



# Changes in Marine Mammal Distribution

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Passive Acoustics Group

Cetacean Assessment and Ecology Program

Marine Mammal Laboratory/Alaska Fisheries Science Center



**NOAA**  
**FISHERIES**

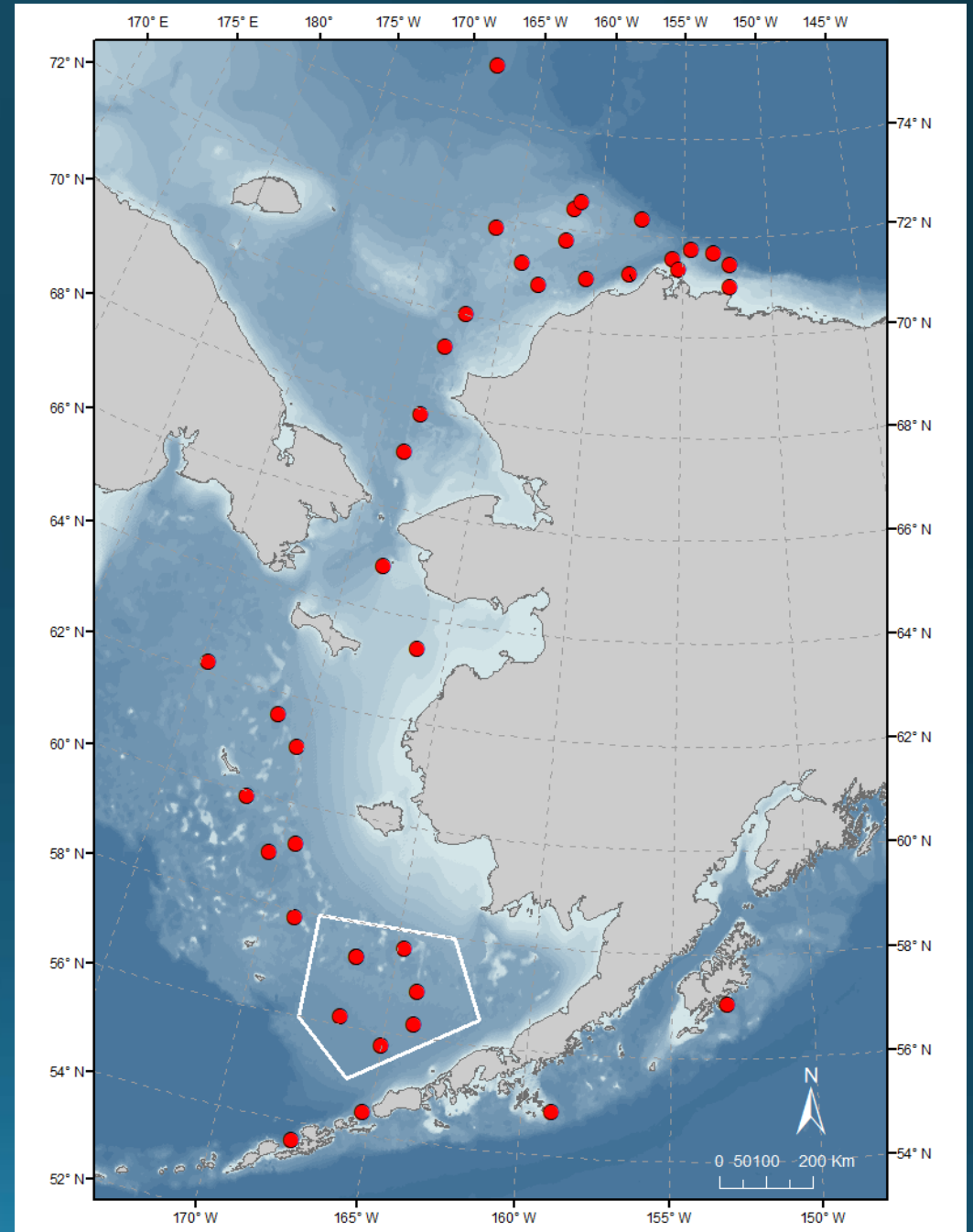
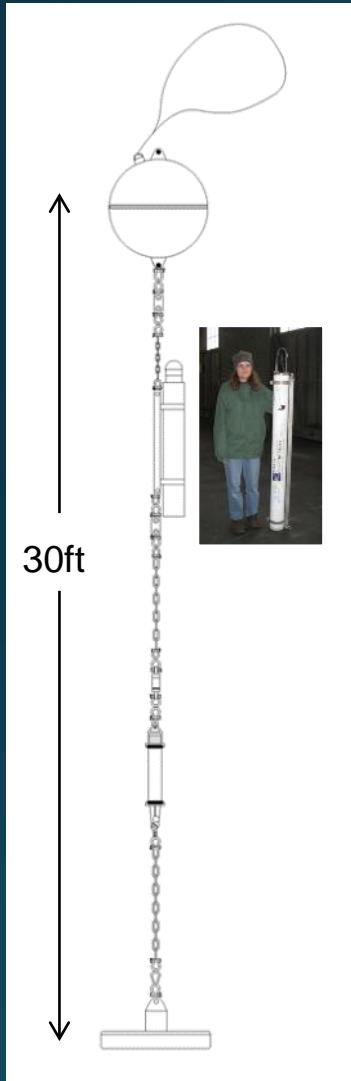
Jessica Crance, Stephanie Grassia, Dana Wright, Brynn Kimber, Eric Braen, Jenna Harlacher, and Dan Woodrich



Cooperative Institute for  
CLIMATE, OCEAN &  
ECOSYSTEM STUDIES

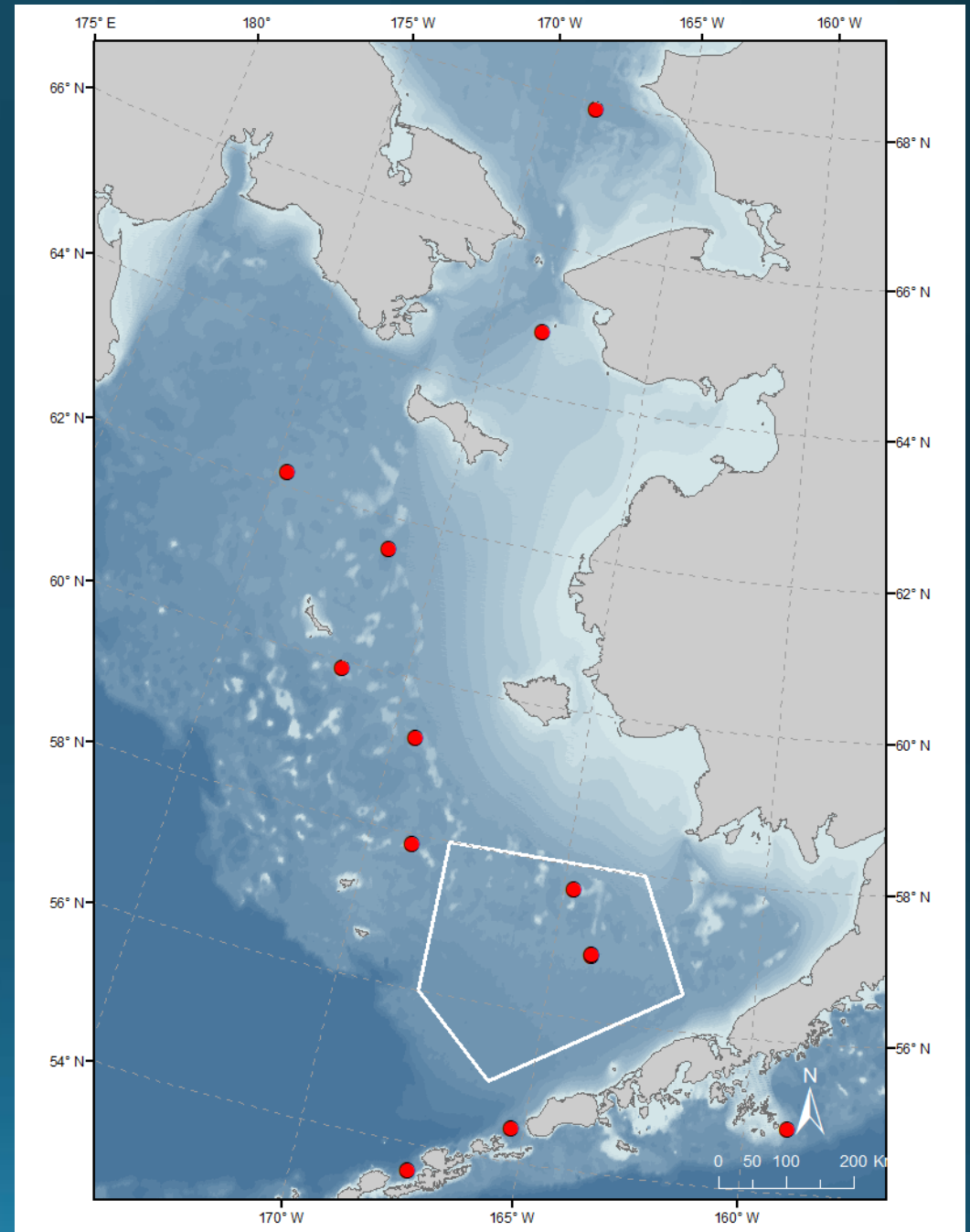
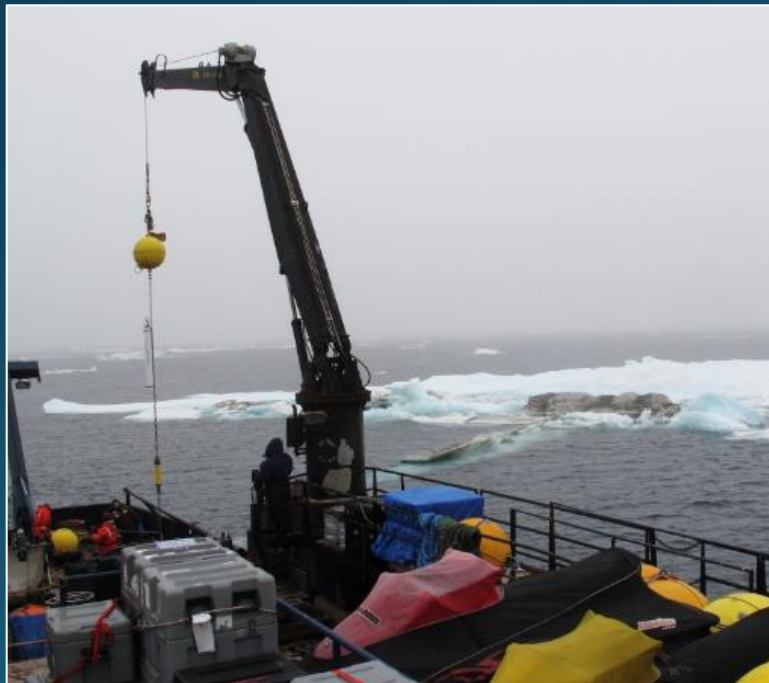
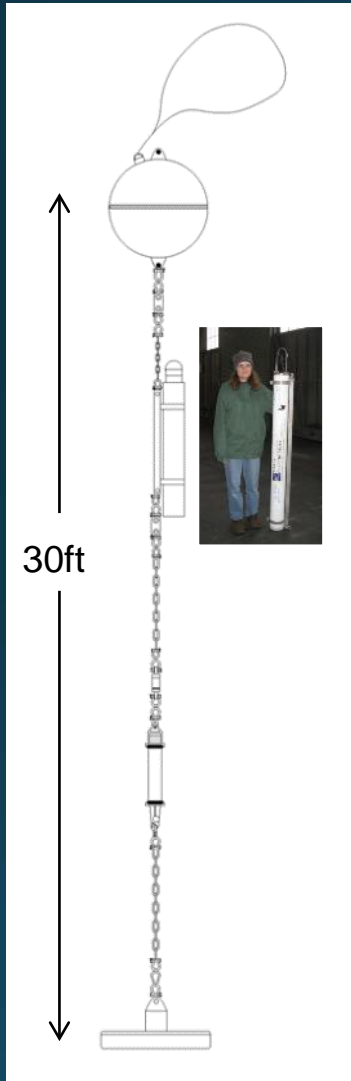
# Long-term moorings

- Passive acoustic
- Since 2007
- Year-round
- Half located w/ oceano.
- ~12 in Bering

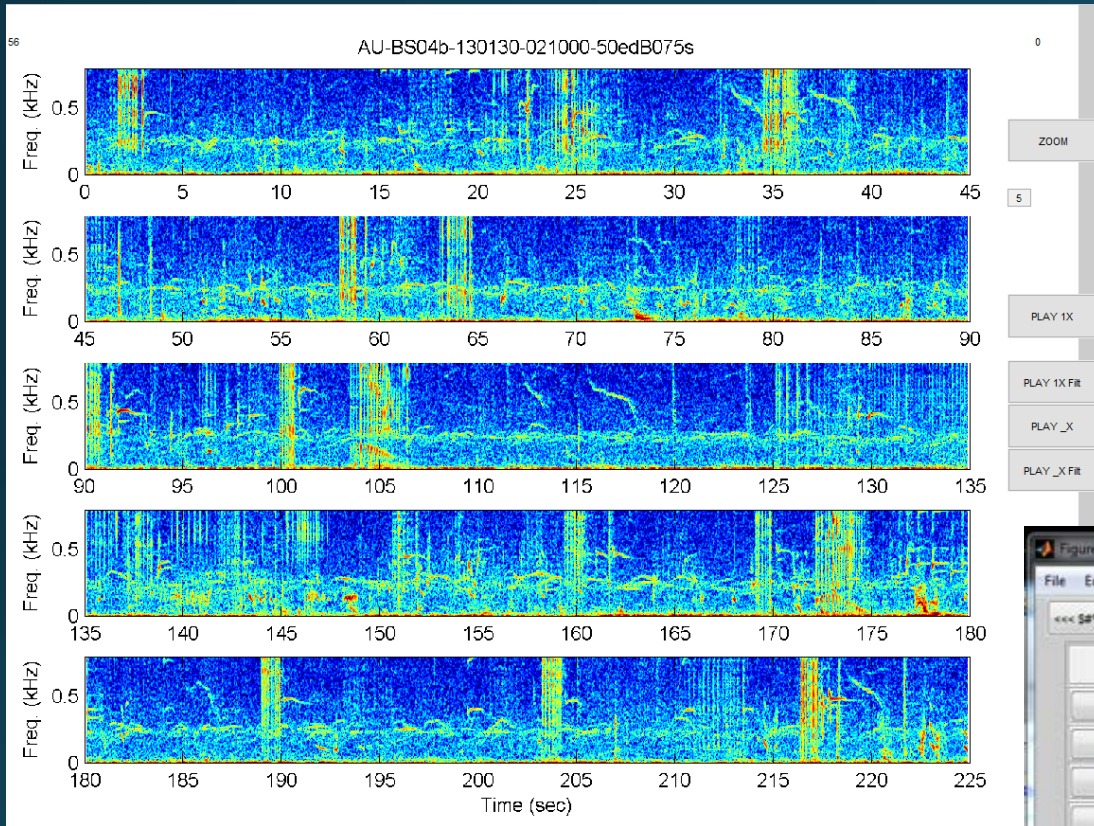


# Long-term moorings

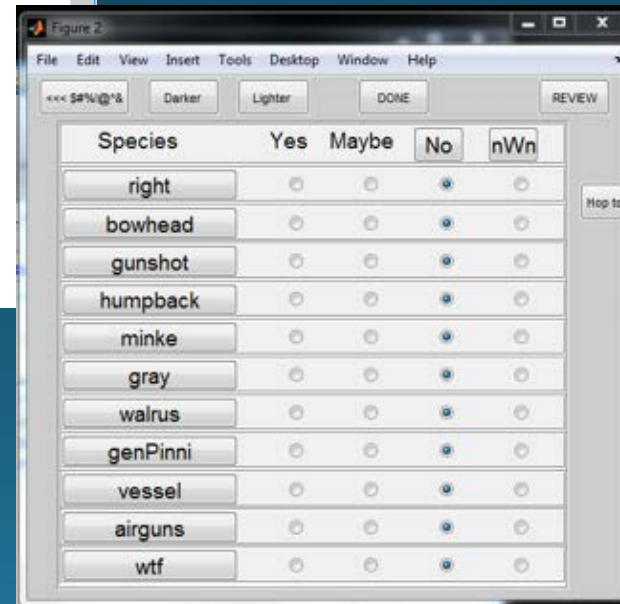
- Passive acoustic
- Since 2007
- Year-round
- Half located w/ oceano.
- ~12 in Bering



# Analysis

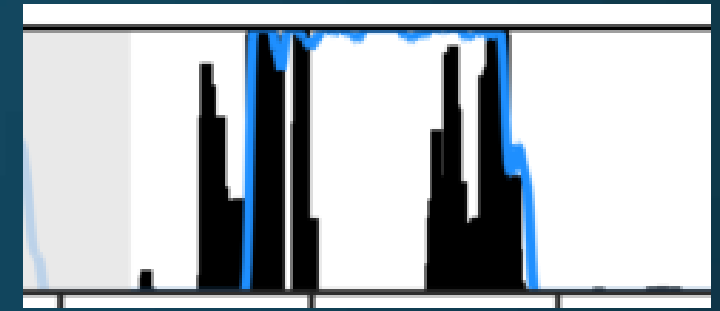
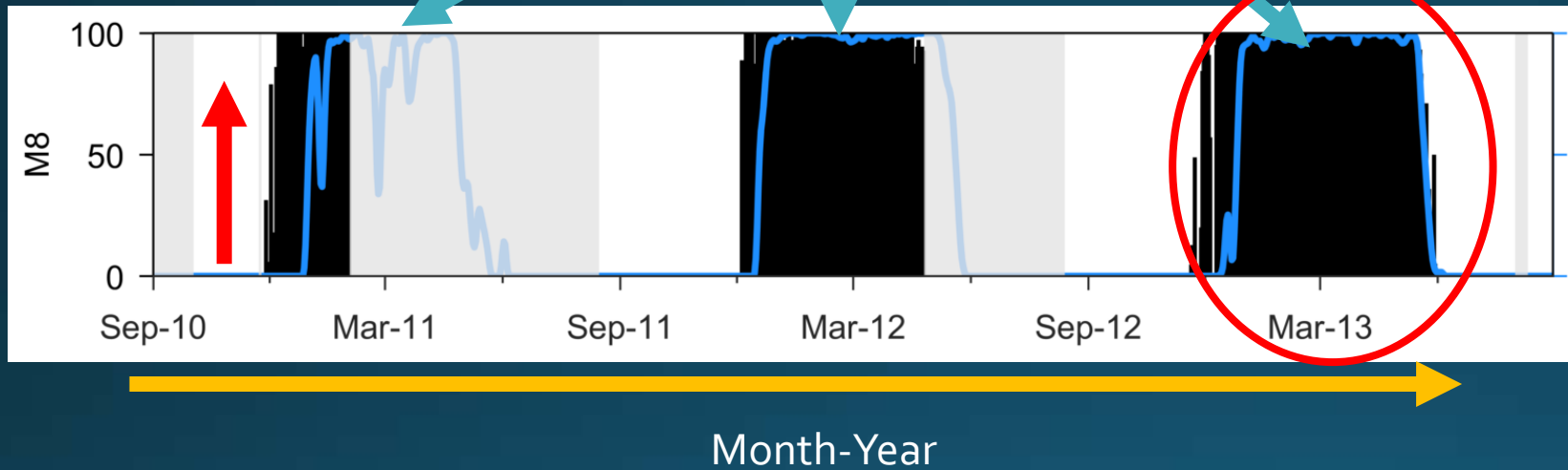


- Analyzed 100% of recordings
- 11 spp. of cetaceans and pinnipeds, + vessels, airguns, and ice
- Results given as daily presence (% 10 min bins)



