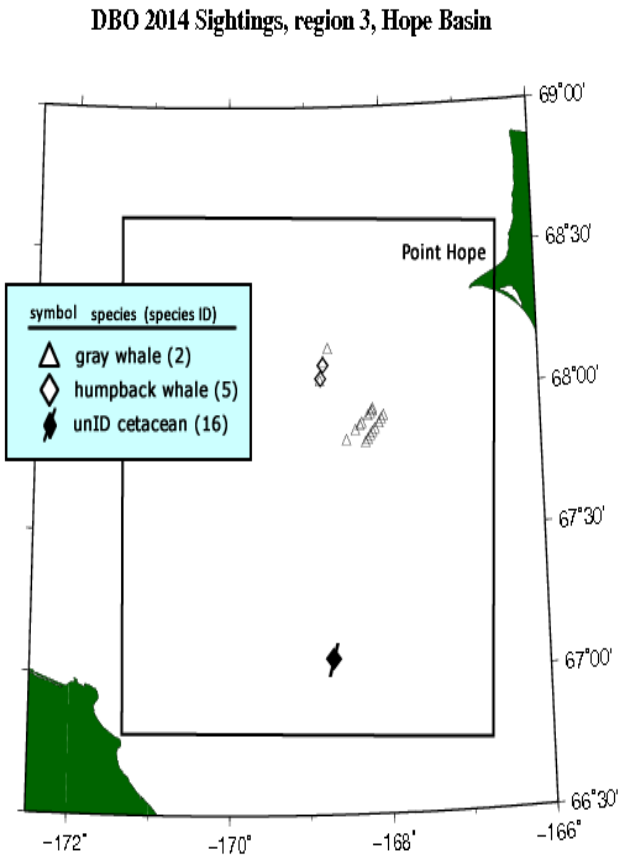
SCH



Moore

Laurier - Marine Mammal Watch – July 2014

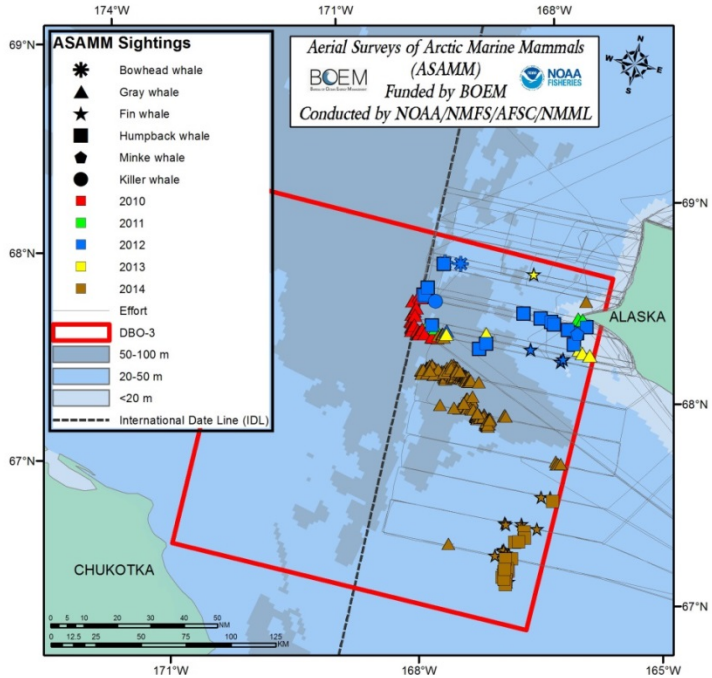




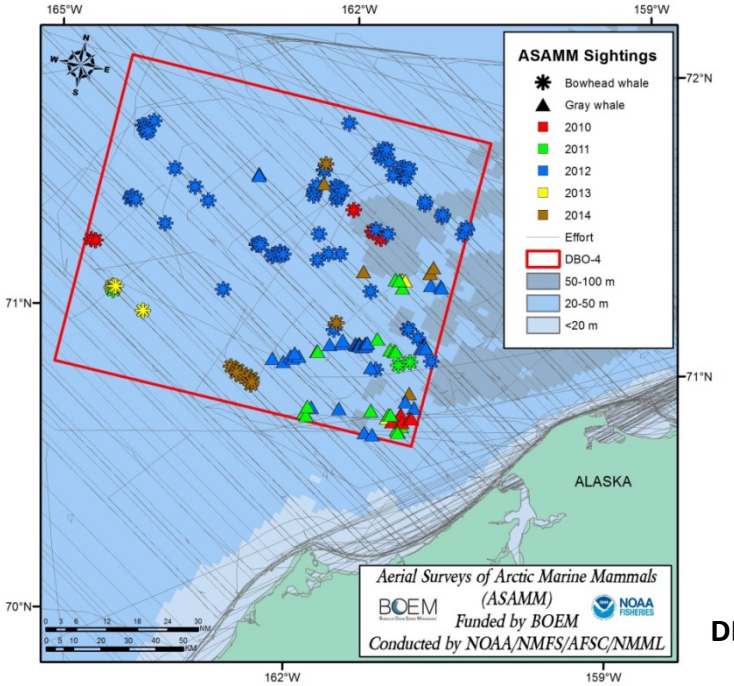
Sighting maps & data available on AOOS/AXIOM DBO Workspace