# Results

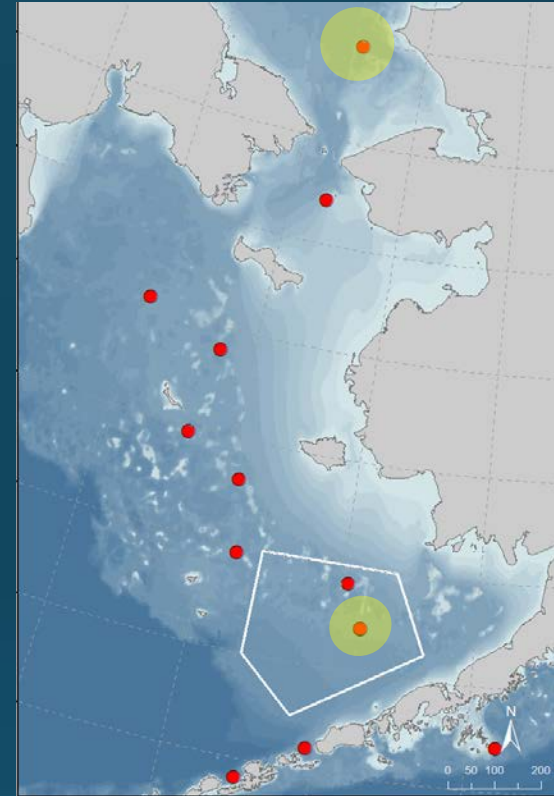
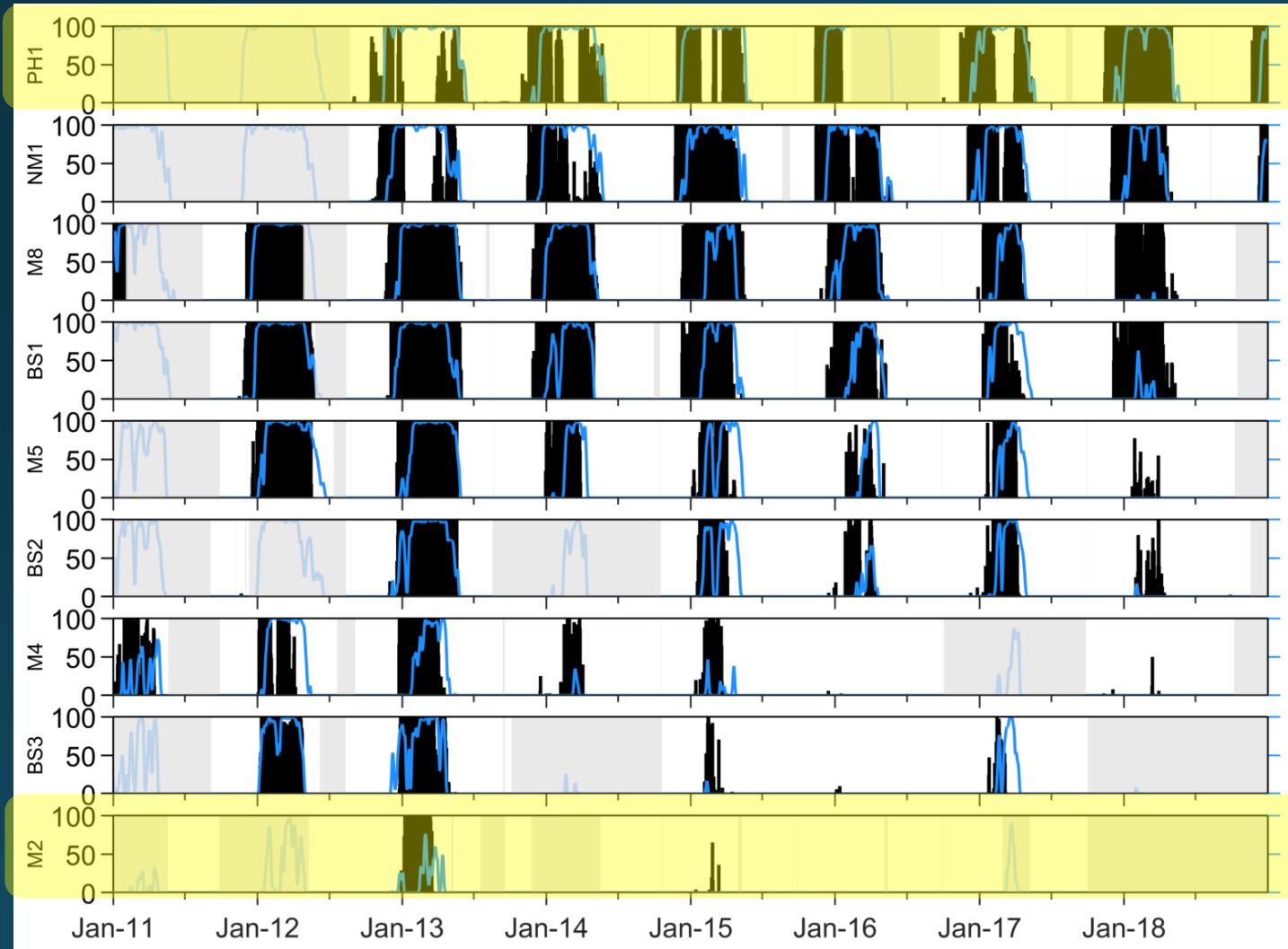
Ice seasons



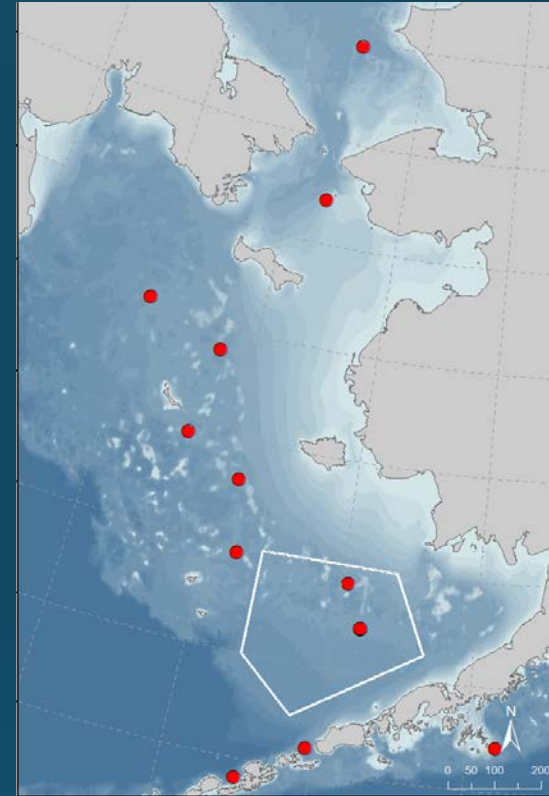
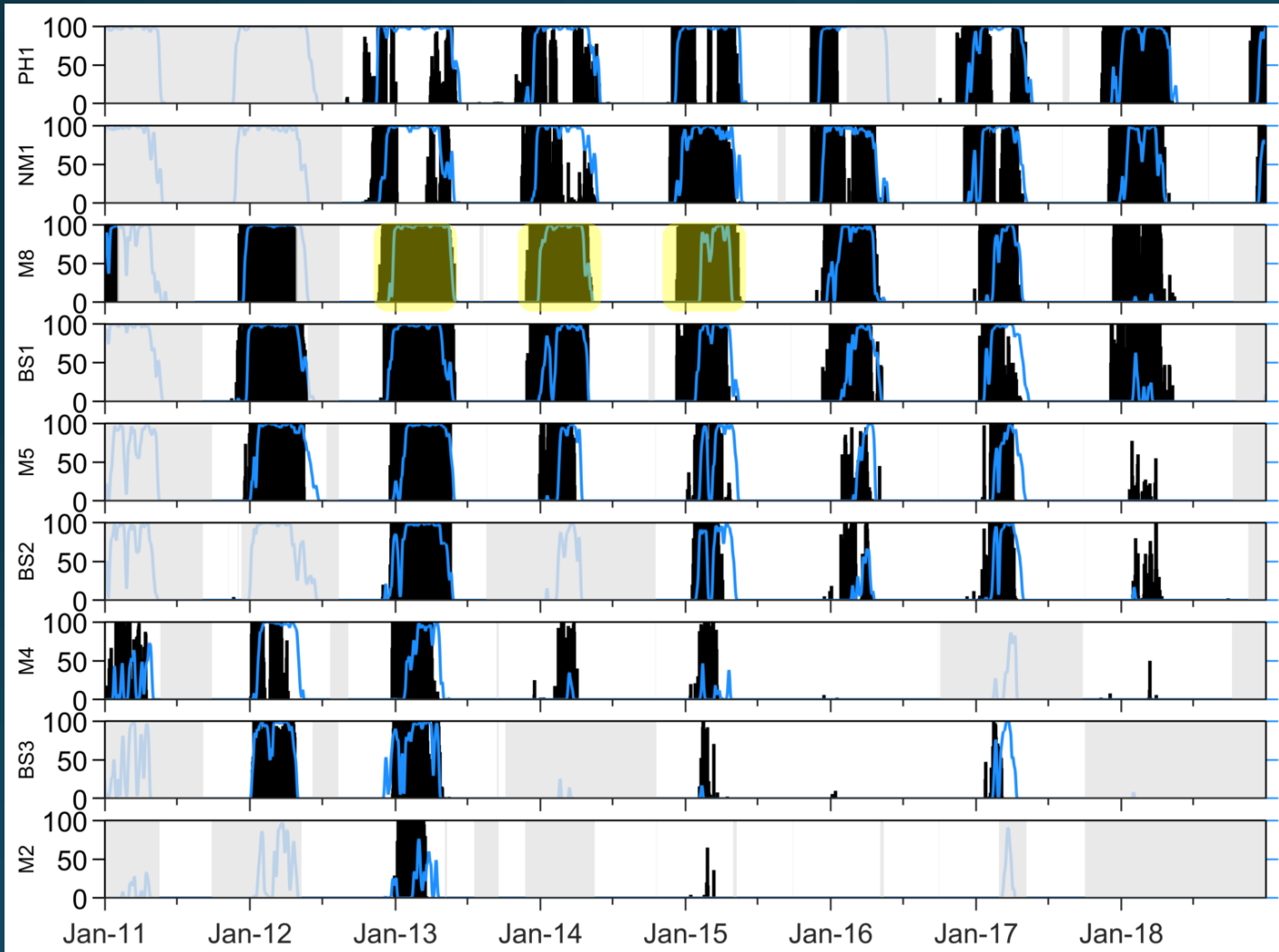
Fall migration  
with ice  
formation

Spring migration  
with ice break-up

# Bowhead whales

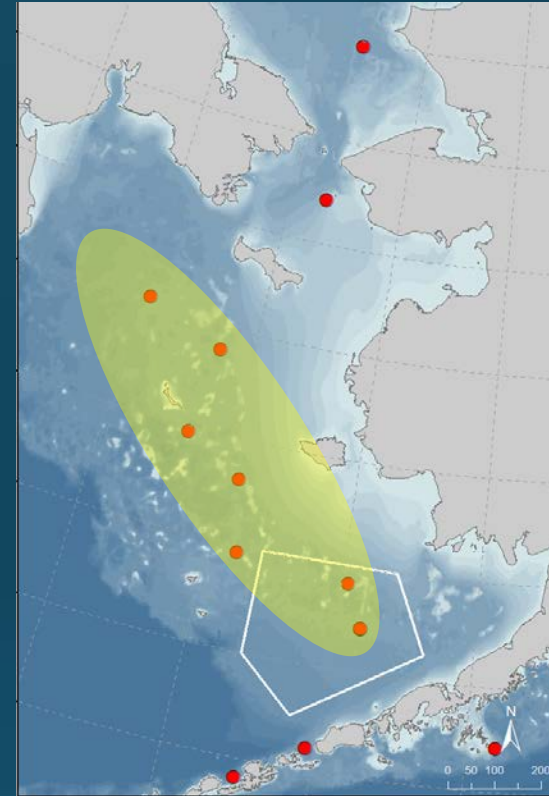
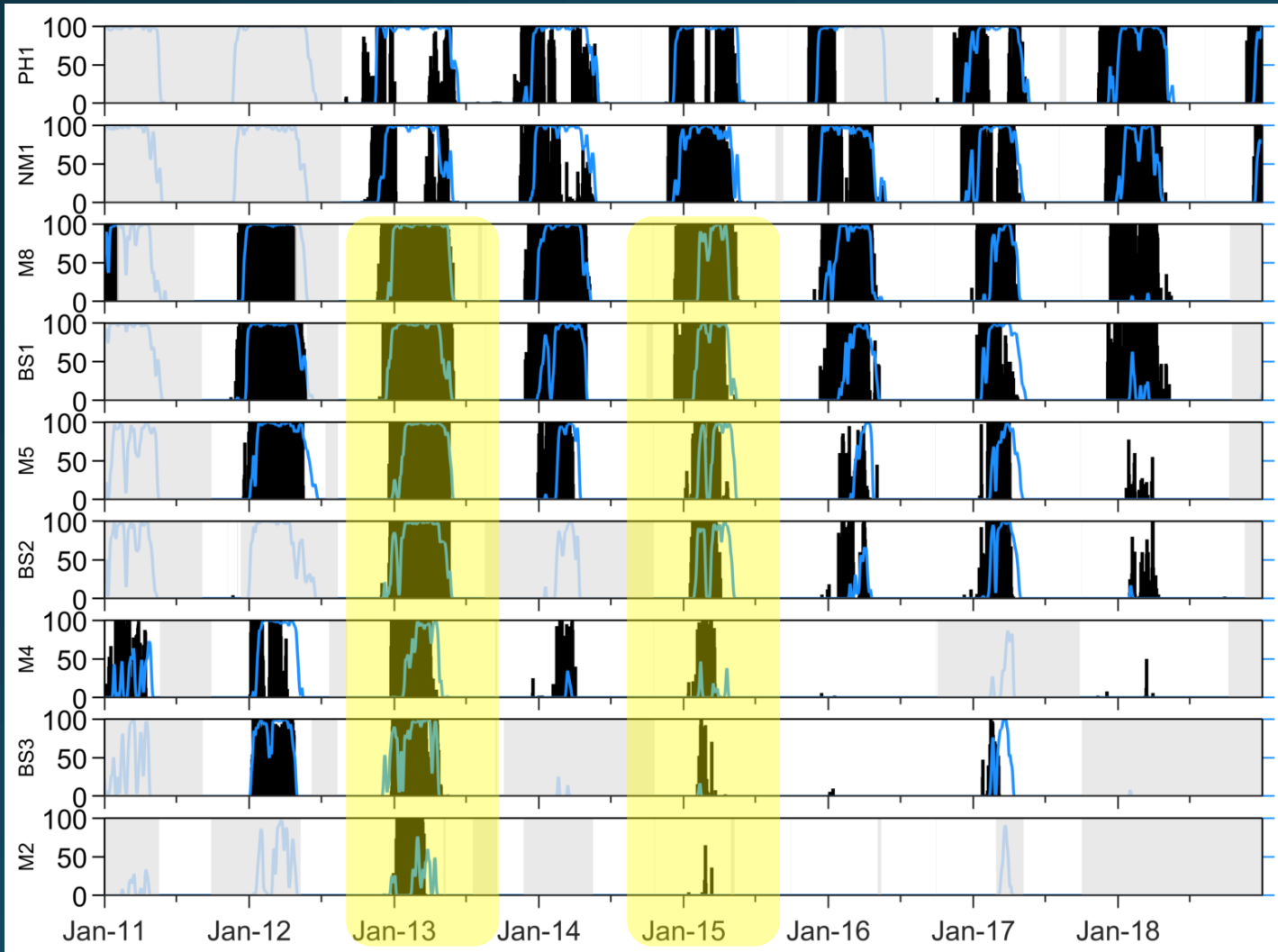


# Bowhead whales



Ice associated

# Bowhead whales

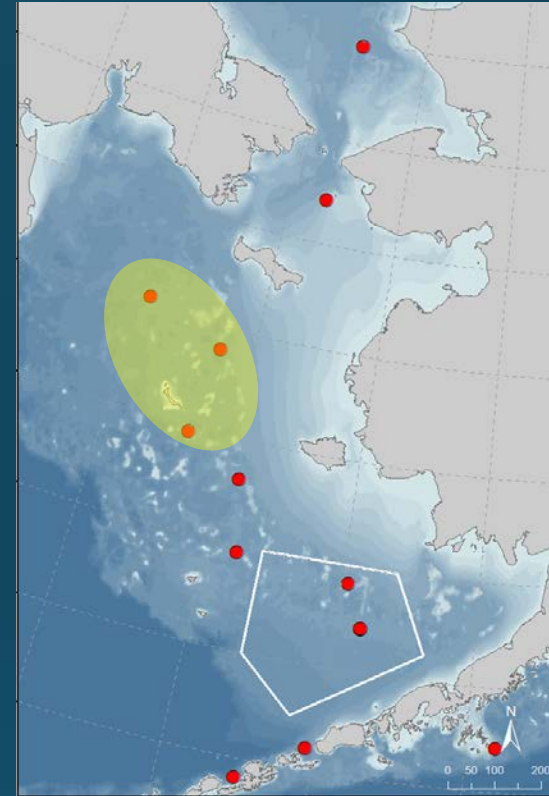
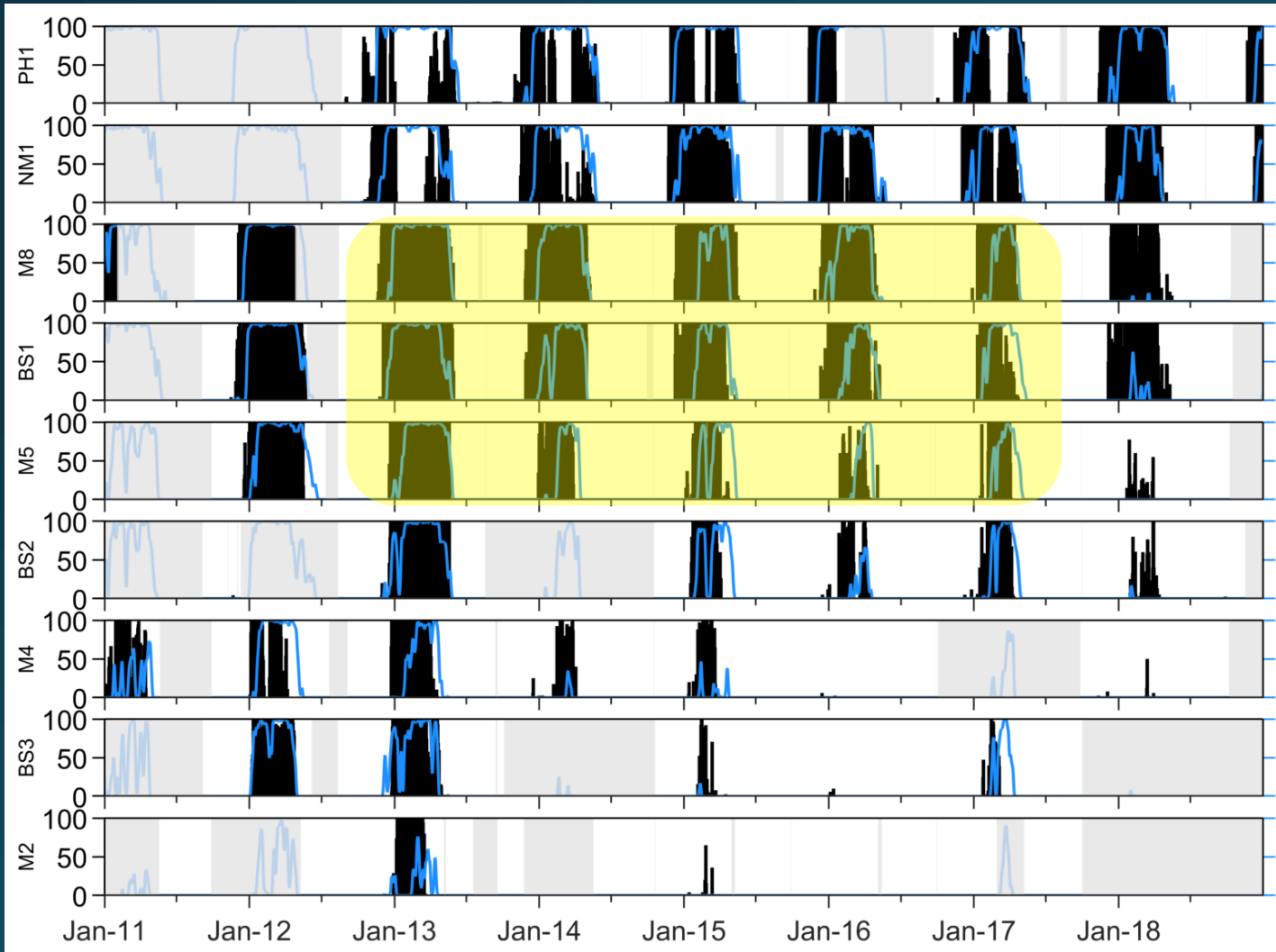


Ice associated

As far south as SE Bering



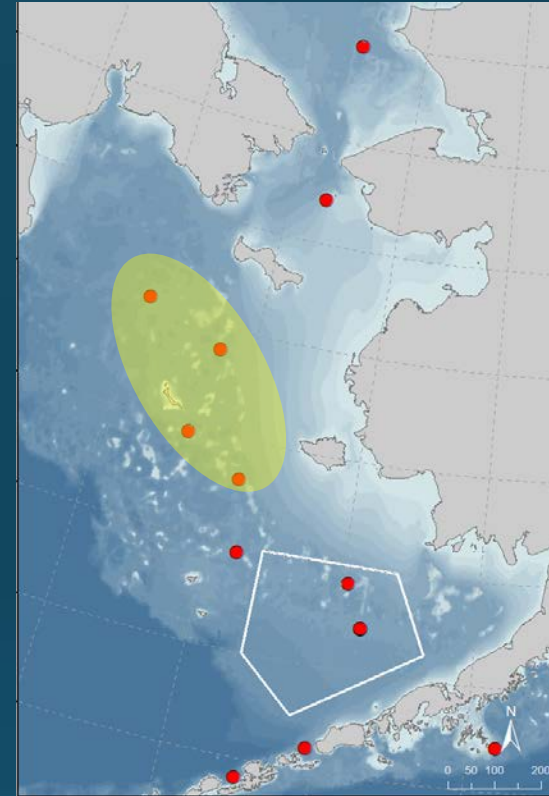
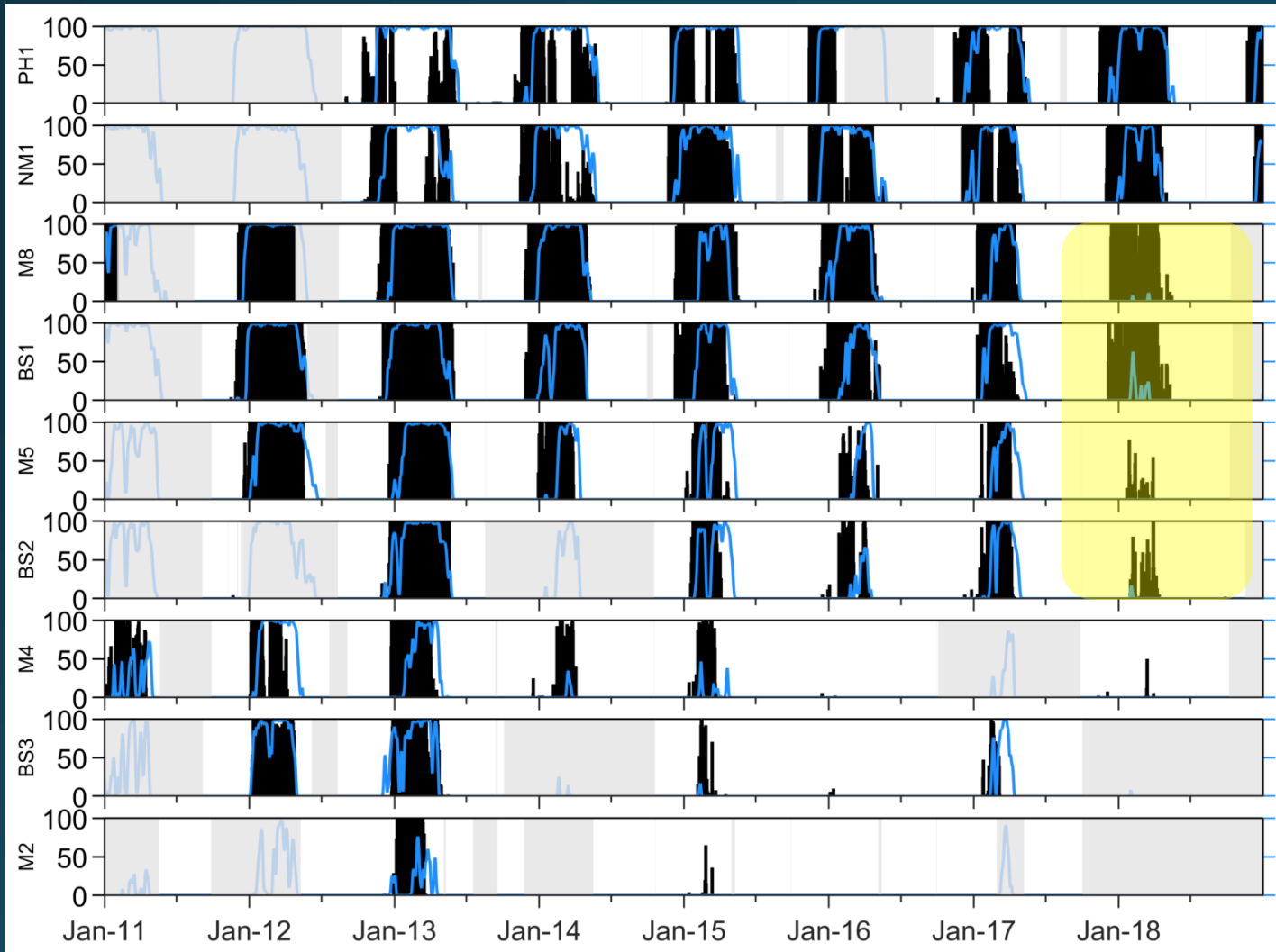
# Bowhead whales