Clarke

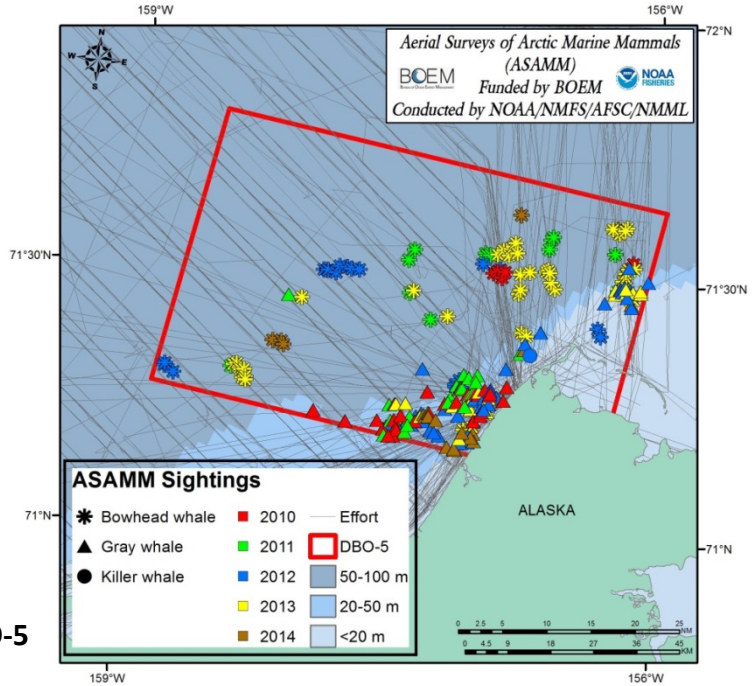
ASAMM 2010-2014, Cetaceans



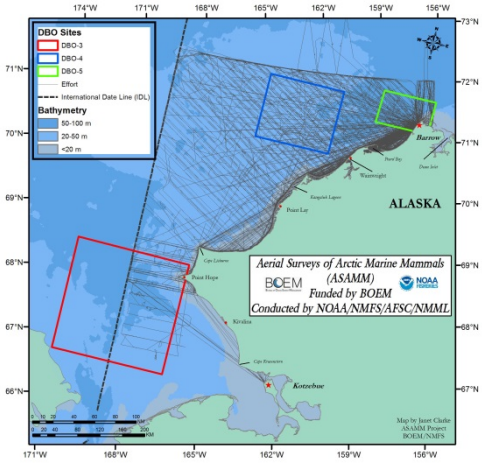
DBO-3



DBO-4

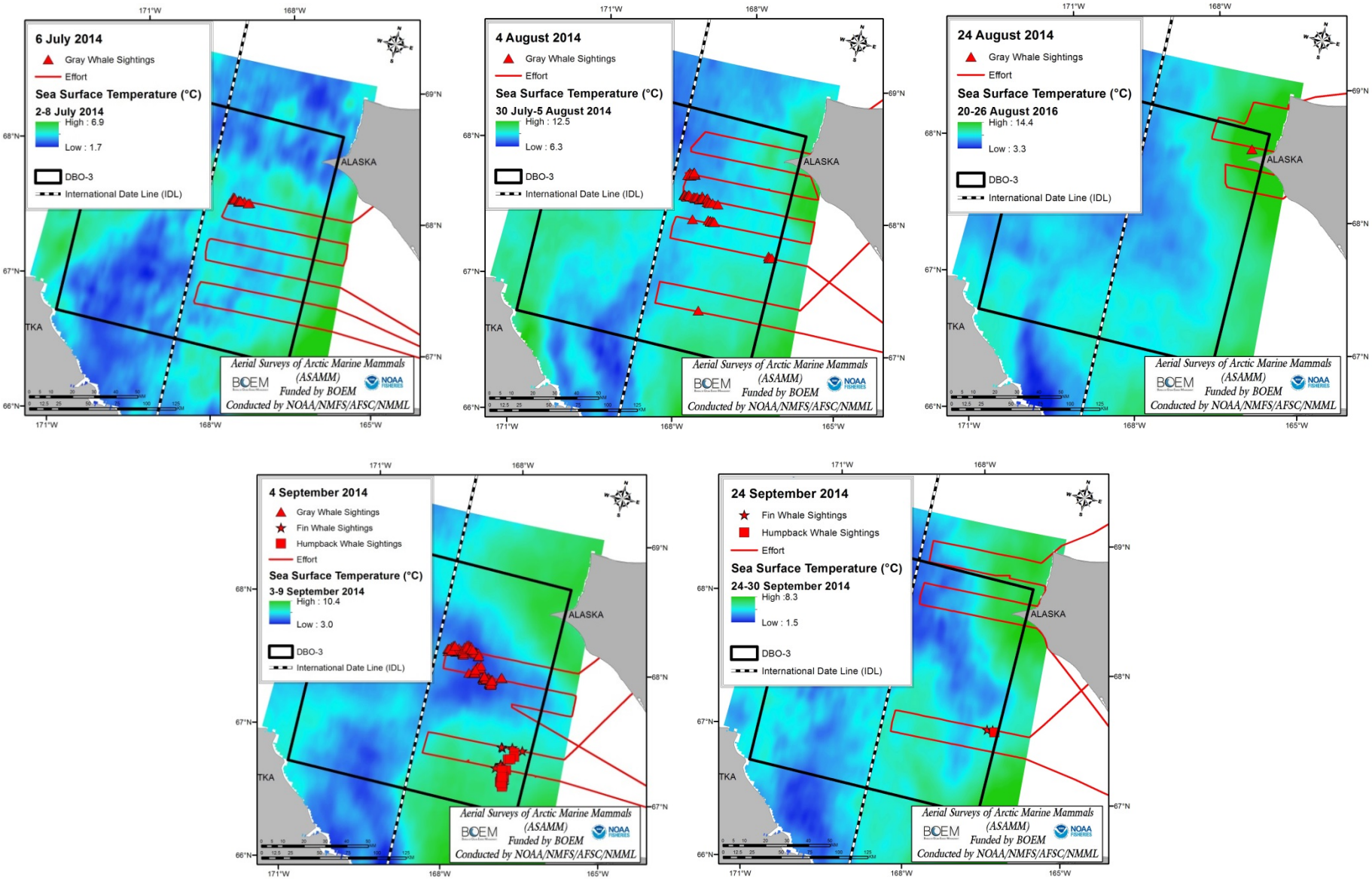


DBO-5



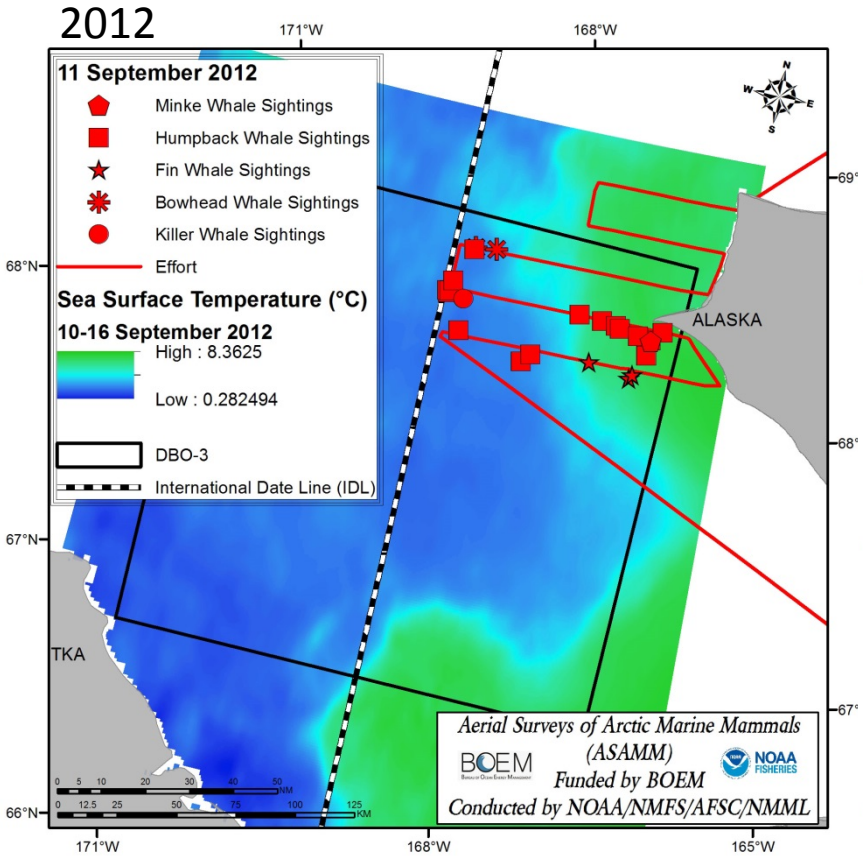
All effort, 2010-2014

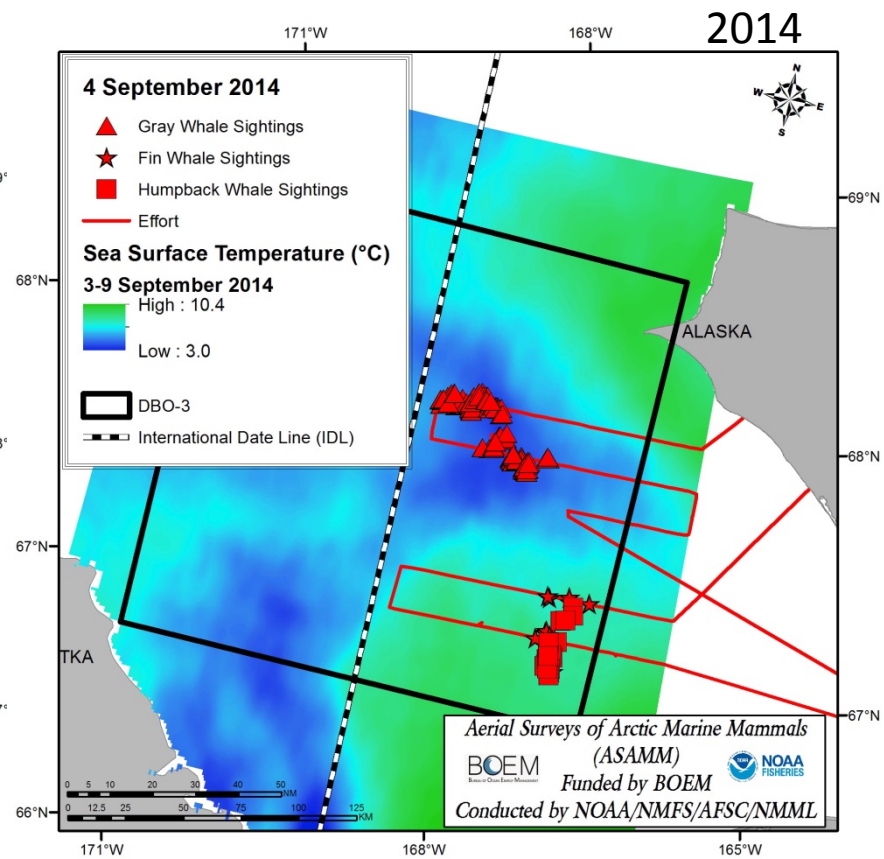
DBO-3, ASAMM Cetacean Sightings and Effort with SST, July - September 2014



Sea surface temperature data from http://podaac.jpl.nasa.gov/dataset?JPL_OUROCEAN-L4UHfnd-GLOB-G1SST
(with generous assistance from Kate Stafford and Erin Labrecque)