Ice associated

Overwinter period in N. Bering decreasing

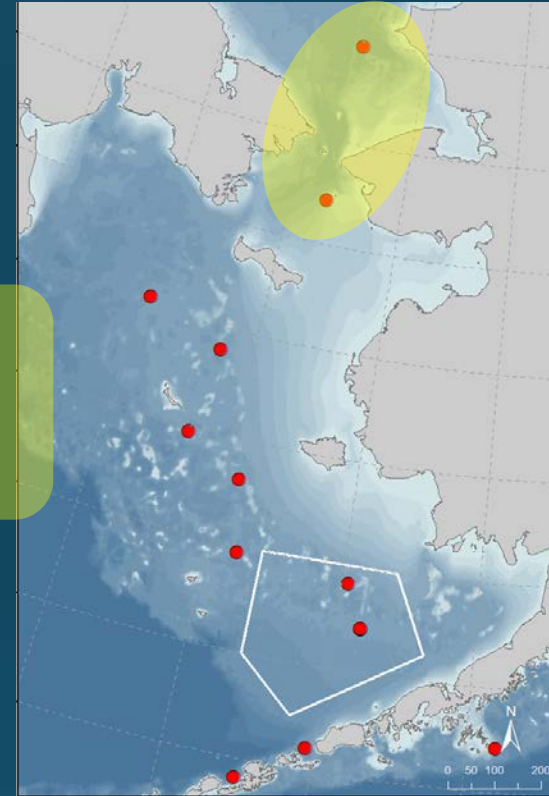
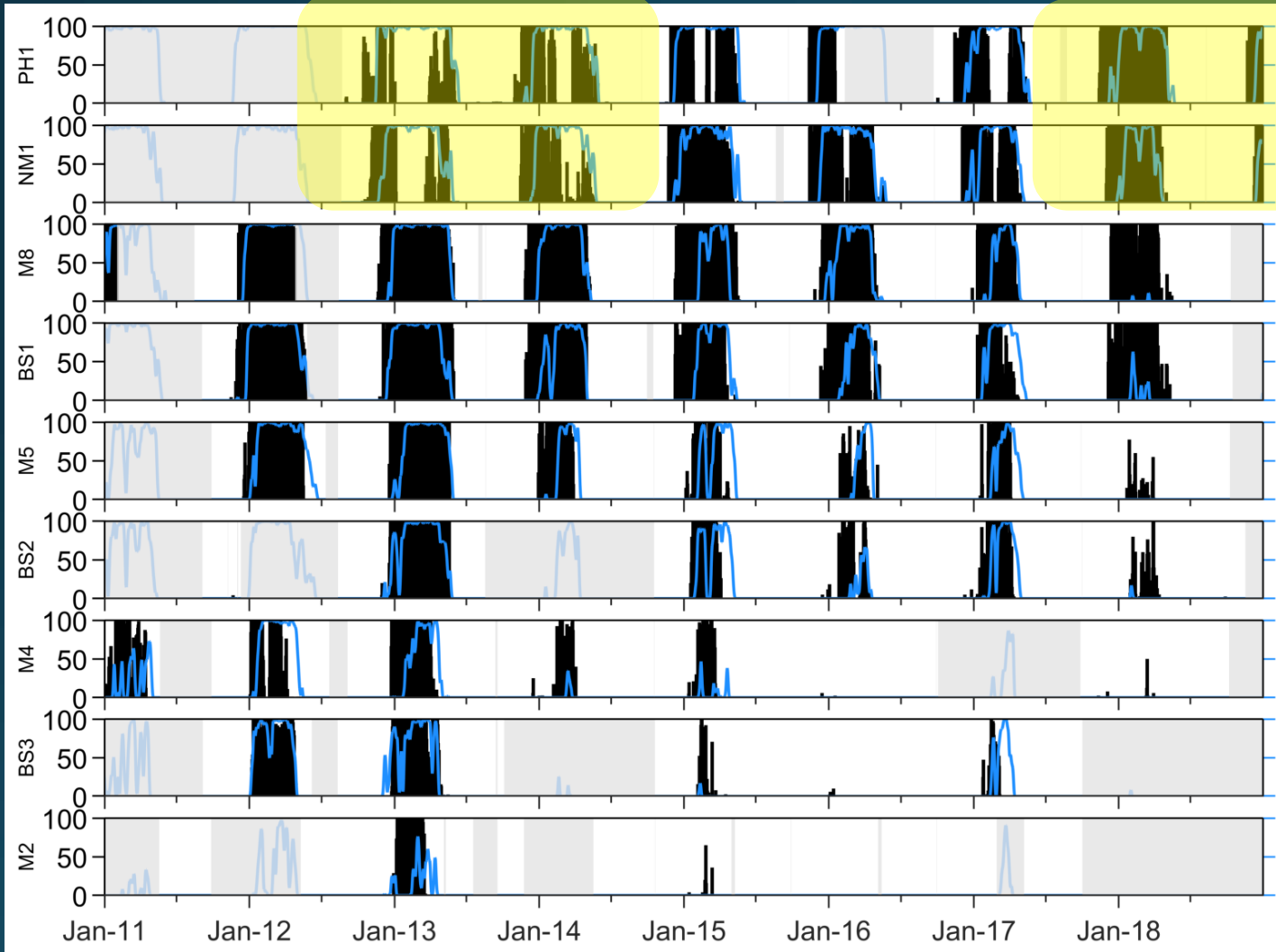
# Bowhead whales



Ice associated

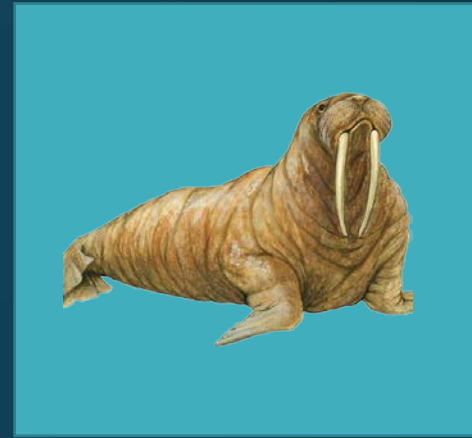
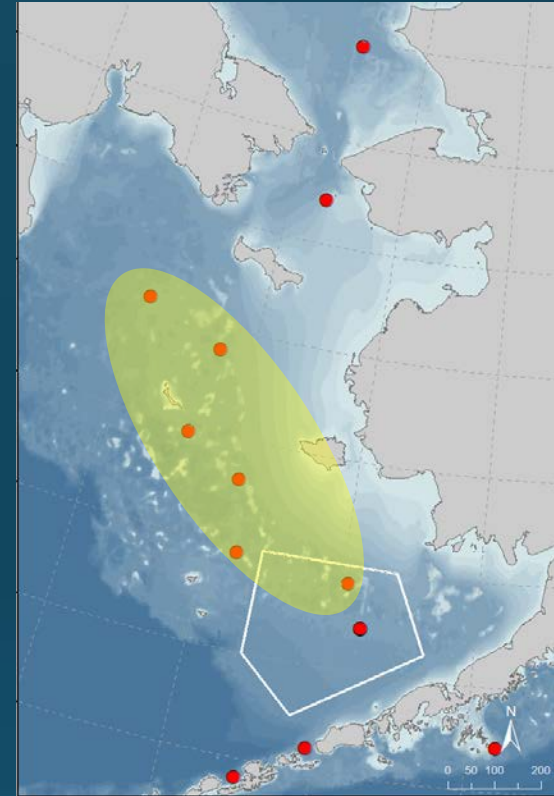
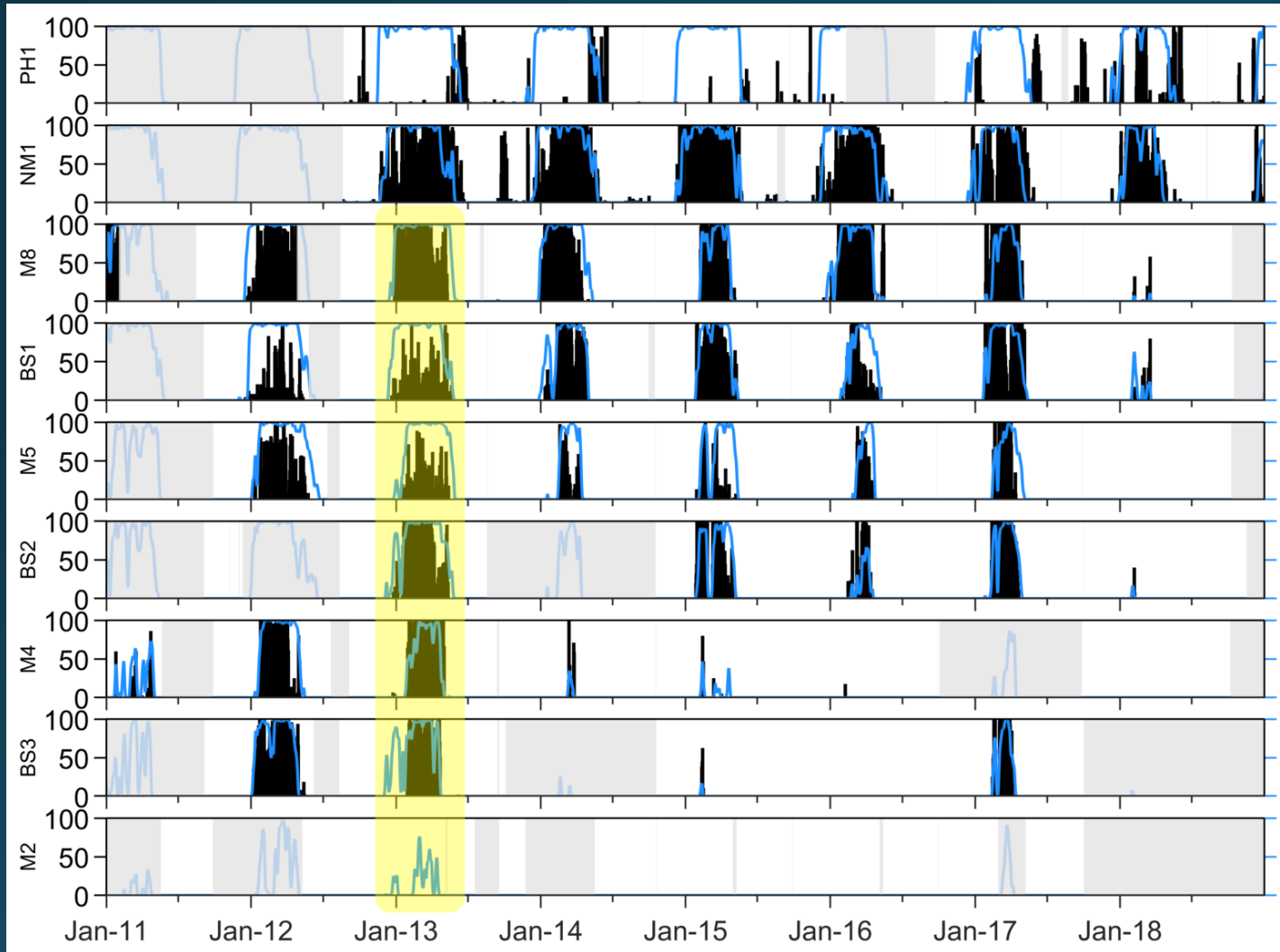
Trend broke in winter  
of 2017-18

# Bowhead whales



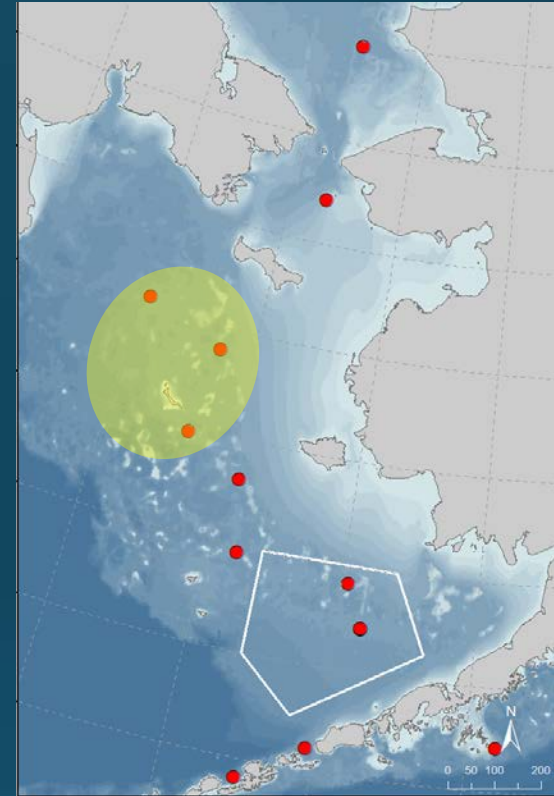
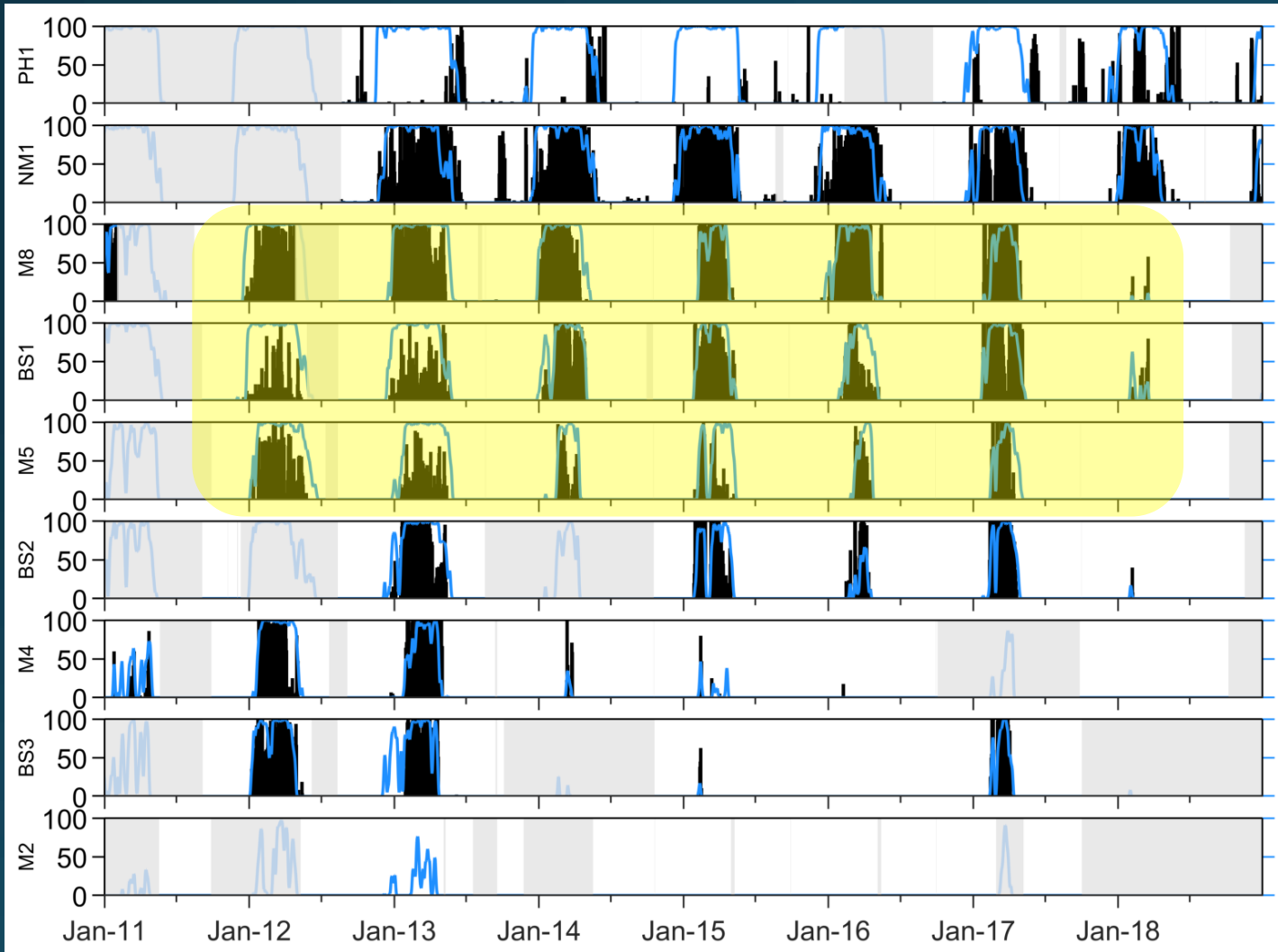
Near Bering Strait,  
migration path to  
overwinter habitat.