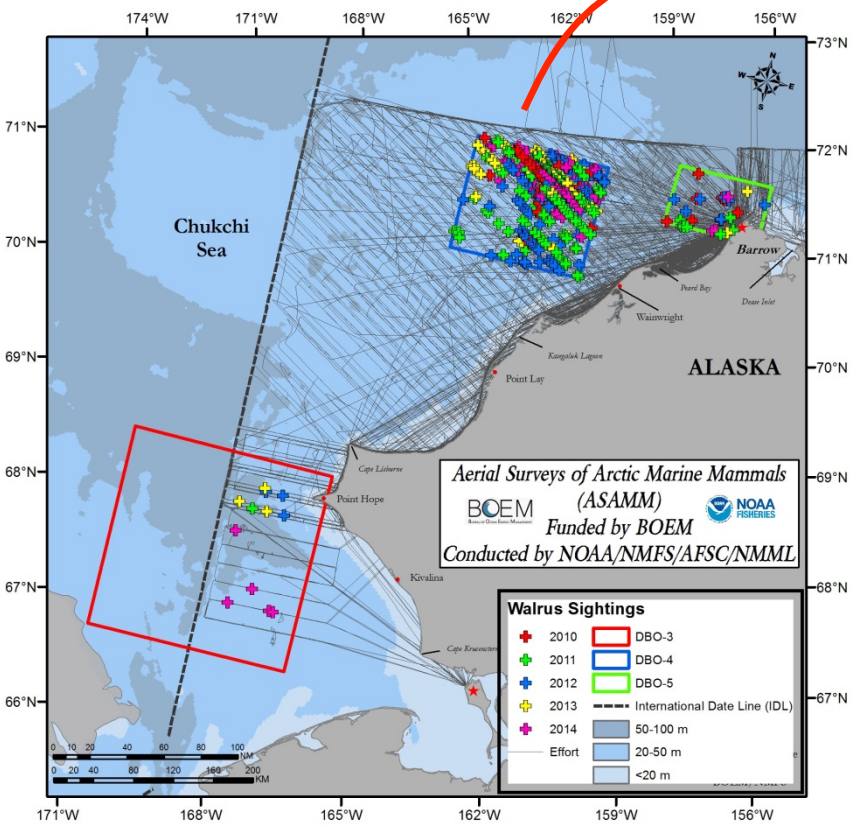
DBO-3
Comparison between 9/11/12 and 9/4/14, Cetacean Sightings and Sea Surface Temperature



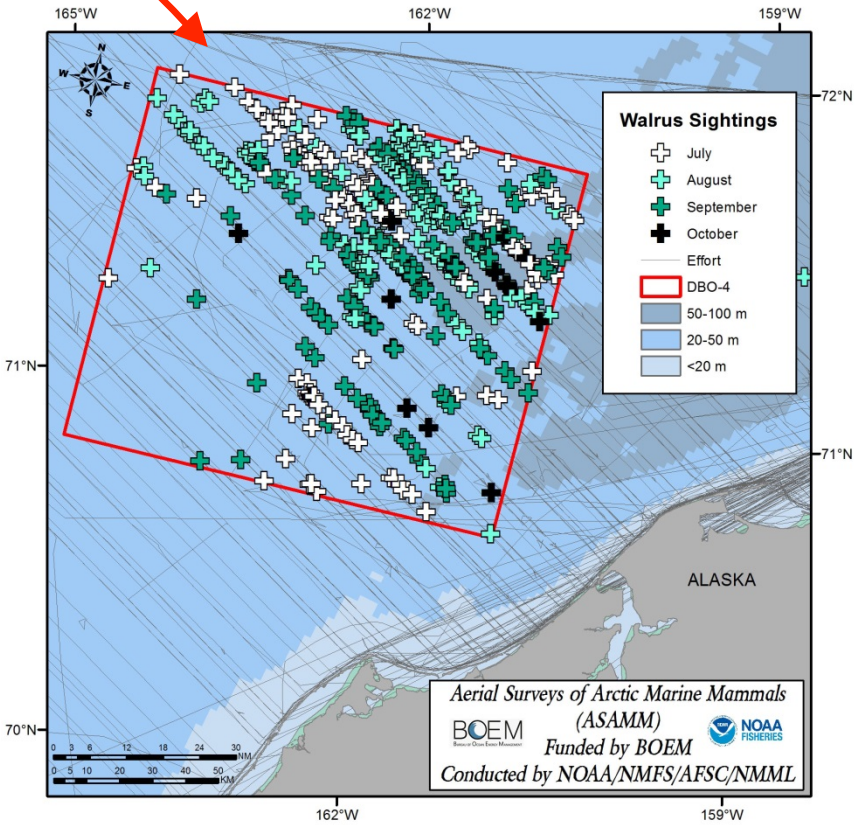


Sea surface temperature data from http://podaac.jpl.nasa.gov/dataset?JPL_OUROCEAN-L4UHfnd-GLOB-G1SST
(with generous assistance from Kate Stafford and Erin Labrecque)

ASAMM 2010-2014, Walruses

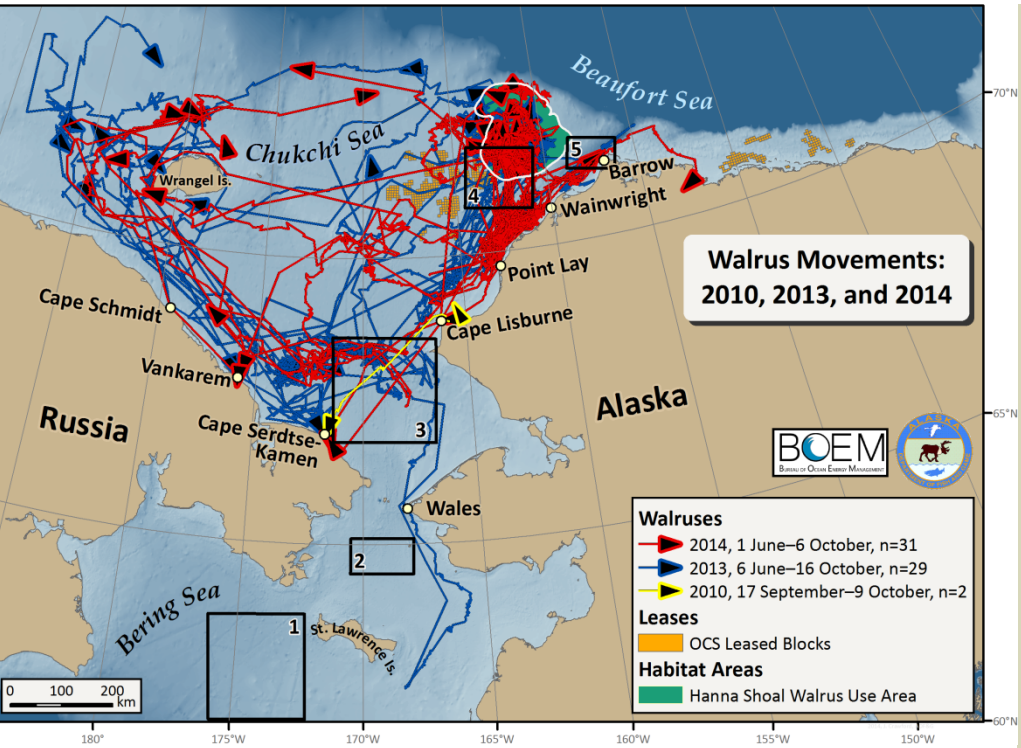


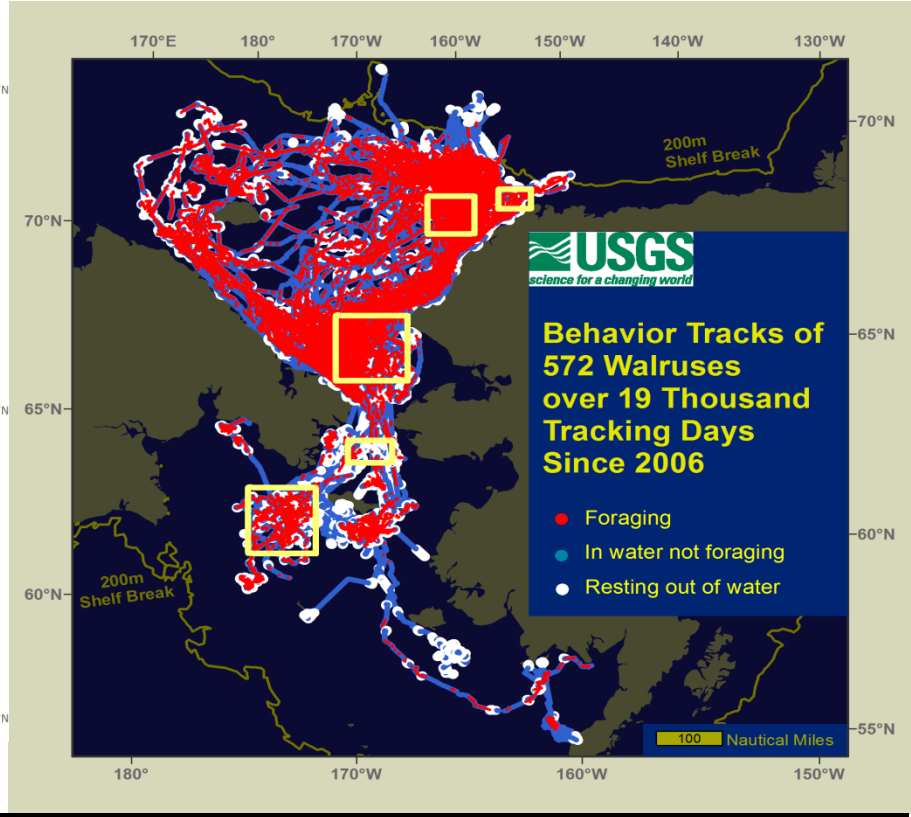
Walrus Sightings, 2010-2014, DBO-3, 4, 5