# Walrus



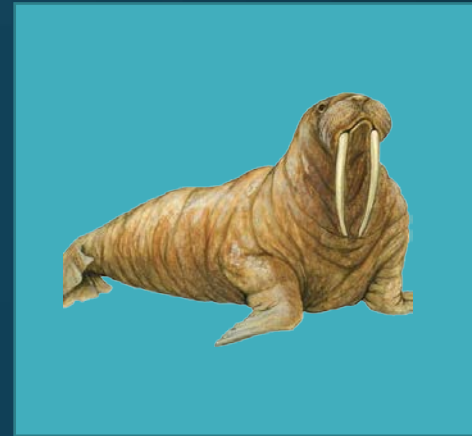
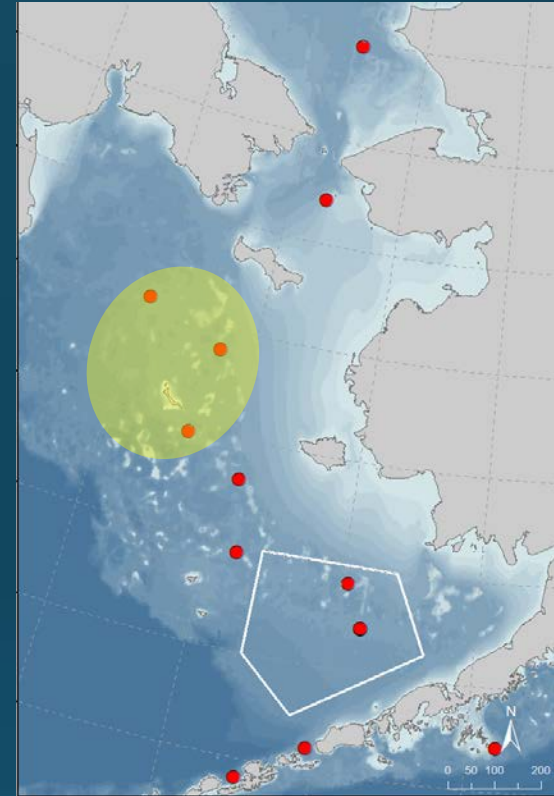
Ice associated

# Walrus



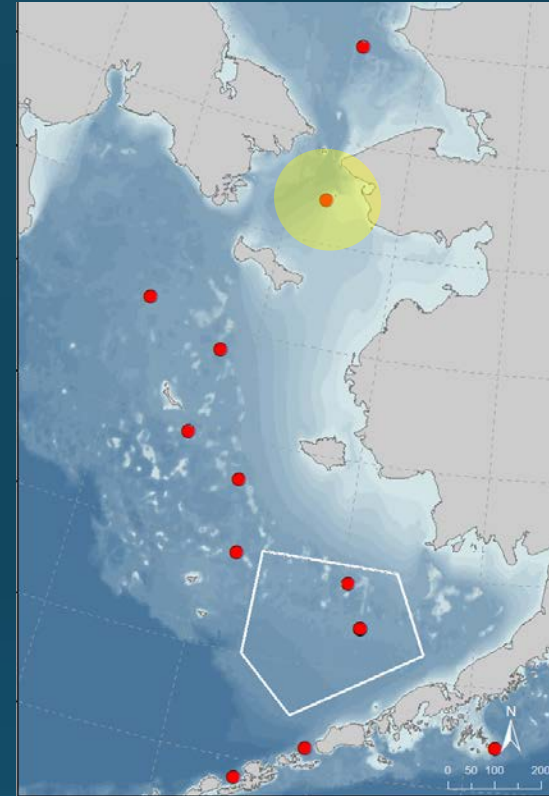
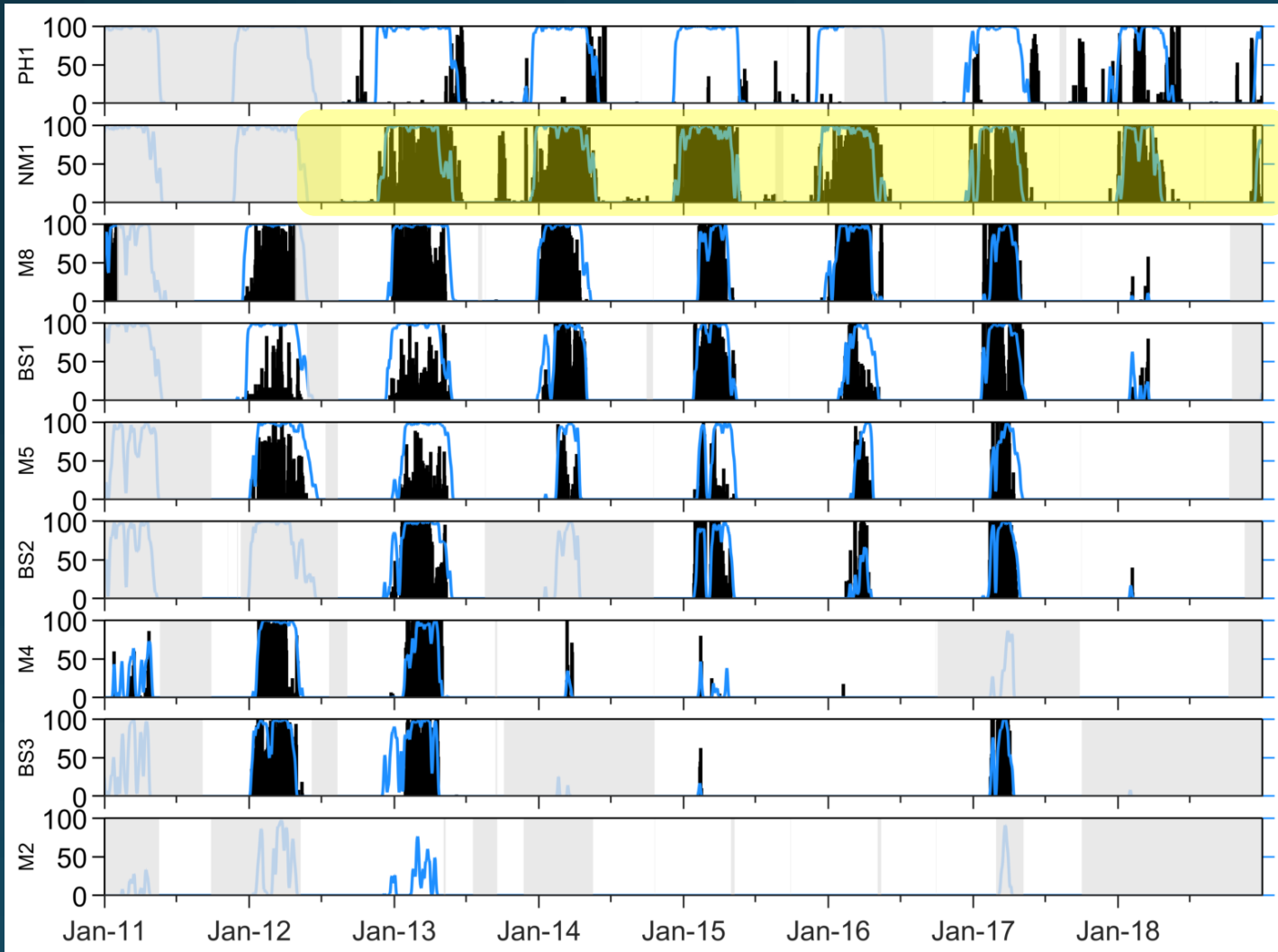
Ice associated

# Walrus



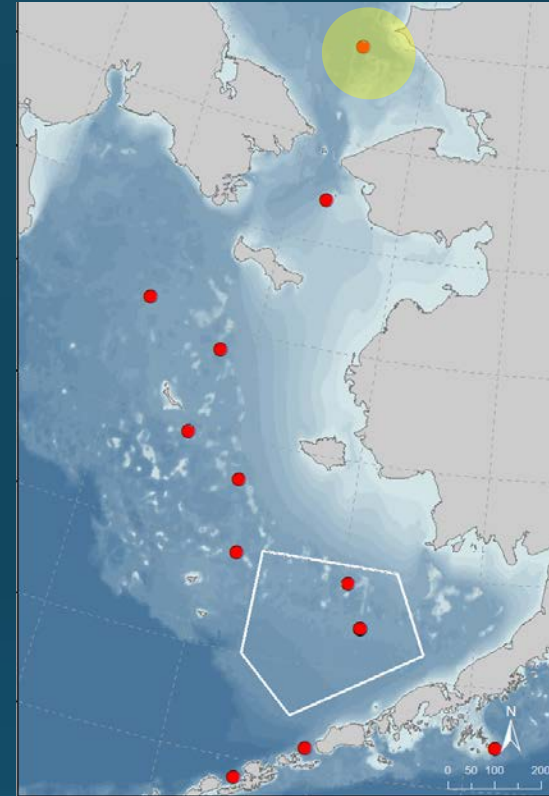
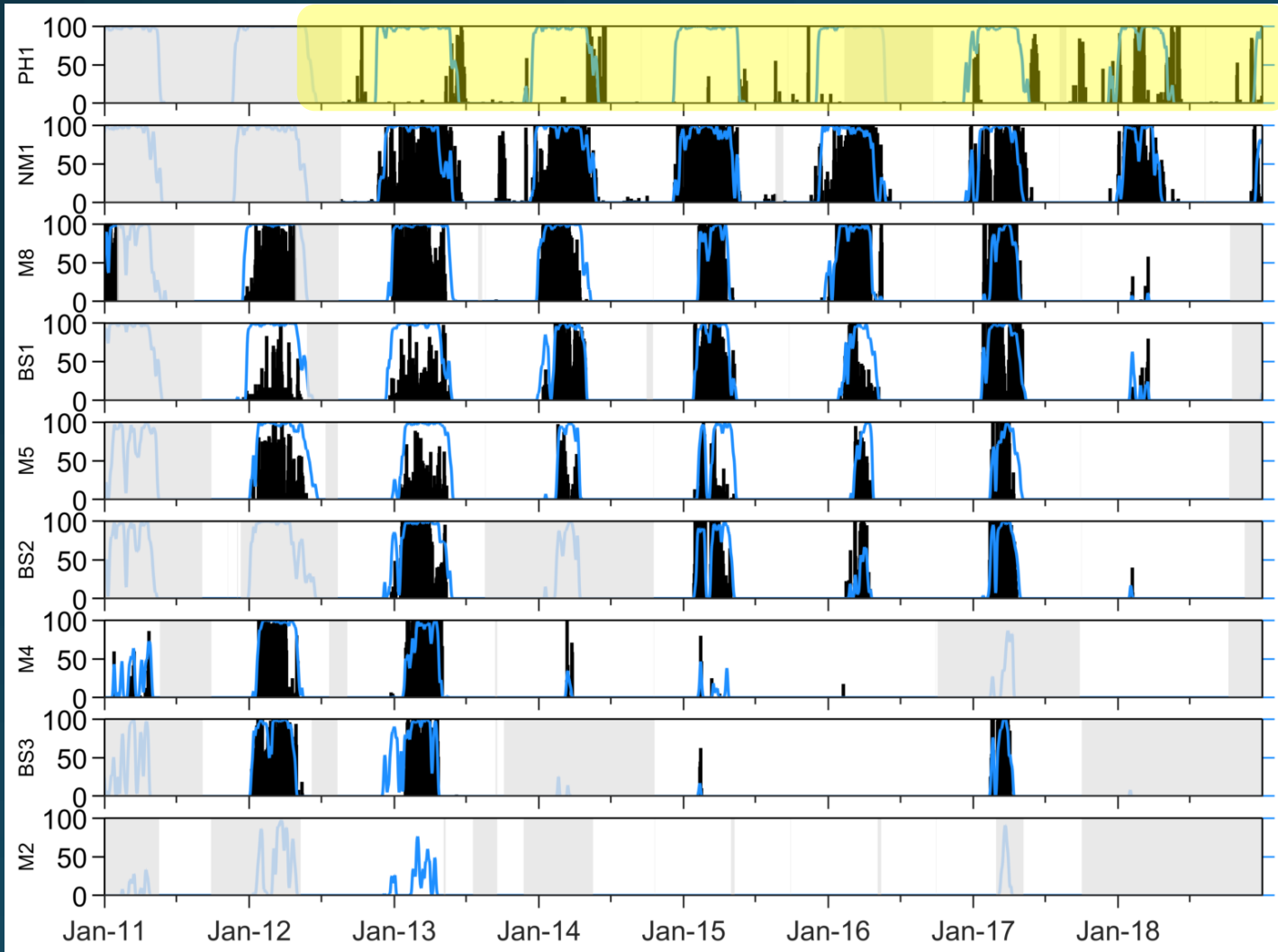
Ice associated

# Walrus



Always overwintering  
in Chirikov Basin

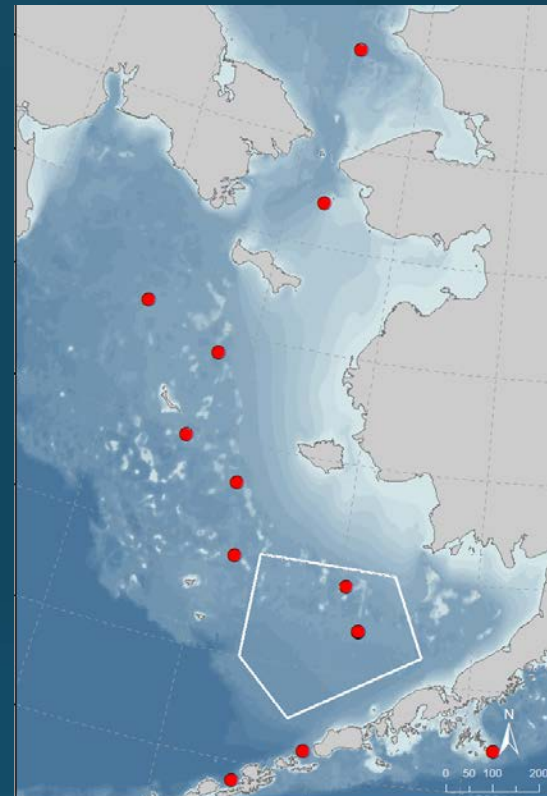
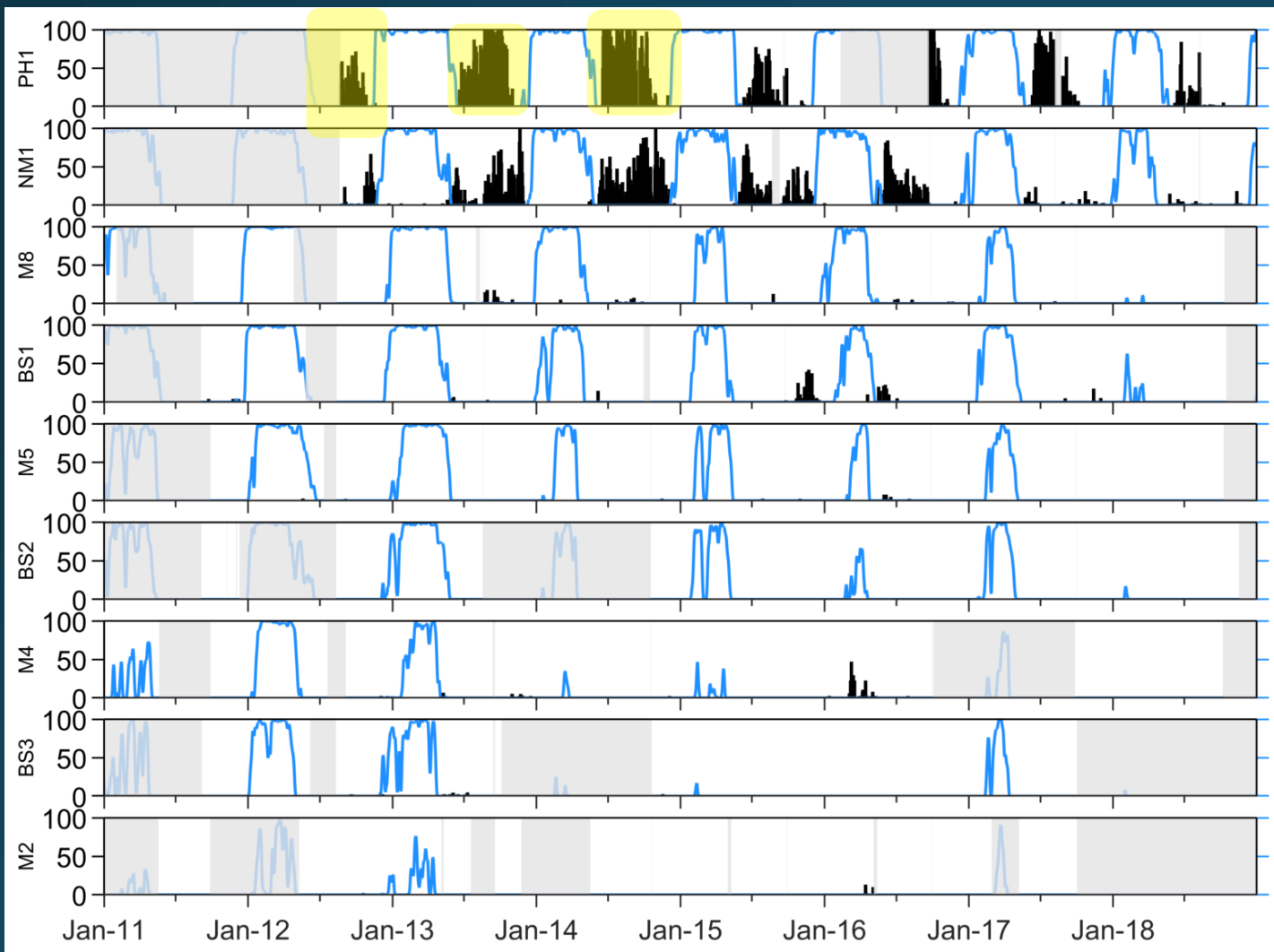
# Walrus



Still mostly migratory  
at Point Hope

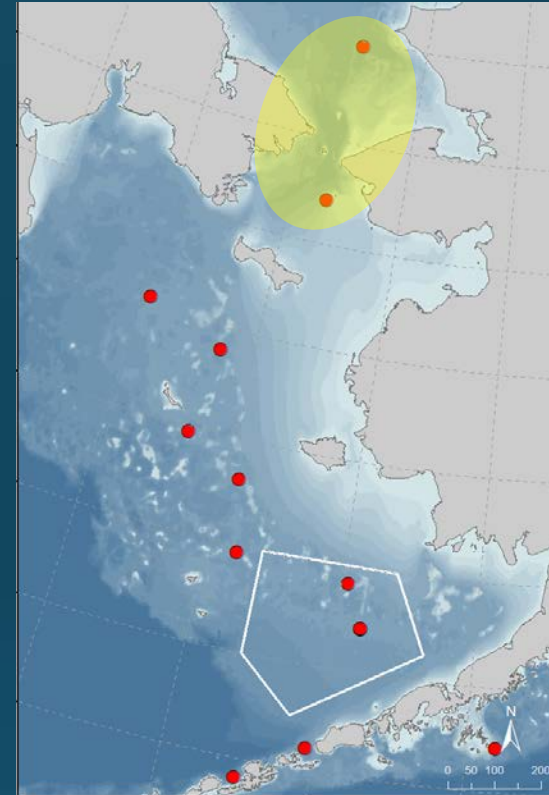
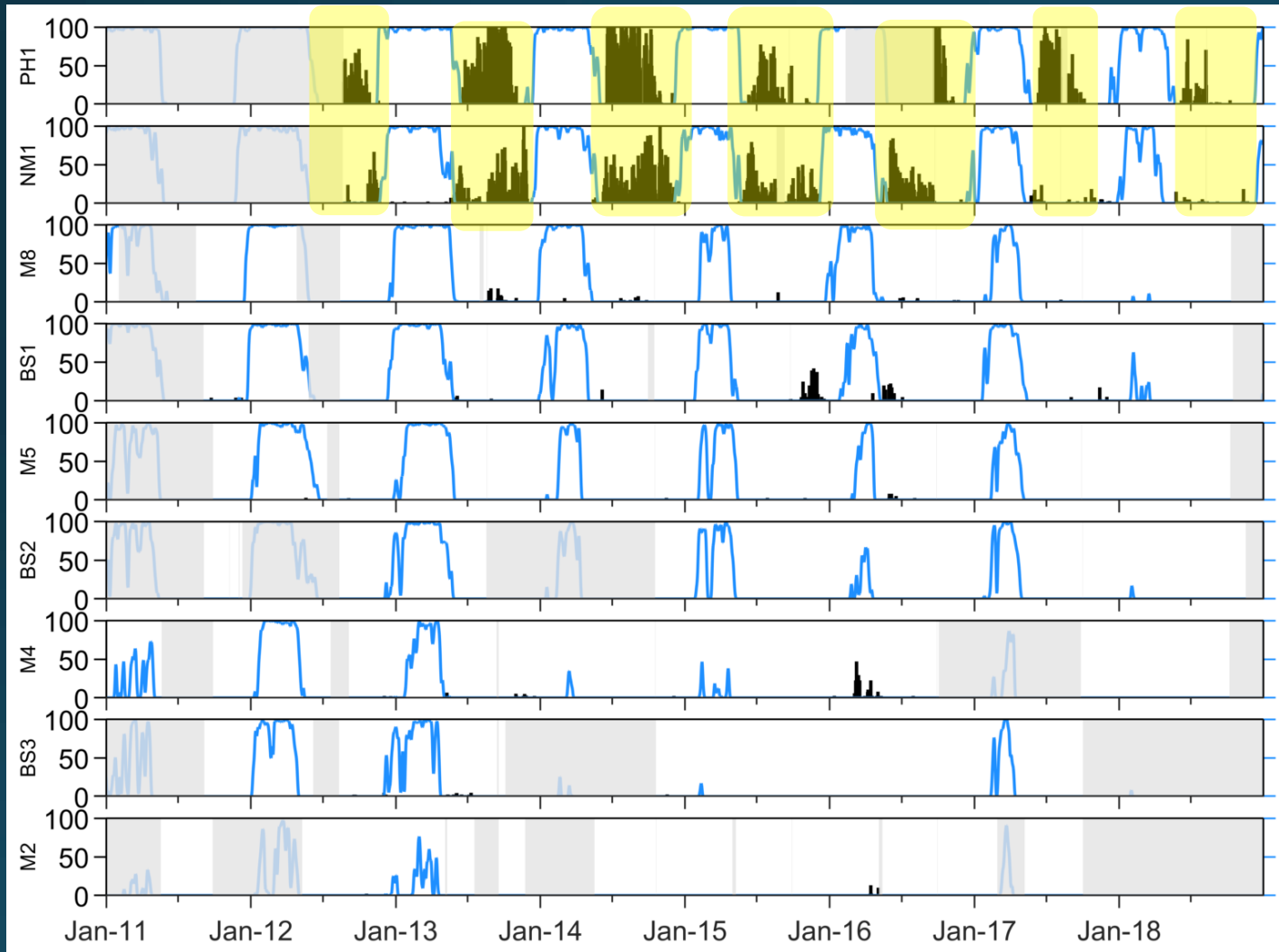