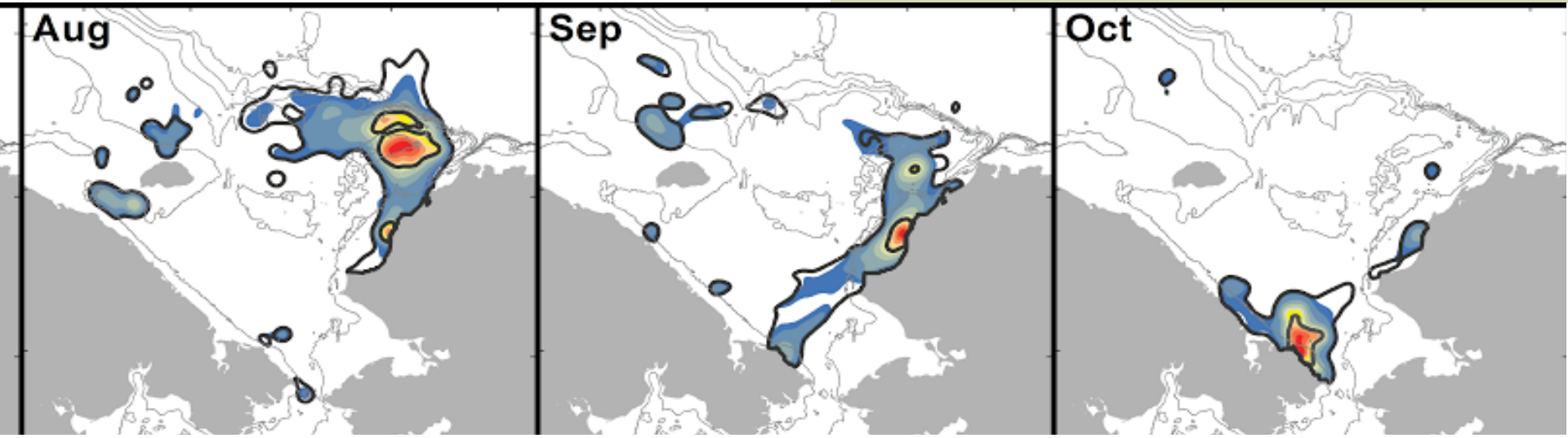


Walrus Sightings, July to October, DBO-4

Coon


Walrus Movements:
2010, 2013, and 2014
Beaufort Sea
Chukchi Sea
Wrangel Is.
Barrow
Wainwright
Point Lay
Cape Lisburne
Cape Schmidt
Vankarem
Russia
Cape Serdtse-Kamen
Alaska
Wales
Bering Sea
St. Lawrence Is.
1
2
3
4
5
BOEM
Walruses
2014, 1 June–6 October, n=31
2013, 6 June–16 October, n=29
2010, 17 September–9 October, n=2
Leases
OCS Leased Blocks
Habitat Areas
Hanna Shoal Walrus Use Area
0 100 200 km
180°
175°W
170°W
165°W
160°W
155°W
150°W
70°N
65°N
60°N


USGS
science for a changing world
Behavior Tracks of 572 Walruses over 19 Thousand Tracking Days Since 2006
Foraging
In water not foraging
Resting out of water
200m Shelf Break
100 Nautical Miles
170°E
180°
170°W
160°W
150°W
140°W
130°W
70°N
65°N
60°N
55°N


Aug
Sep
Oct

Birds
Kuletz

At-sea surveys in Bering, Chukchi, Beaufort

PI – Kathy Kuletz, U.S. Fish & Wildlife Service

Questions:

How will seabirds respond to predicted changes in ice, SST, currents, prey abundance and distribution?

What can seabirds tell us?

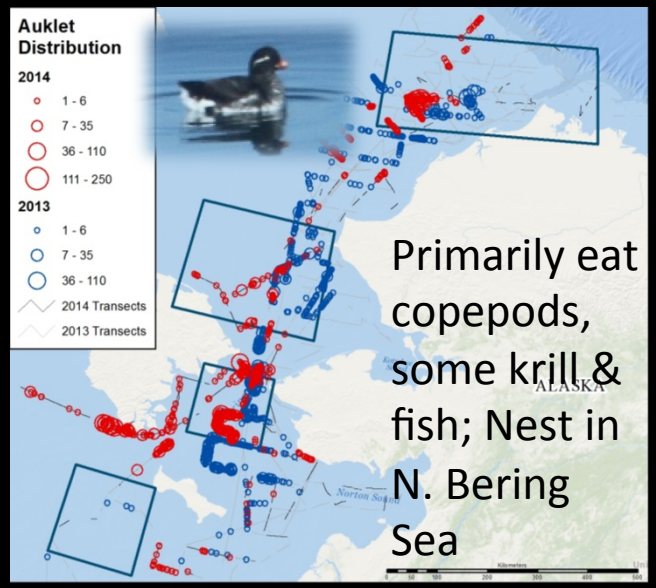
- Depend on ships of opportunity
- Join 4-8 cruises / year in Arctic
- ~ 45,000 km surveys 2006-2014 in Arctic
- Synthesize seabird data with physical & biological sampling