# Gray whales



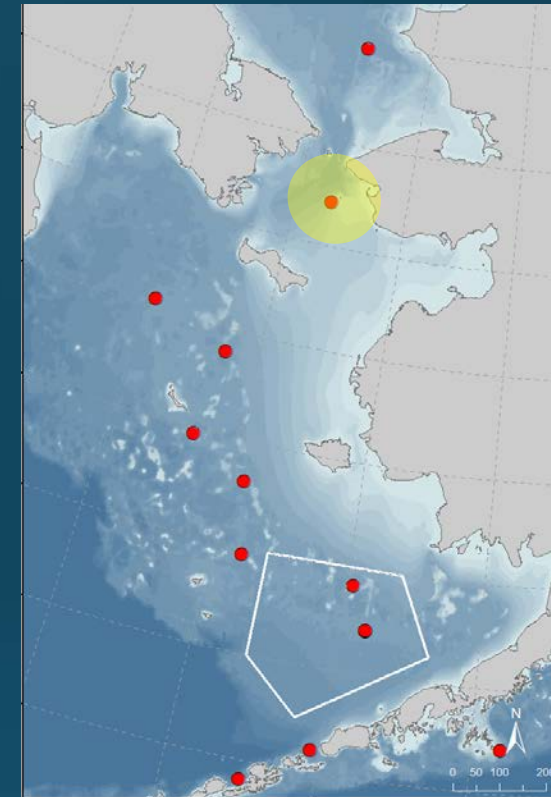
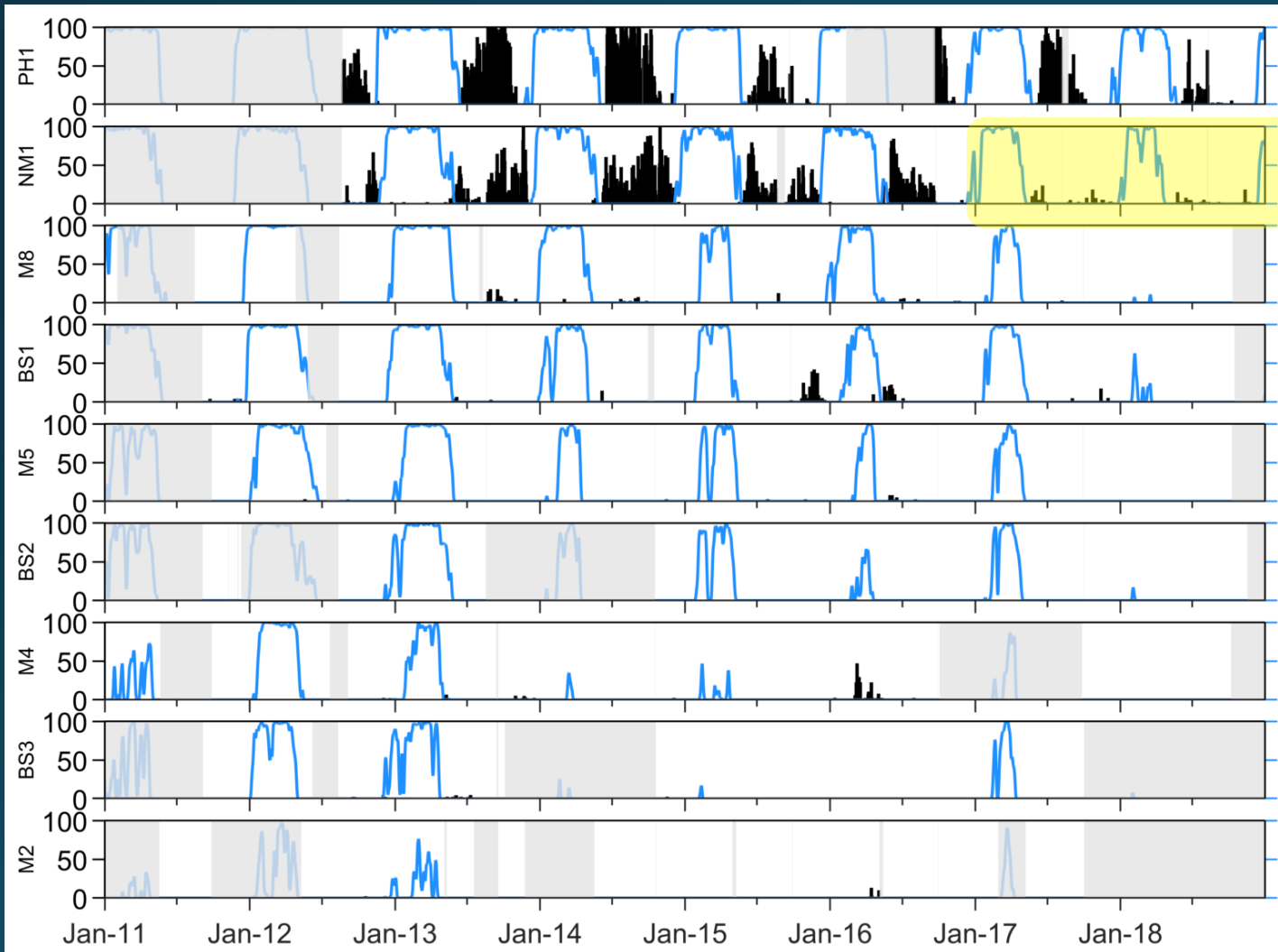
Ice avoidant

# Gray whales



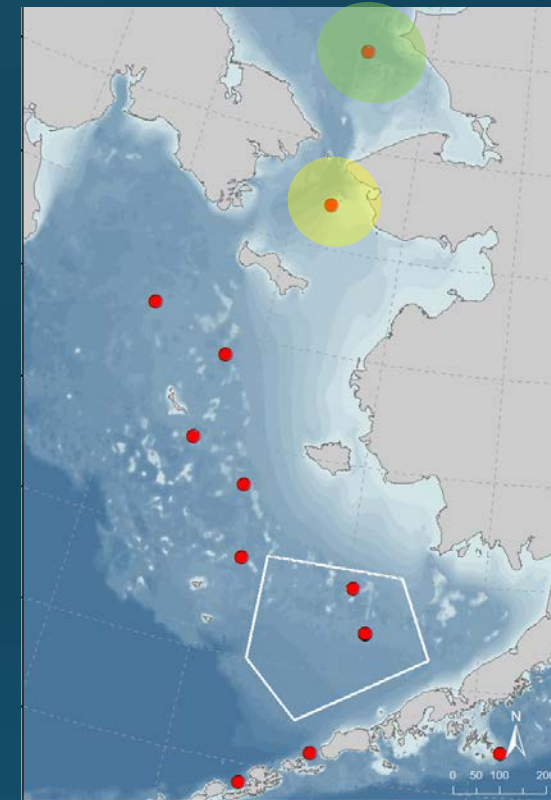
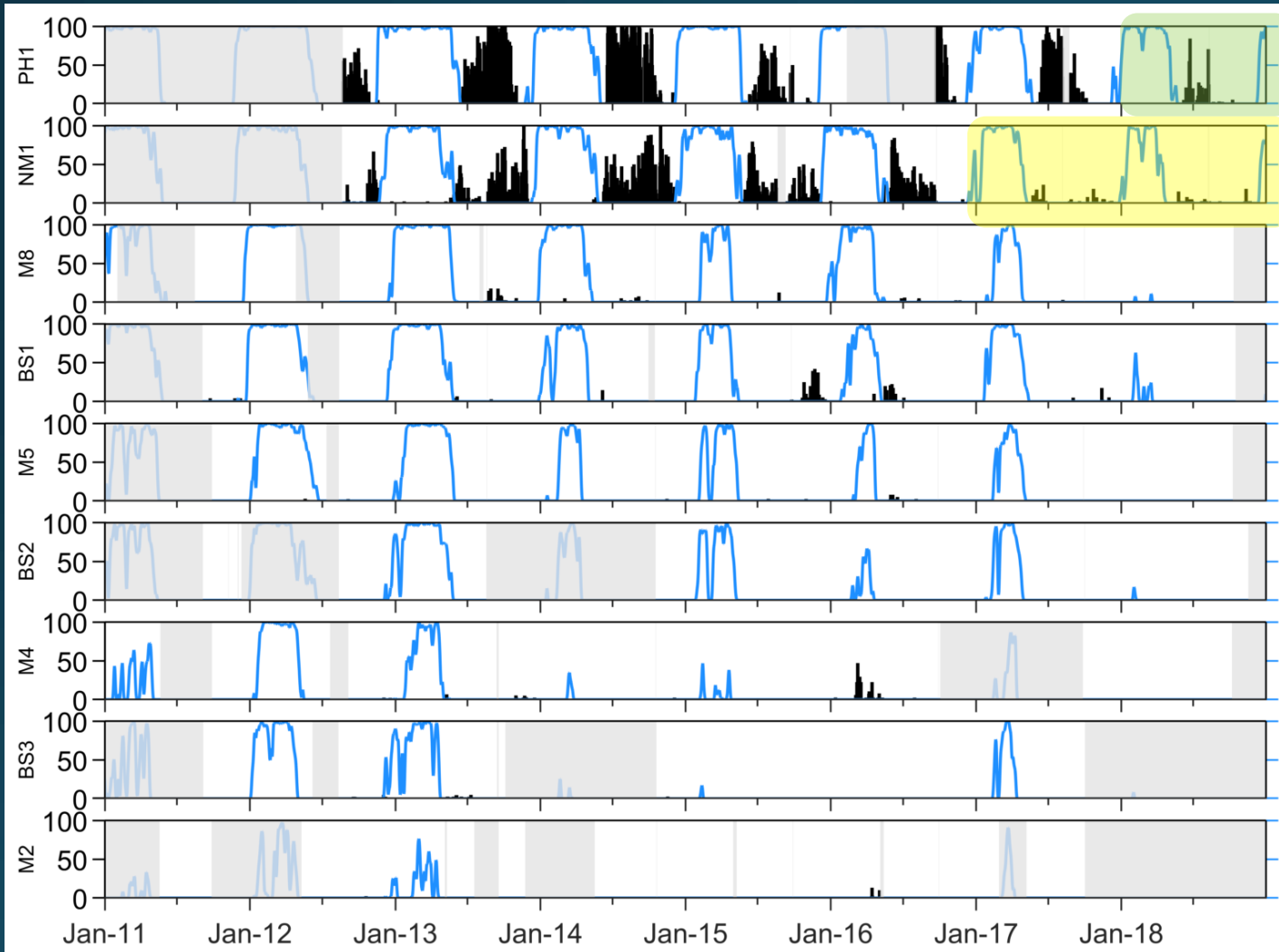
Mooring locations in Bering aren't ideal

# Gray whales



Detections drop starting 2017  
Chirikov and 2018 Hope  
Basins. Continues into 2019

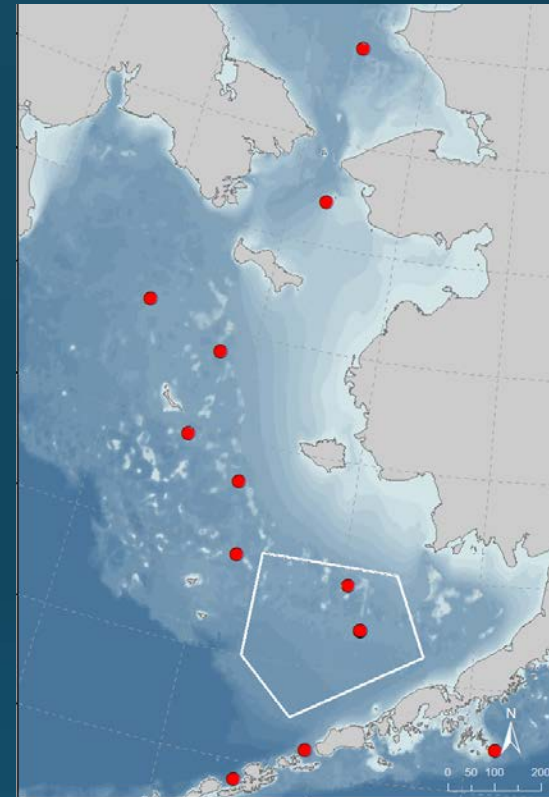
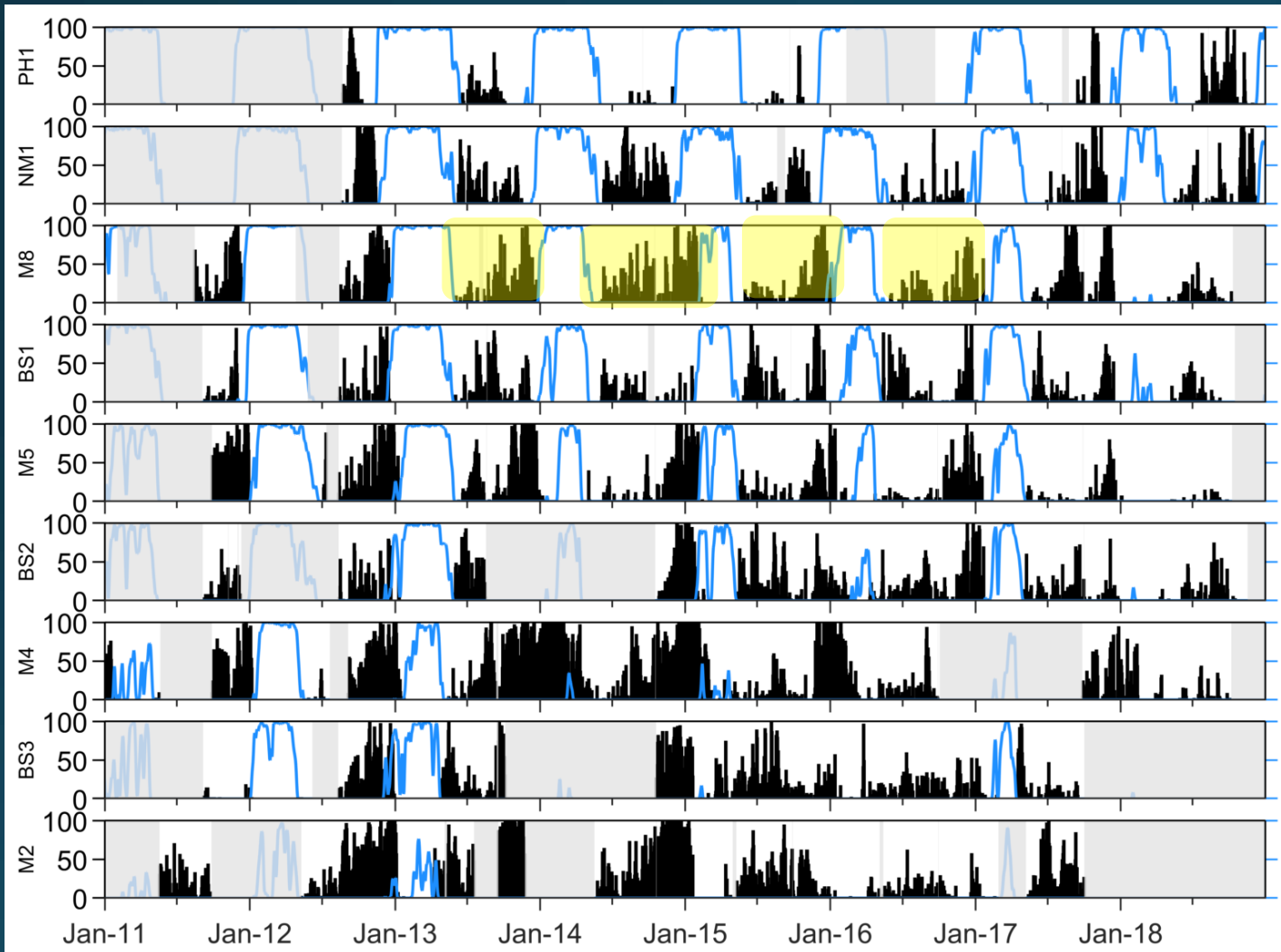
# Gray whales



Ice avoidant

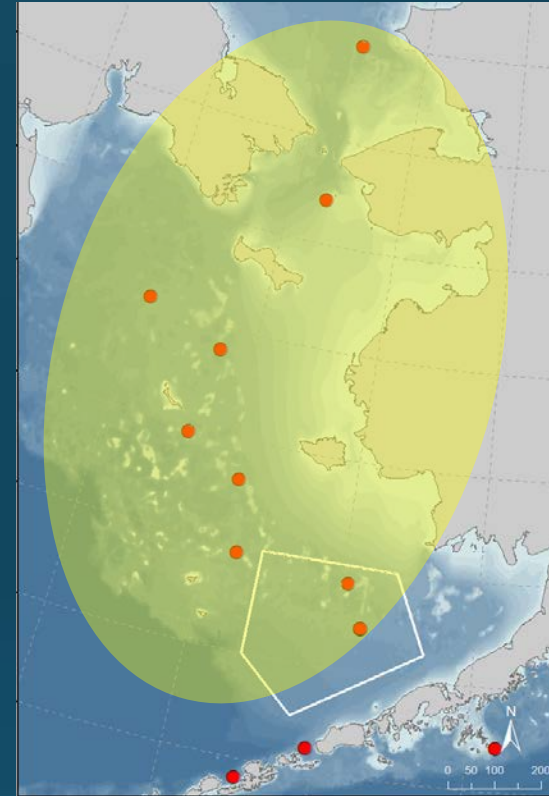
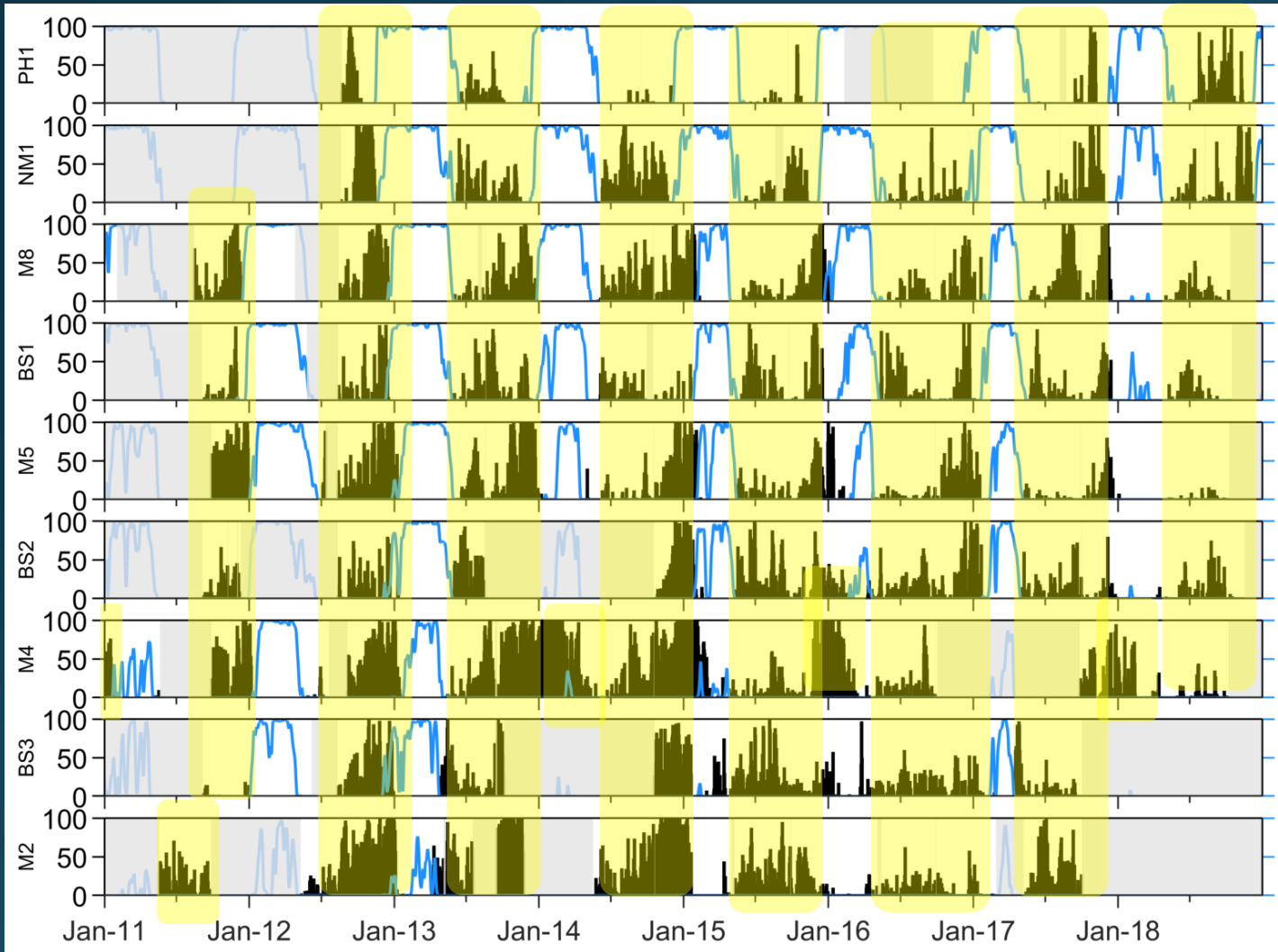
Detections drop starting 2017  
Chirikov and 2018 Hope  
Basins. Continues into 2019

# Humpback whales



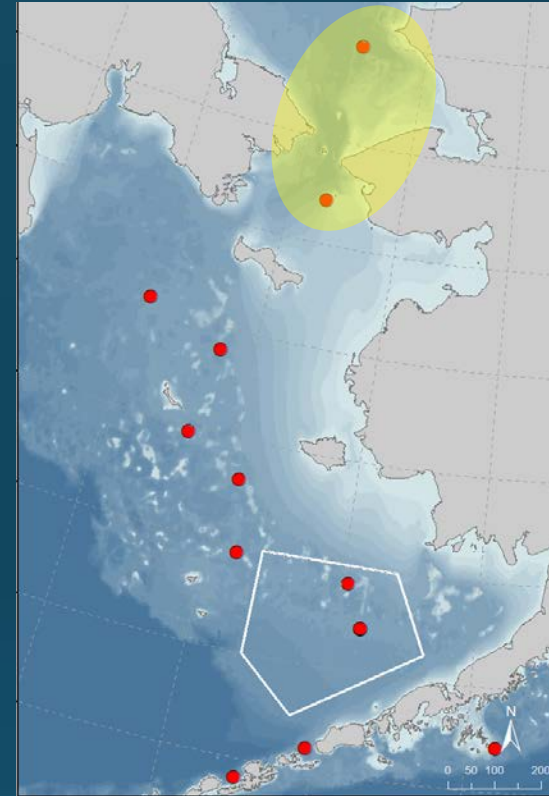
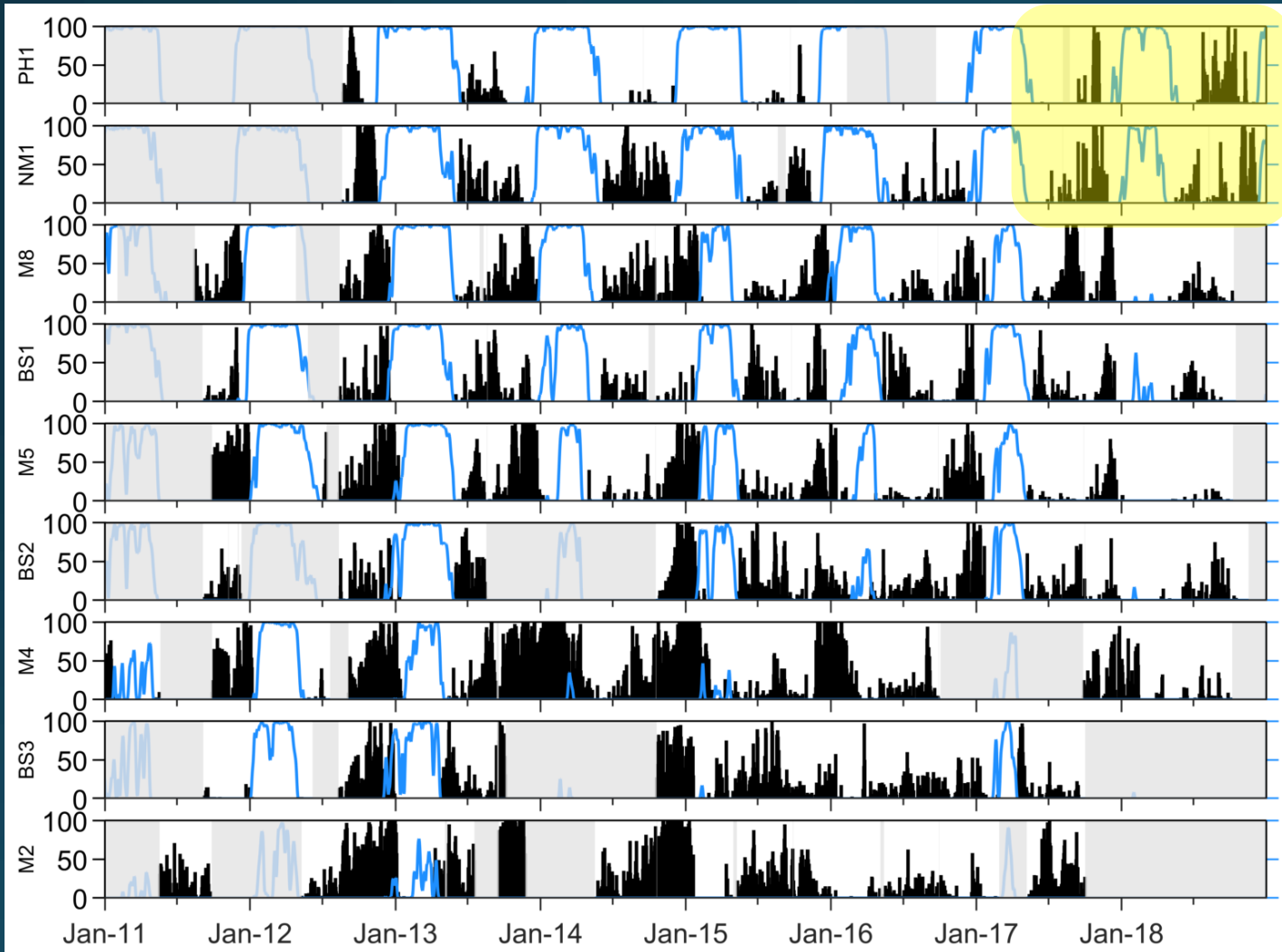
Ice avoidant