Seabird distribution, 2013 & 2014

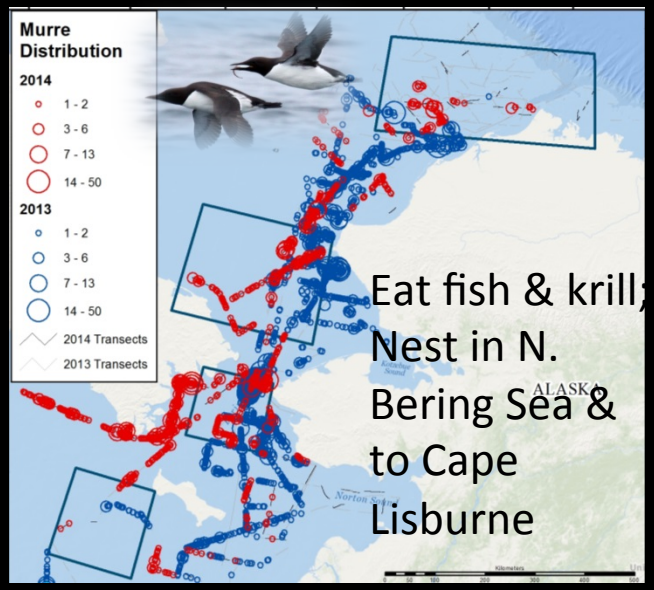
Three examples

Most 'stop' at head of Barrow Canyon

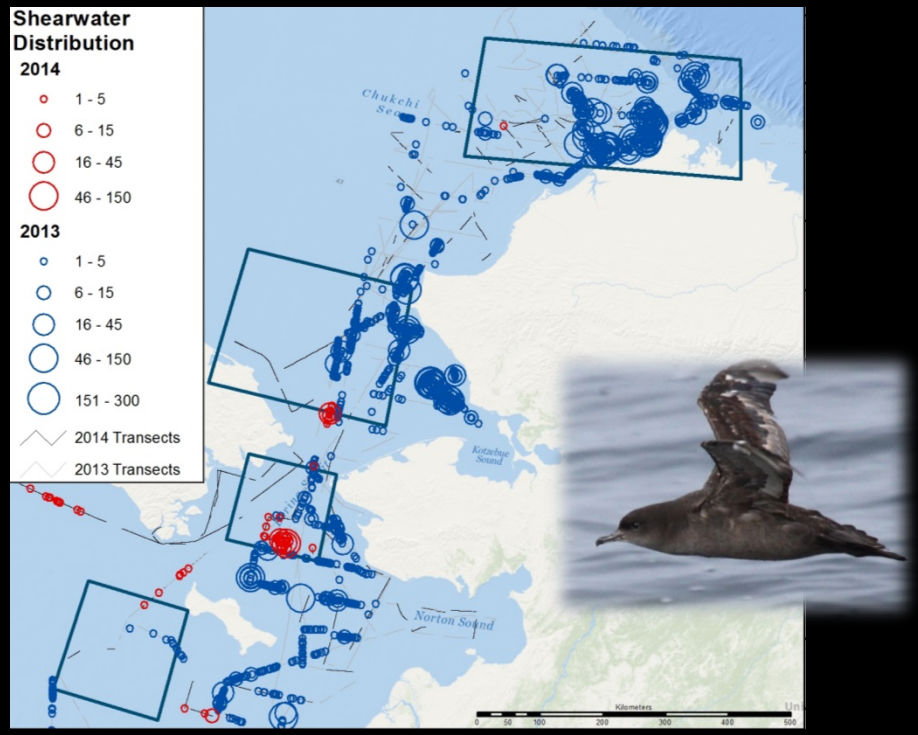
Auklets (3 spp)



Murres (2 spp)



Shearwaters were highest around Barrow Canyon, also Hope Basin, throughout NBS (~50% of all seabirds). In 2014, they were absent.

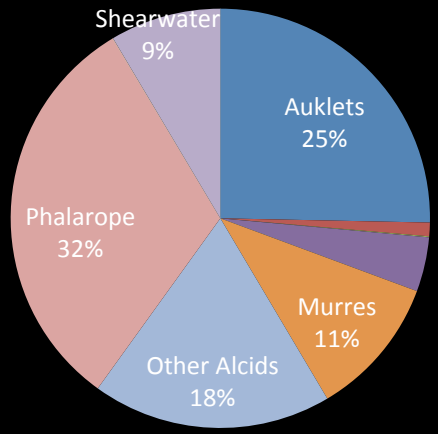


Short-tailed shearwaters – breed in NZ & AU, come to Alaska to feed all summer

Seabird species composition by DBO - 2013 & 2014
(2013 was similar to previous 3 years; 2014 had different species & abundance)

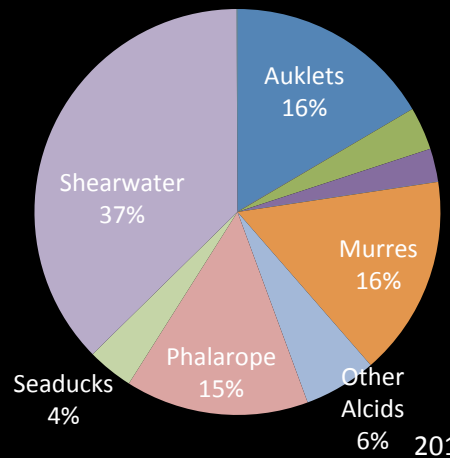
2013

Chirikov Basin



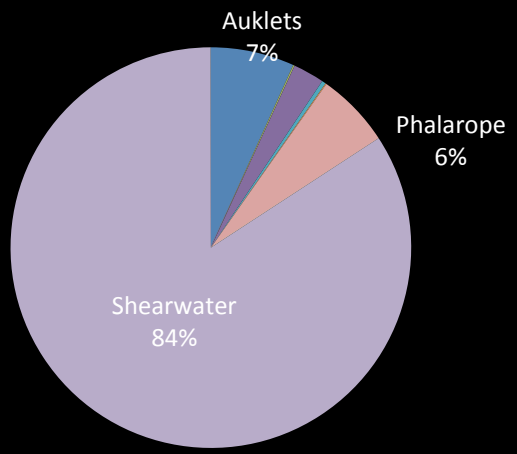
2013

Hope Basin



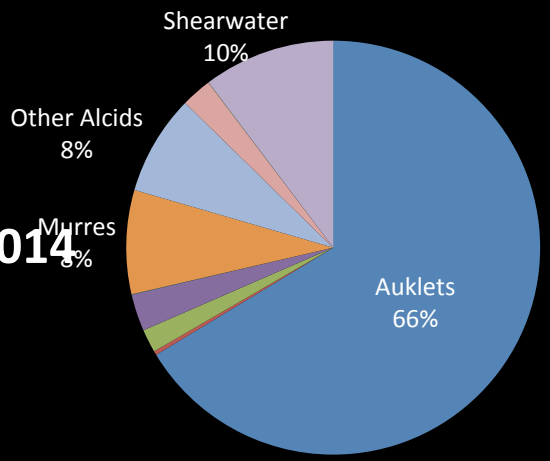
2013

NE Chukchi



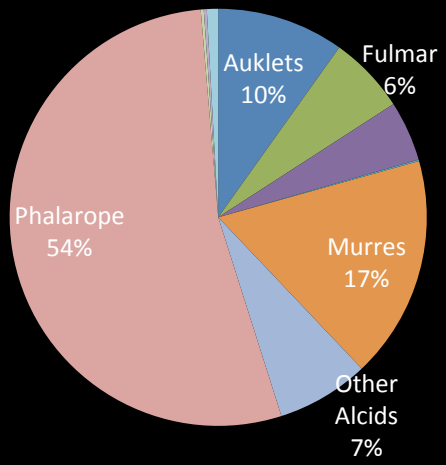
2014

Chirikov Basin



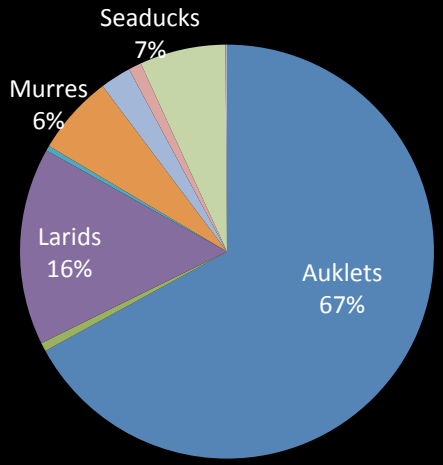
2014

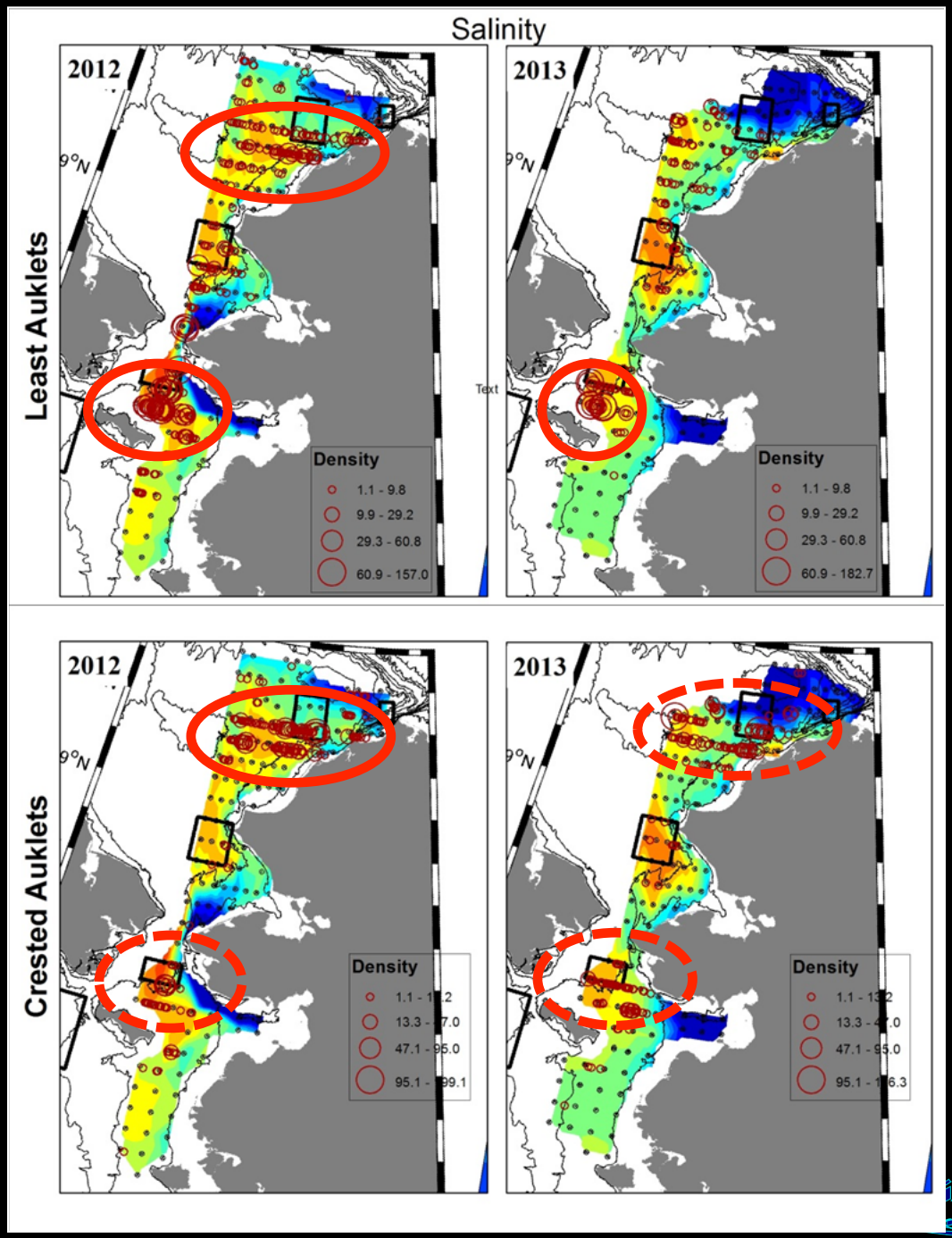
Hope Basin



2014

NE Chukchi





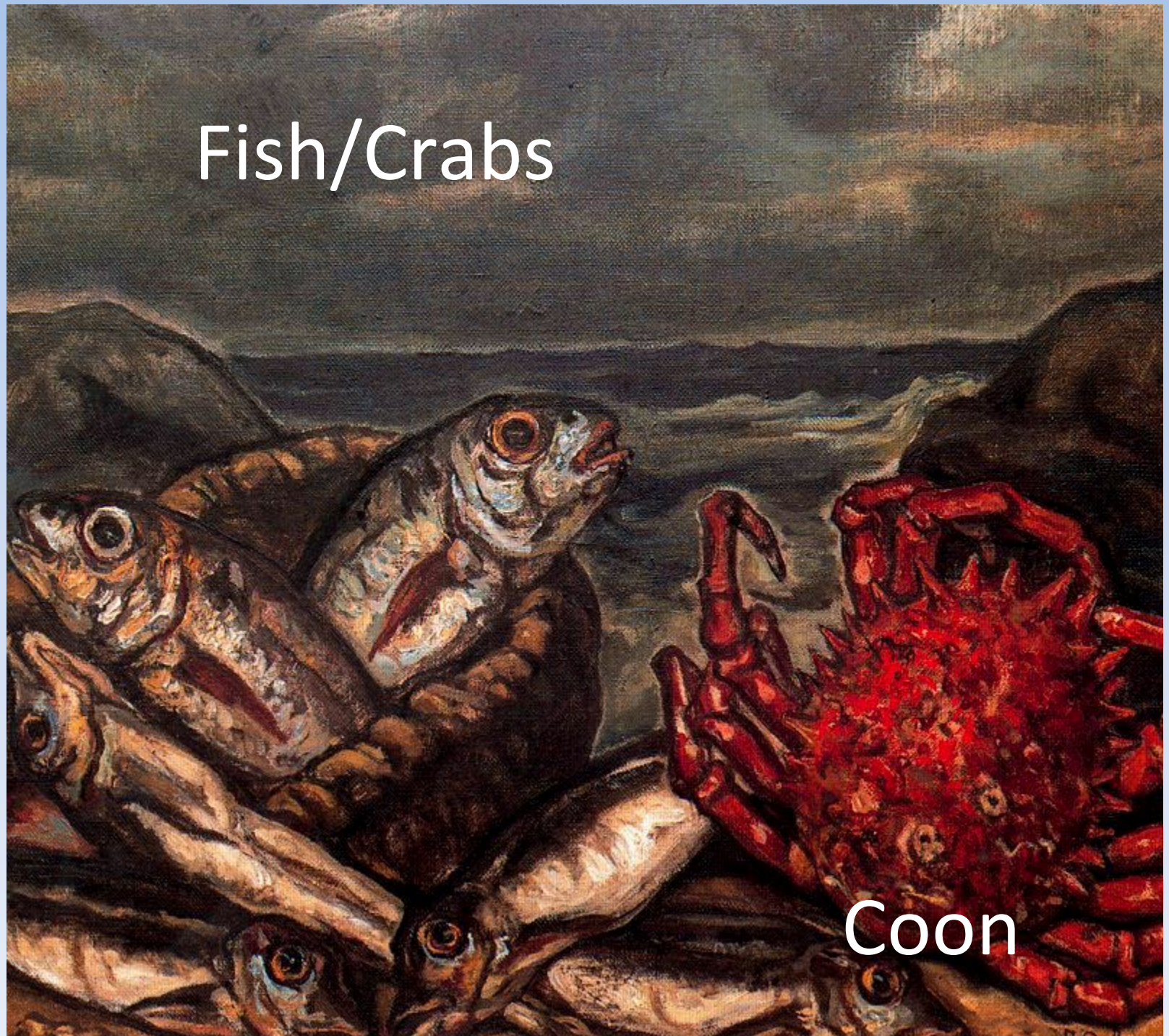
Seabird Distribution varies among years

Example:

Total Seabird density higher in 2012 than in 2013, especially in N. Chukchi Sea (3x higher; similar to plankton abundance).

Auklets [red circles] accounted for most of the change. Mostly planktivorous

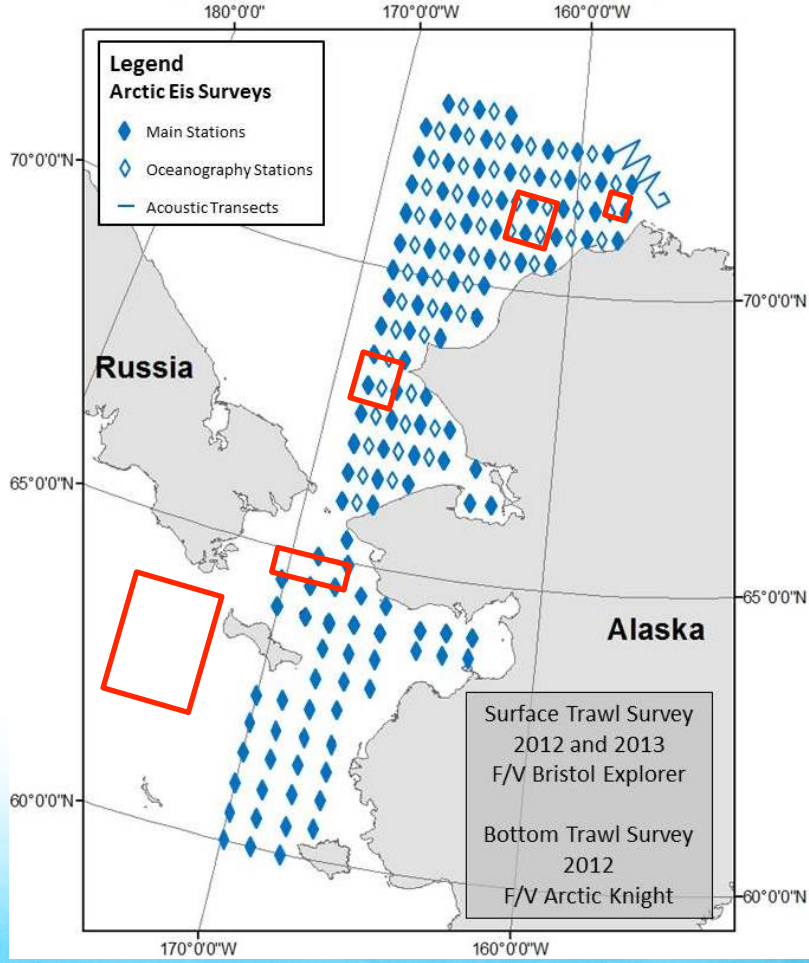
Most auklets occurred in fairly saline waters (associated with higher zooplankton abundance?)