# Humpback whales



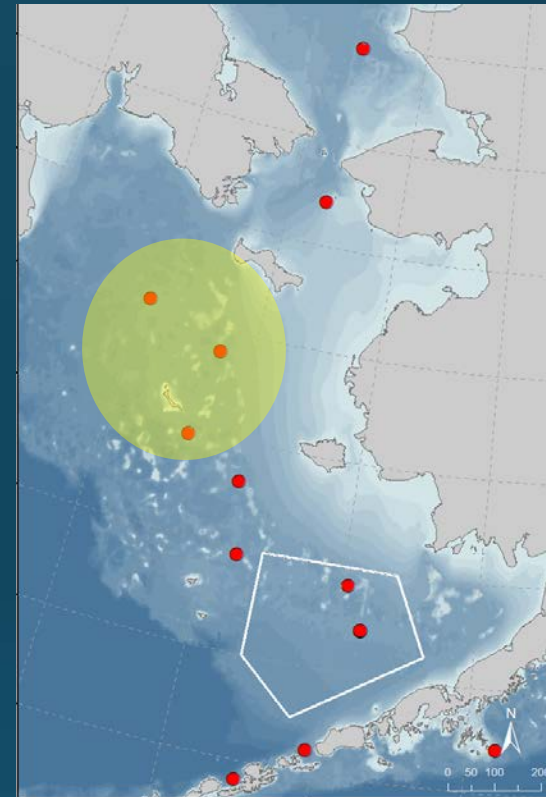
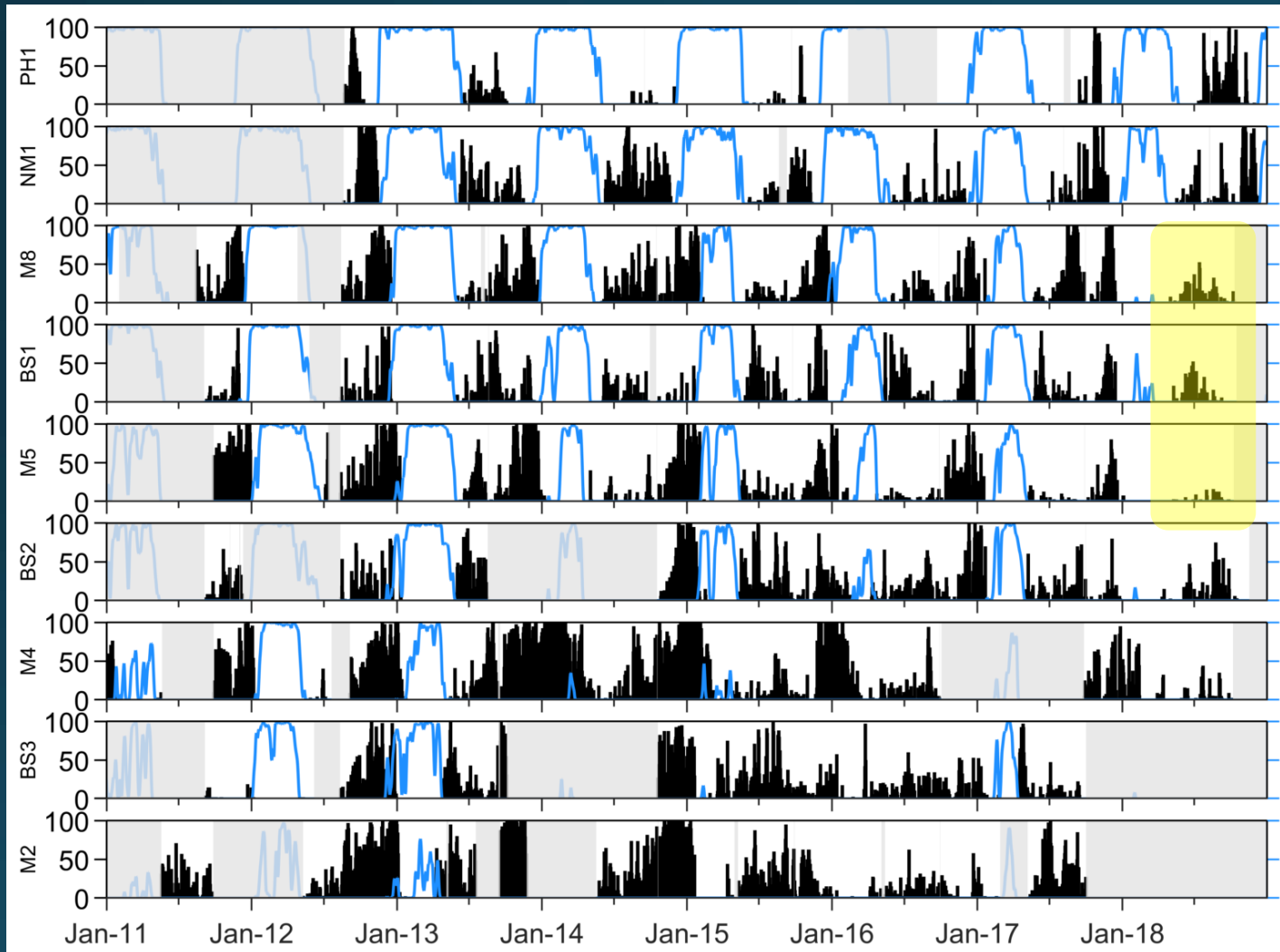
Ubiquitous throughout shelf

# Humpback whales



No decrease in Hope/Chirikov

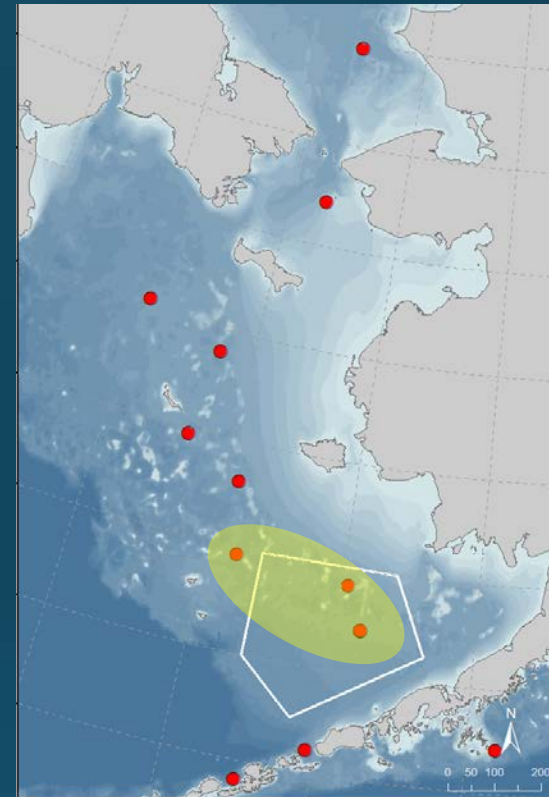
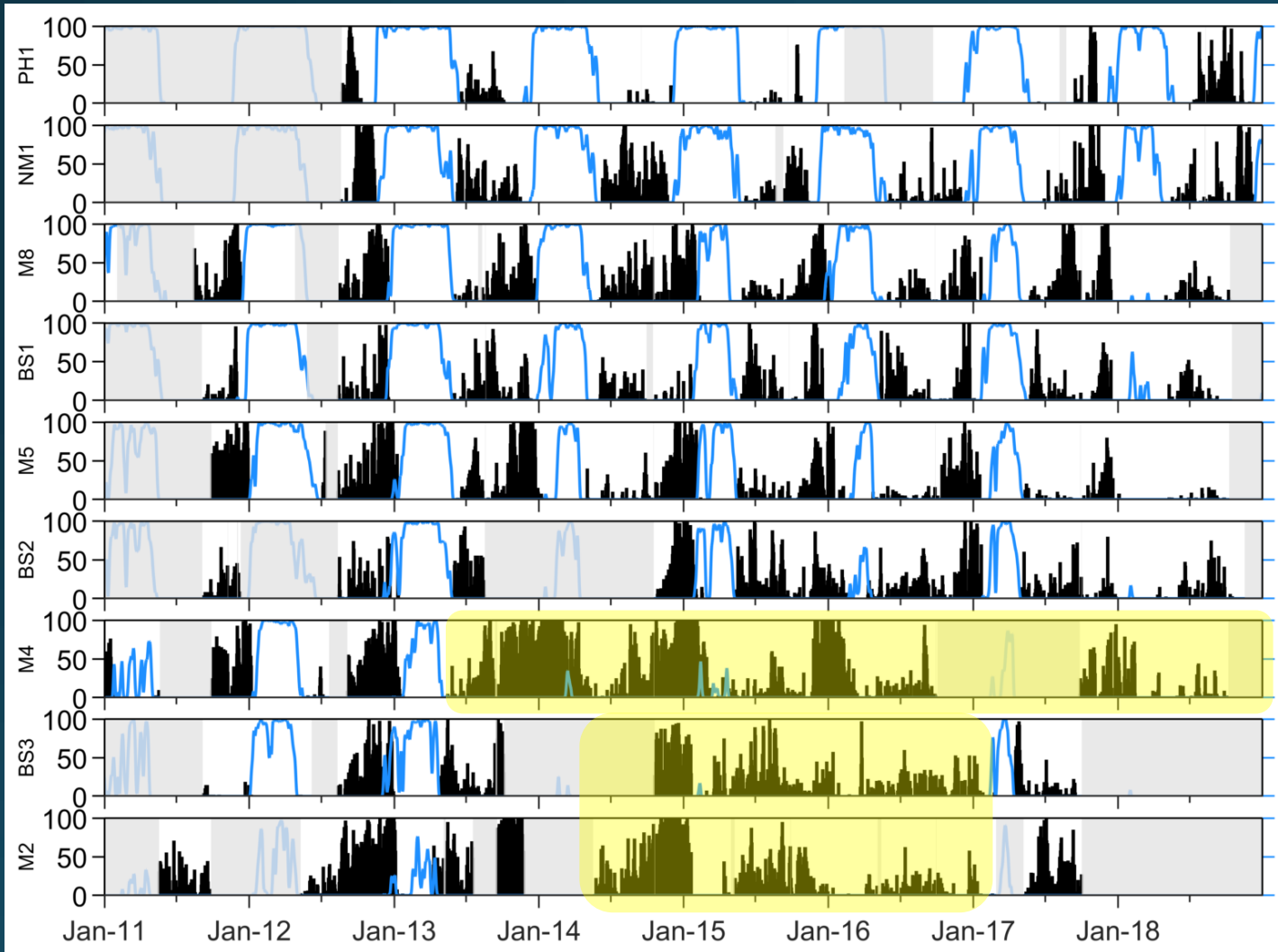
# Humpback whales



Decrease in N. Bering in 2018

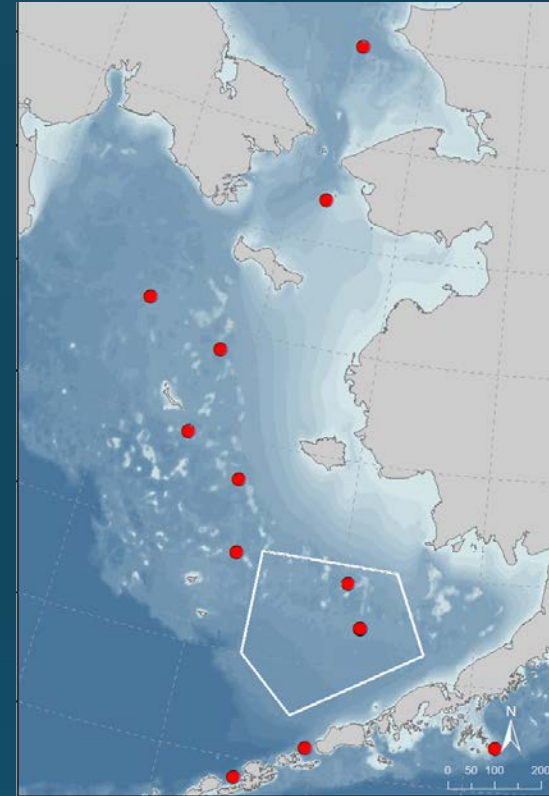
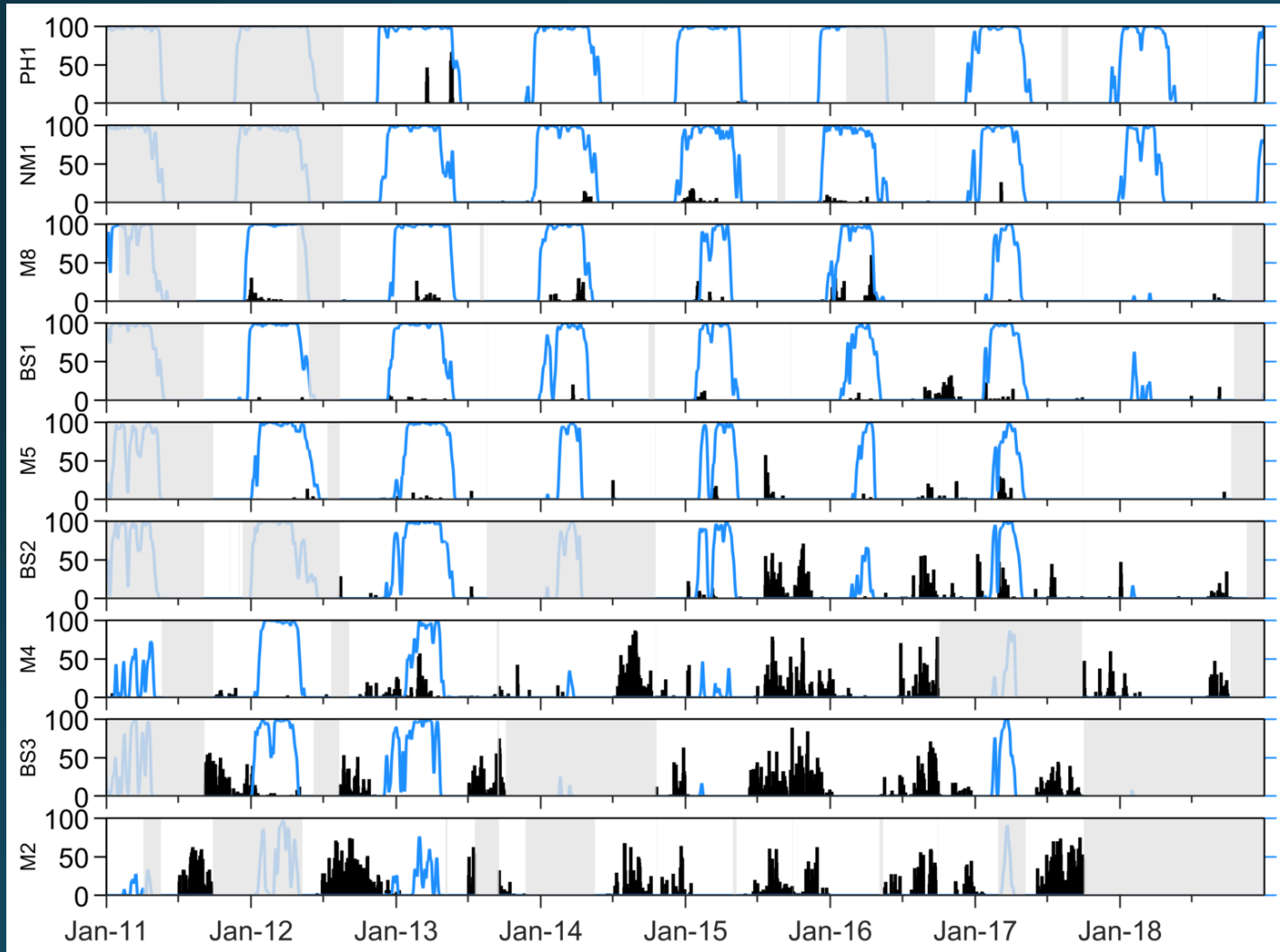


# Humpback whales



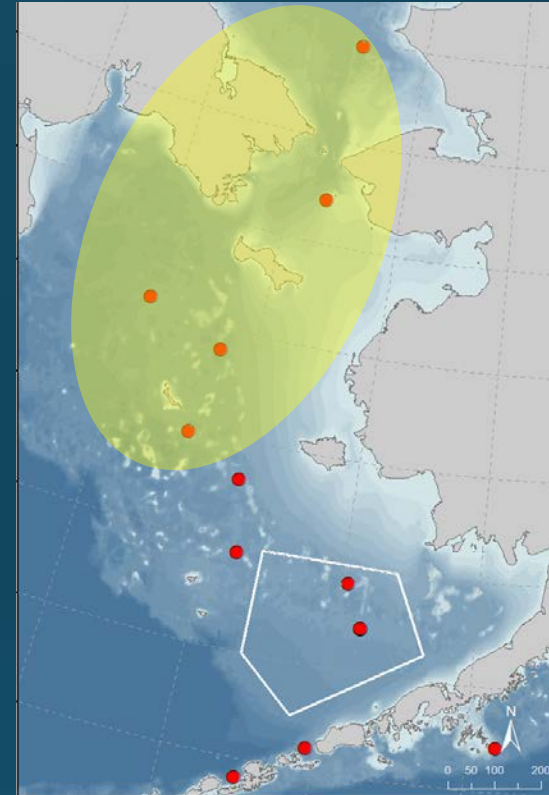
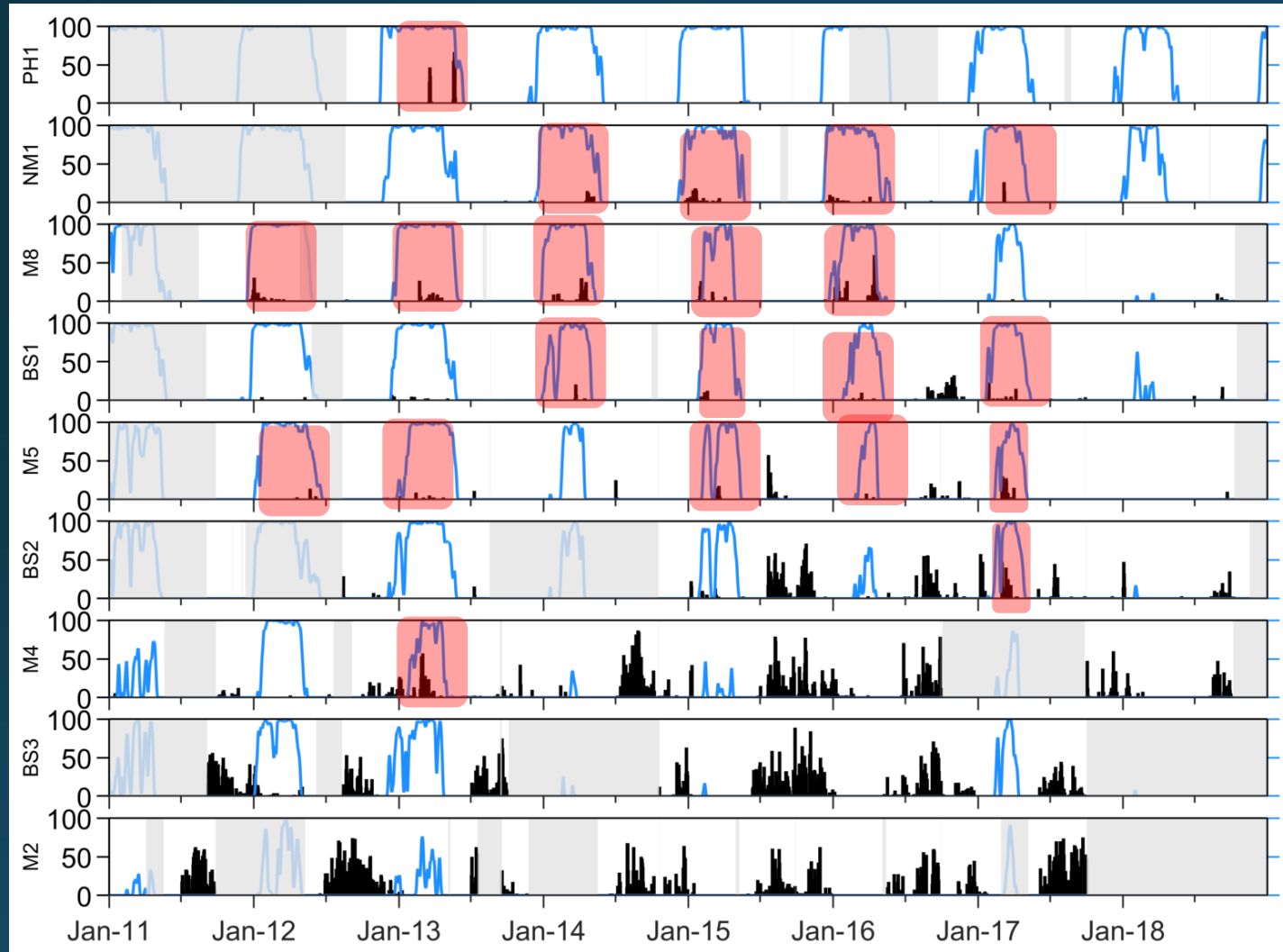
Appear to be overwintering  
in SE Bering up to the  
Pribilofs

# N. Pacific right whales



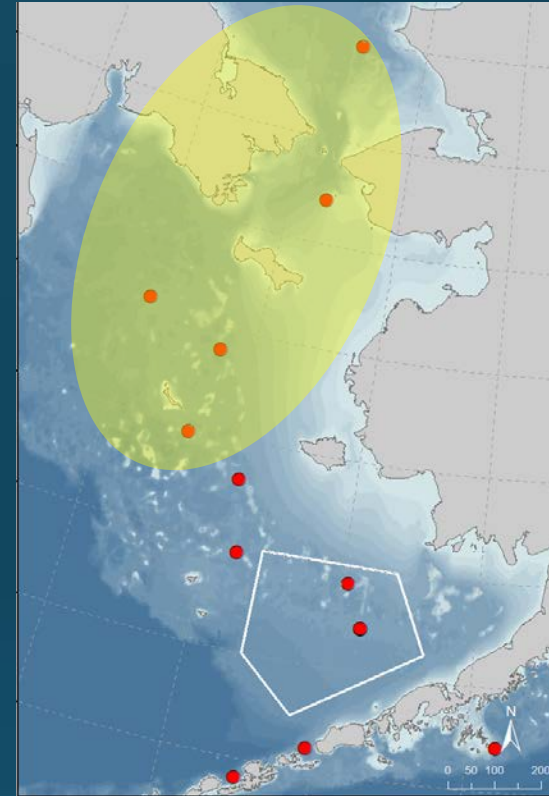
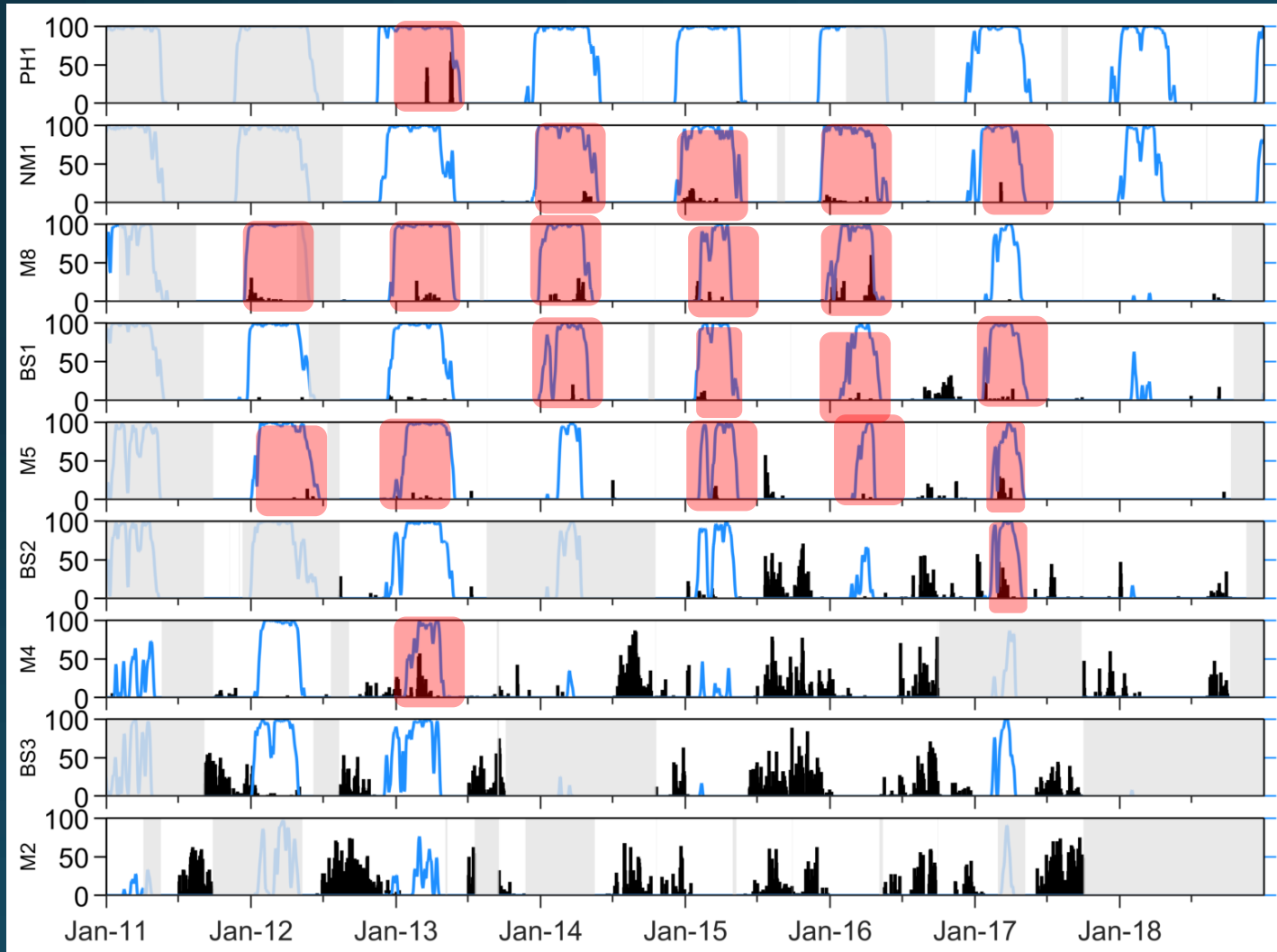
Assumed ice avoidant

# N. Pacific right whales



Assumed ice avoidant

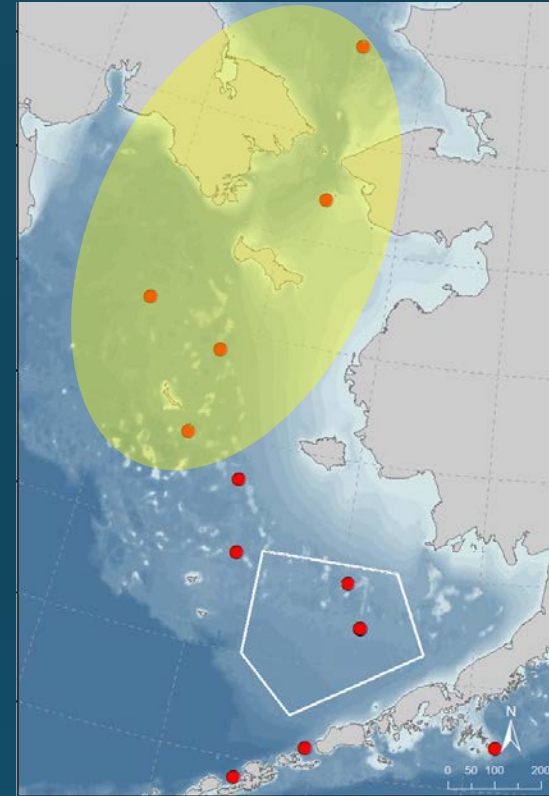
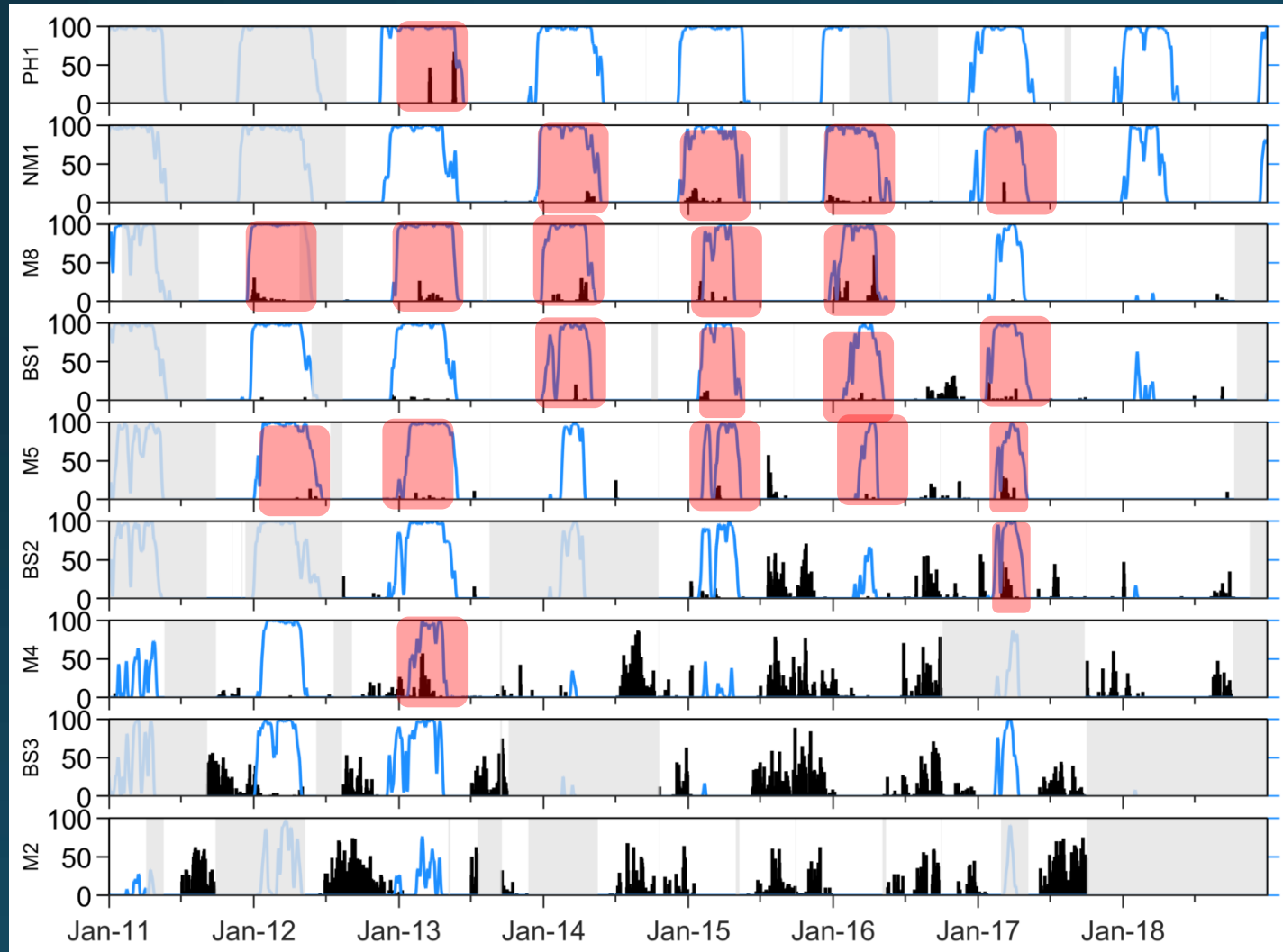
# N. Pacific right whales



Assumed ice avoidant

Similar repertoires

# N. Pacific right whales

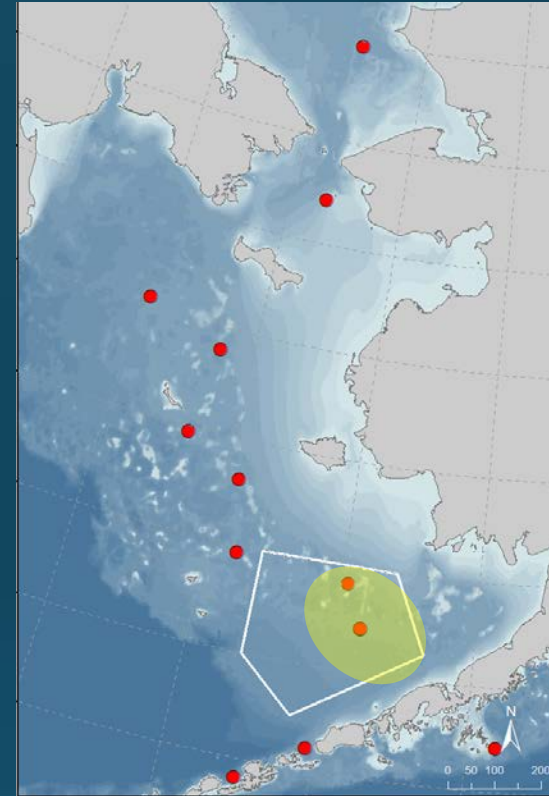
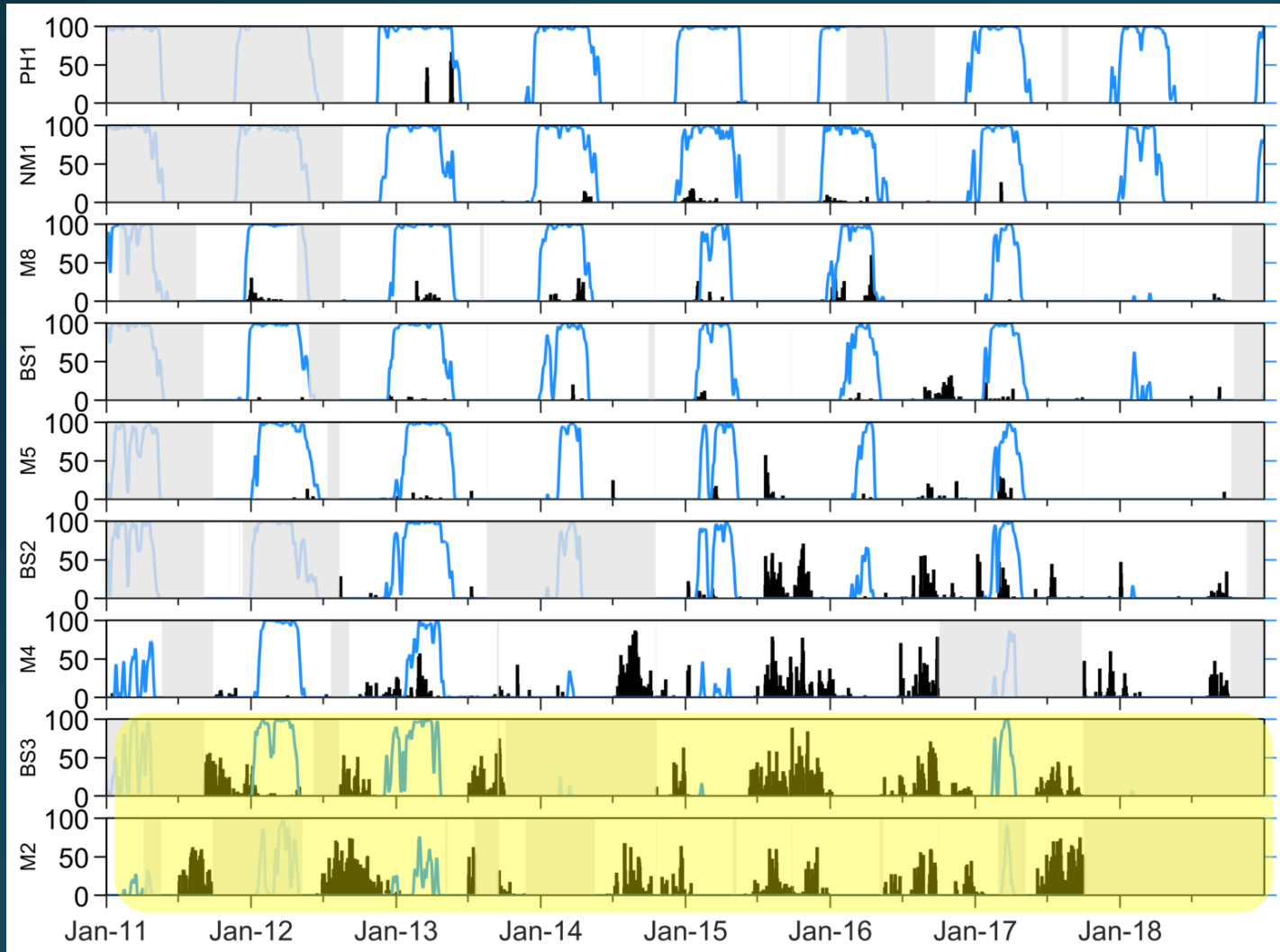