Fish/Crabs
Coon

Arctic Ecosystem Integrated Survey

How: Three surveys sampling a 30x30 mile grid:

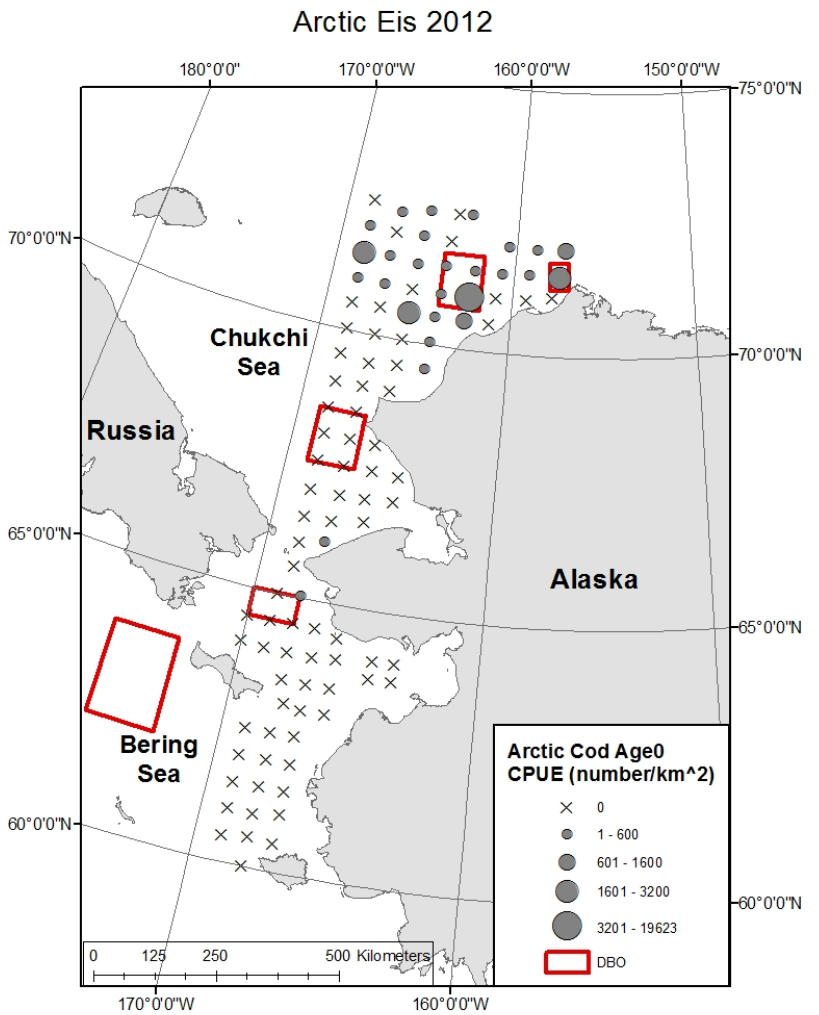
- 2012 and 2013 - The F/V *Bristol Explorer*, conducts surface trawl (top 65'), mid-water trawl, and acoustic surveys to collect data on ocean circulation and physics, water chemistry, plankton, and fishes
- 2012 – The F/V Alaskan Knight, conducted bottom trawl surveys in the Chukchi Sea only to collect demersal fishes and invertebrates
- All surveys collect tissue samples and whole fish to study the biology of salmon, Arctic cod, saffron cod, snow crab, capelin, and other fish & invertebrates



Climate impacts on the marine ecosystem, what do we expect in the future (in terms of fish distribution and fishery potential).

Photo by Elizabeth Calvert Siddon (NOAA/UAF)

Arctic Ecosystem Integrated Survey
Age 0 Arctic Cod



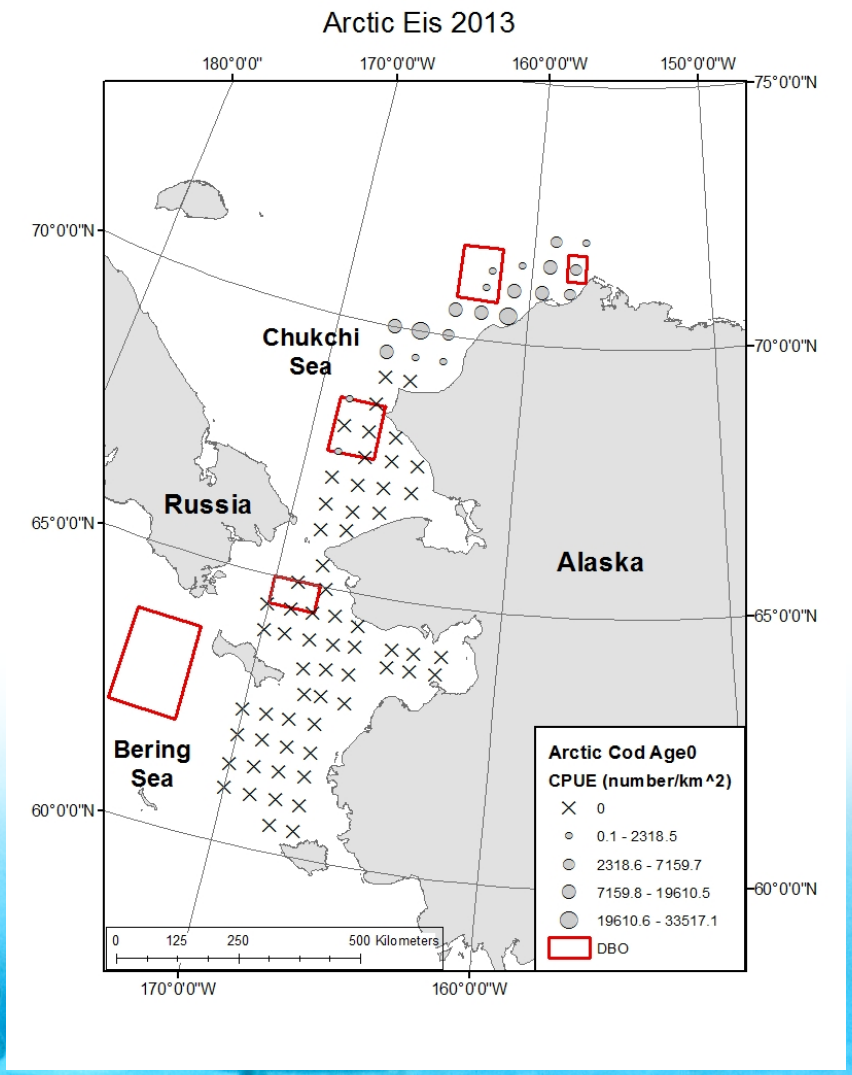
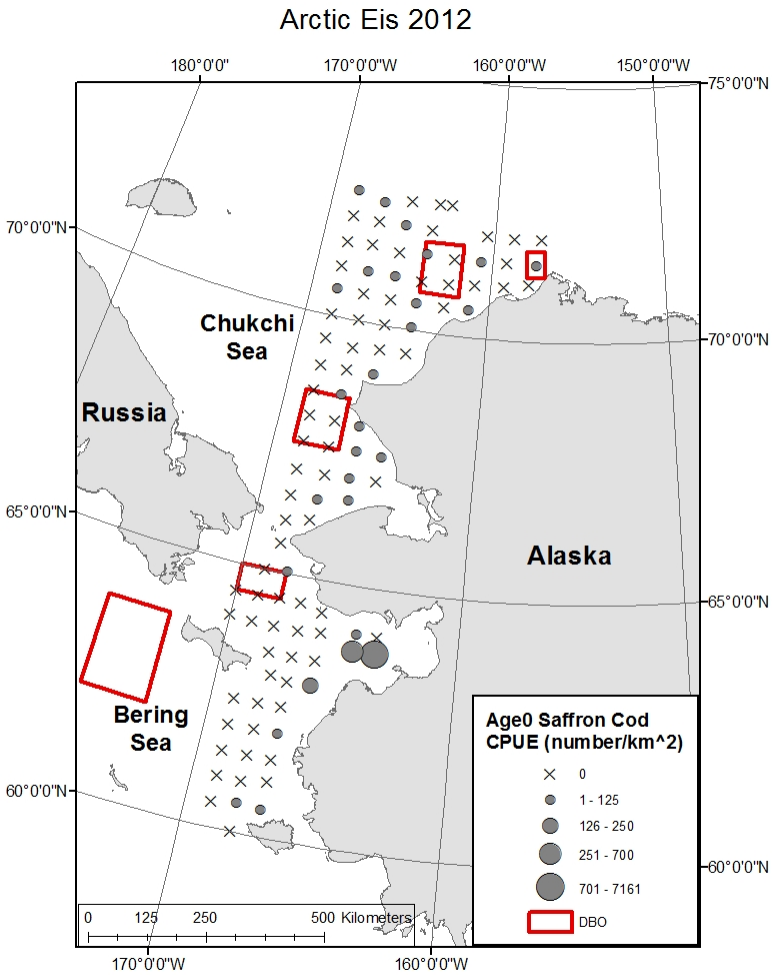


Figure courtesy of Alex Andrews, Alaska Fisheries Science Center, Seattle, WA

Photo by Elizabeth Calvert Siddon (NOAA/UAF)

Arctic Ecosystem Integrated Survey
Age 0 Saffron Cod



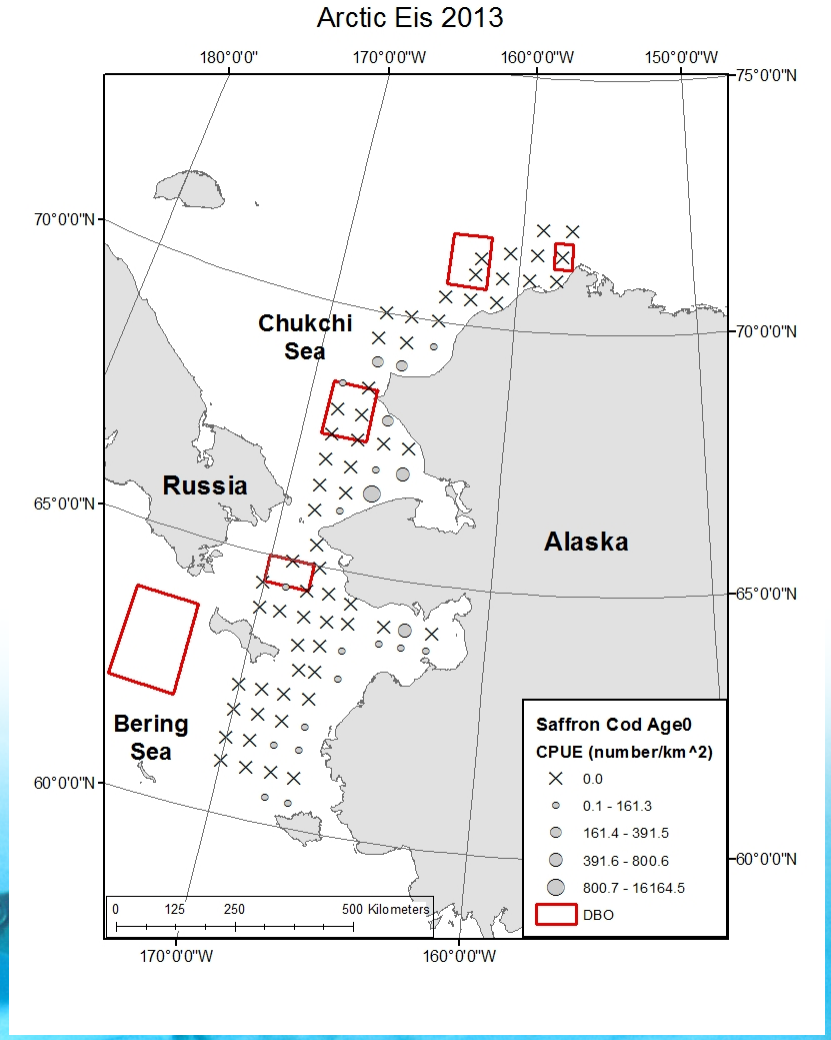
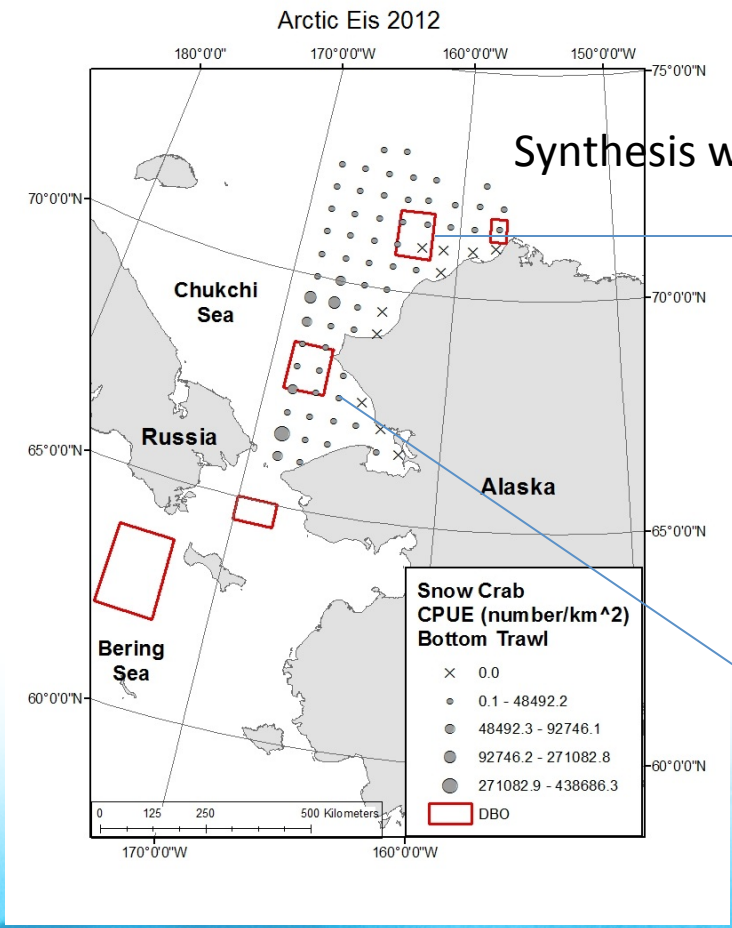
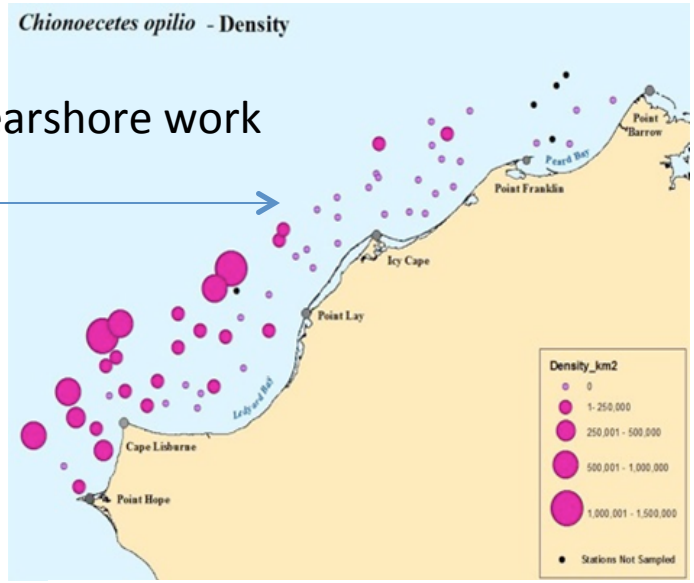


Photo by Elizabeth Calvert Siddon (NOAA/UAF)

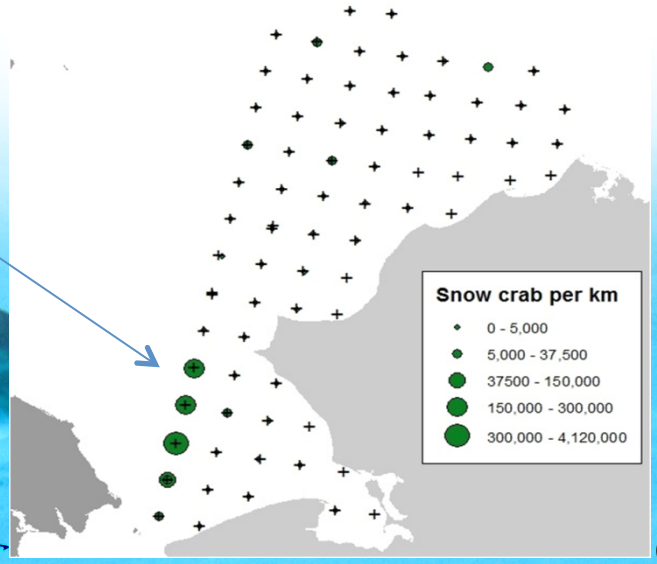
Arctic Ecosystem Integrated Survey
Snow Crab



Synthesis with AK MAP nearshore work



Snow crab abundance male and female CPUE (both gears)



(NOAA/UAF)