Assumed ice avoidant

Similar repertoires

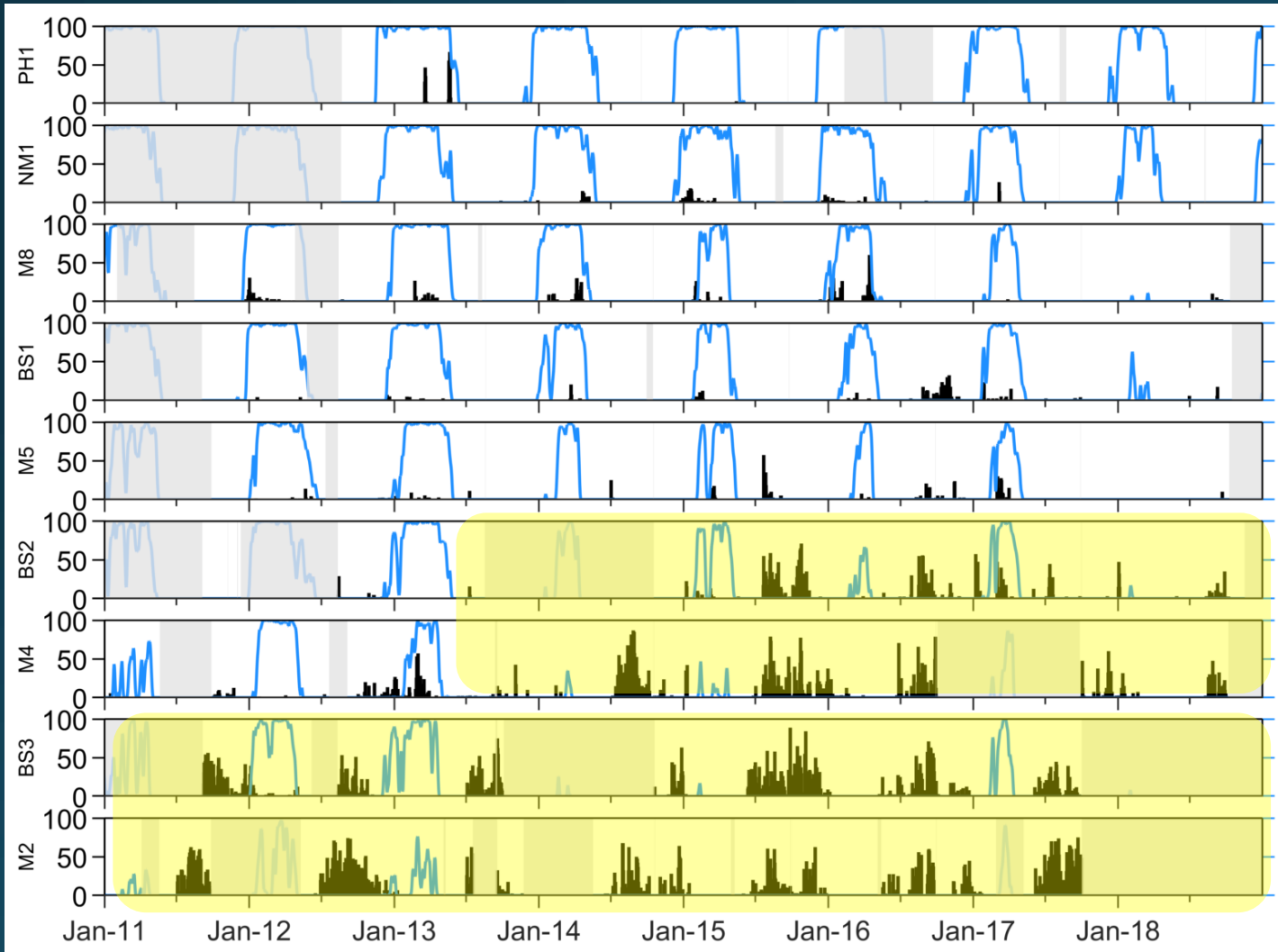
Ambiguous for now

# N. Pacific right whales



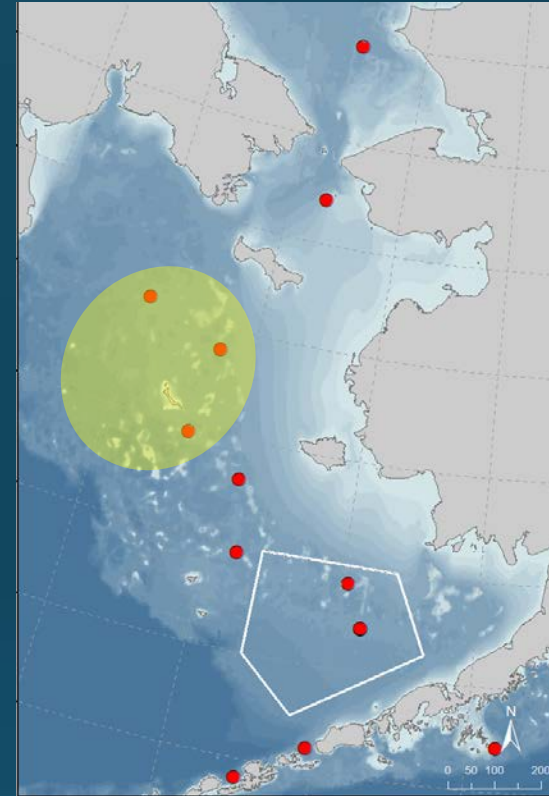
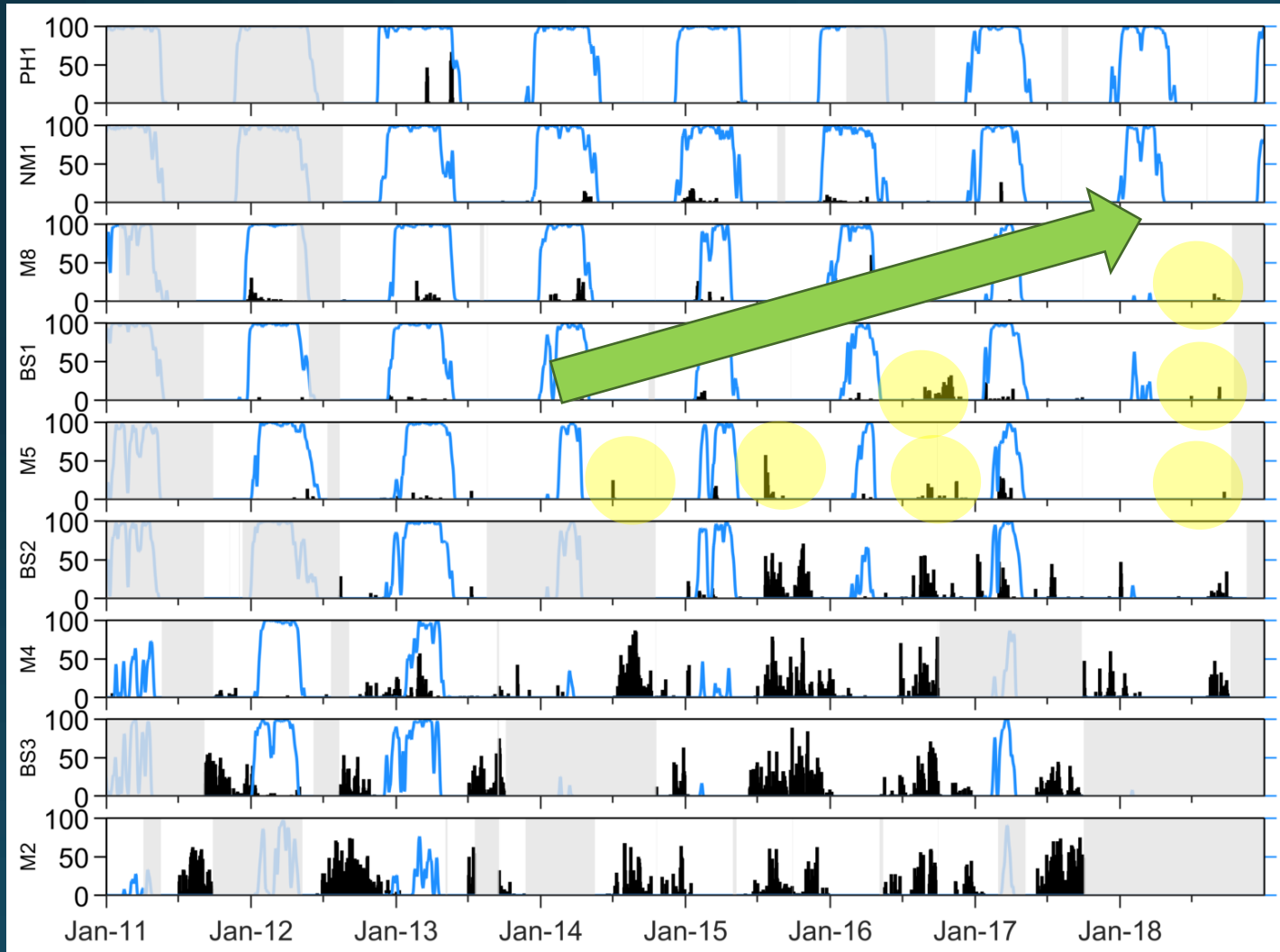
Common in Critical Habitat

# N. Pacific right whales



Spreading northward in SE Bering since 2014

# N. Pacific right whales

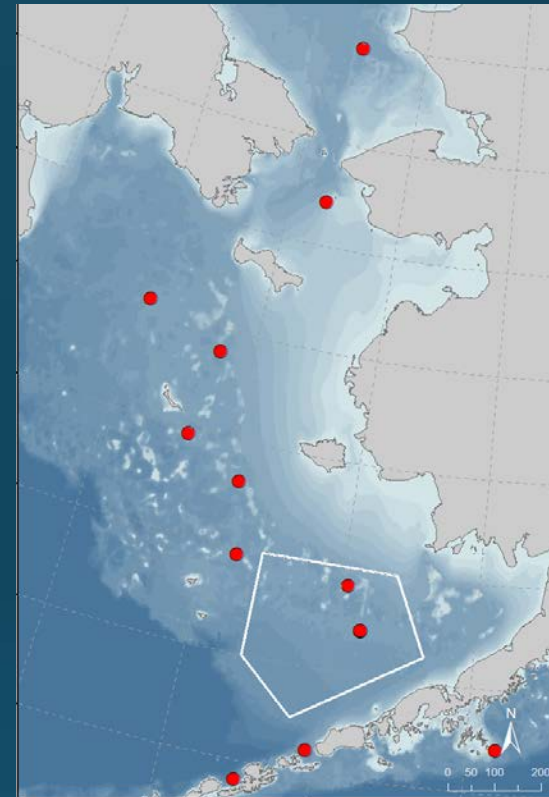
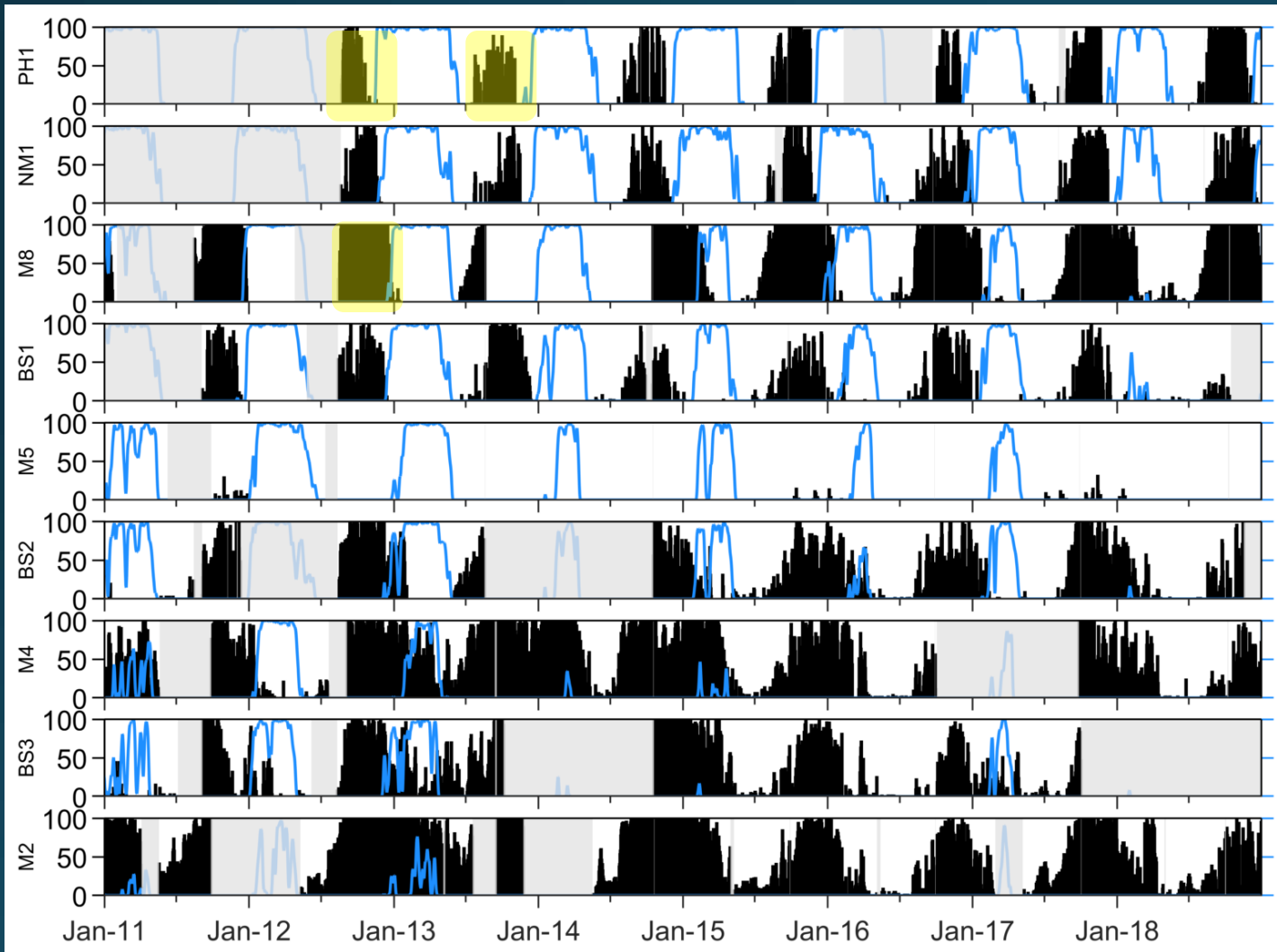


Spreading northward in N Bering  
as well

Supports recent visual sightings  
near St. Lawrence Island

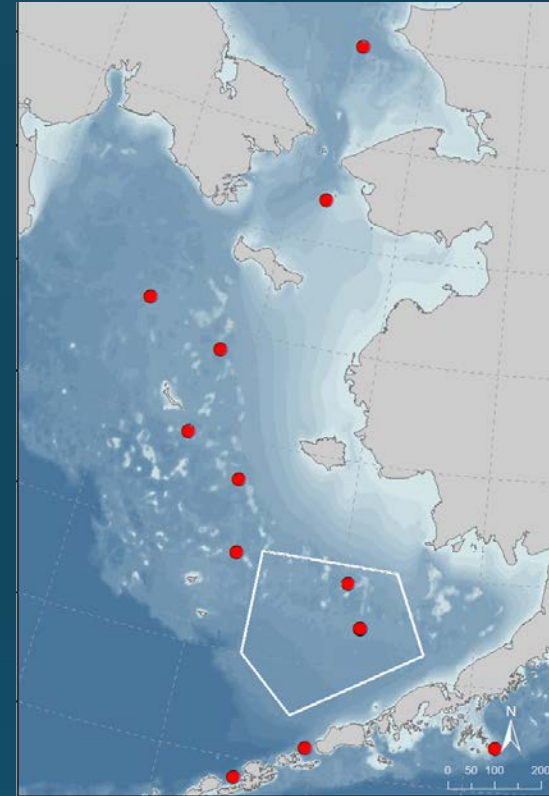
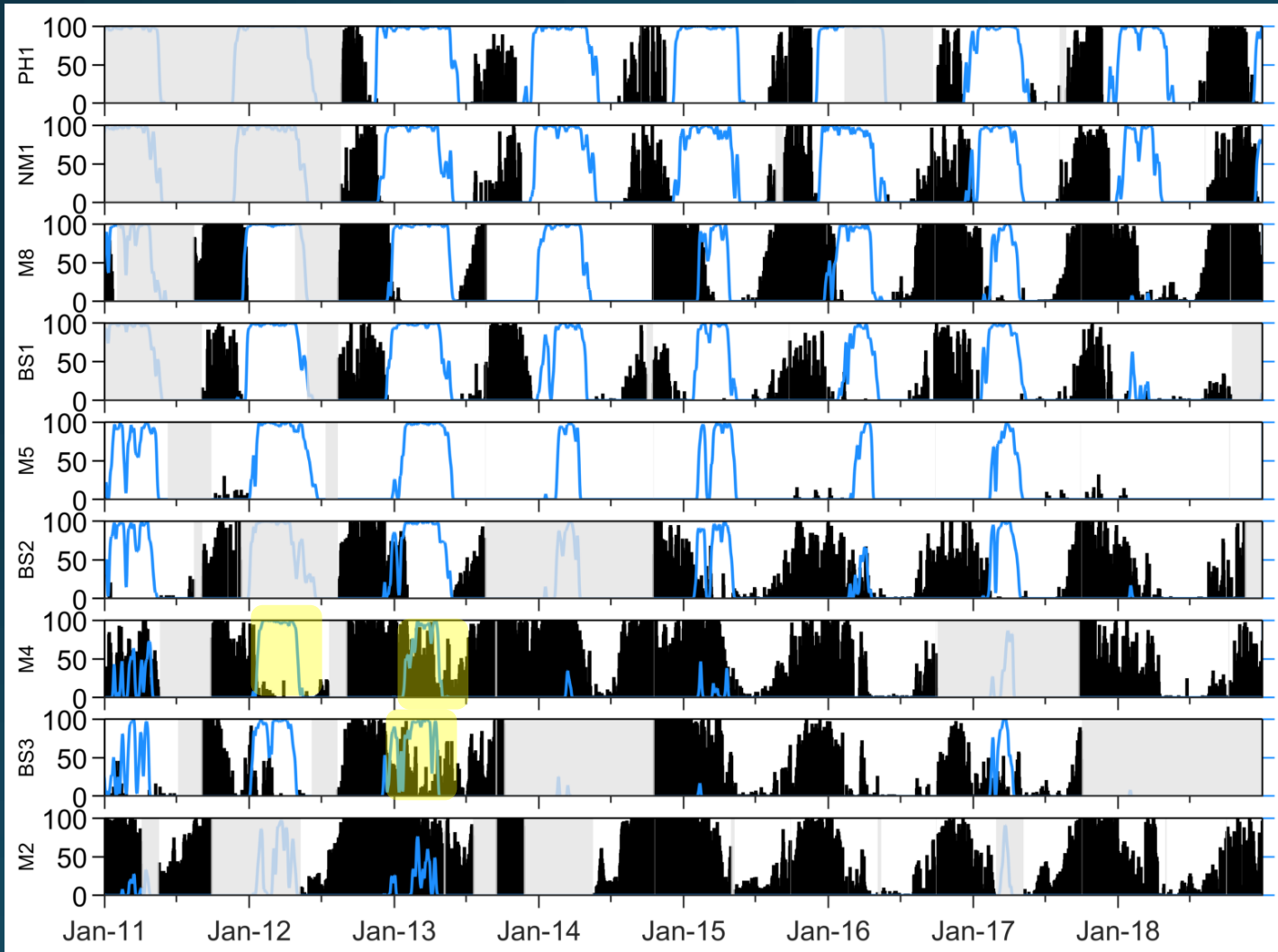


# Fin whales



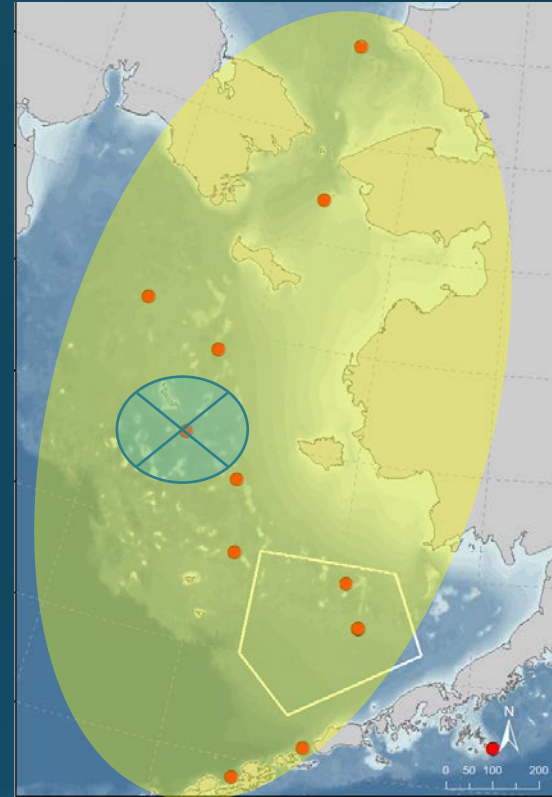
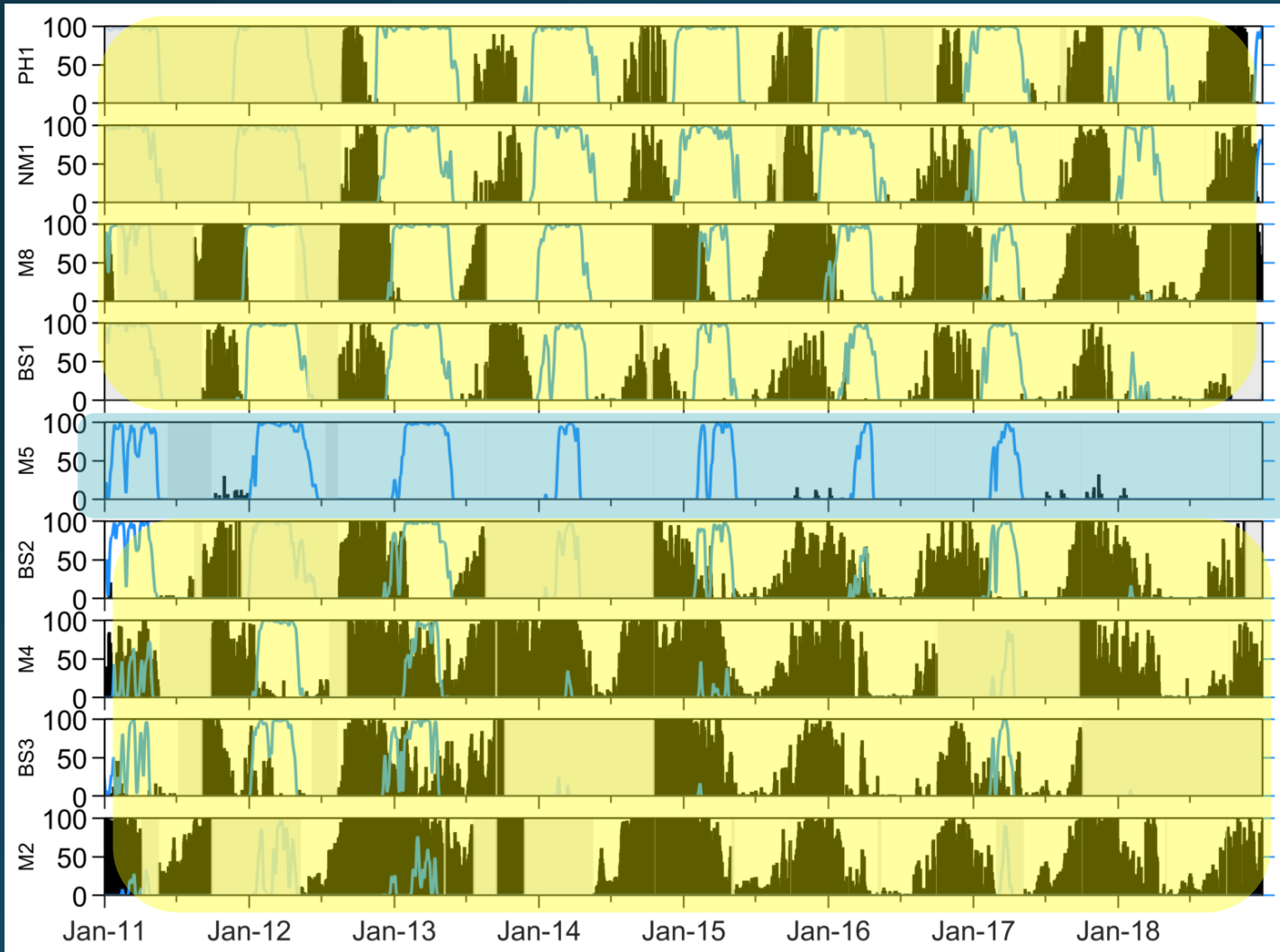
Mostly ice avoidant

# Fin whales



Mostly ice avoidant

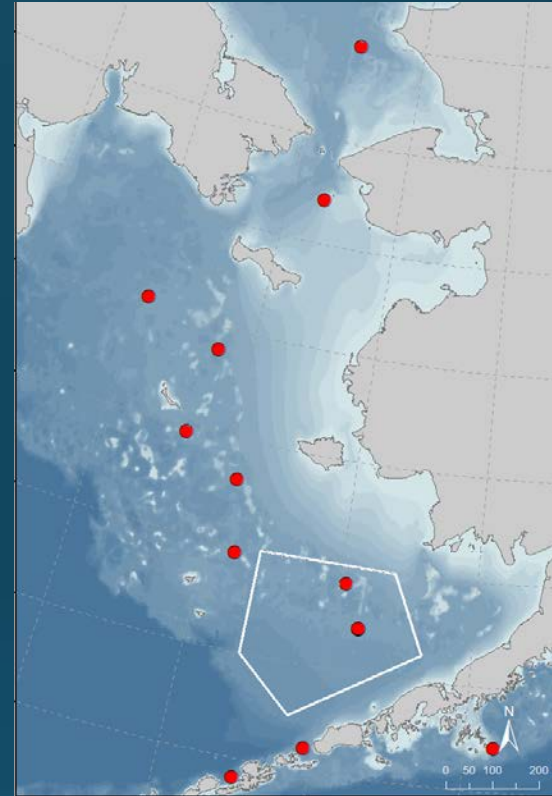
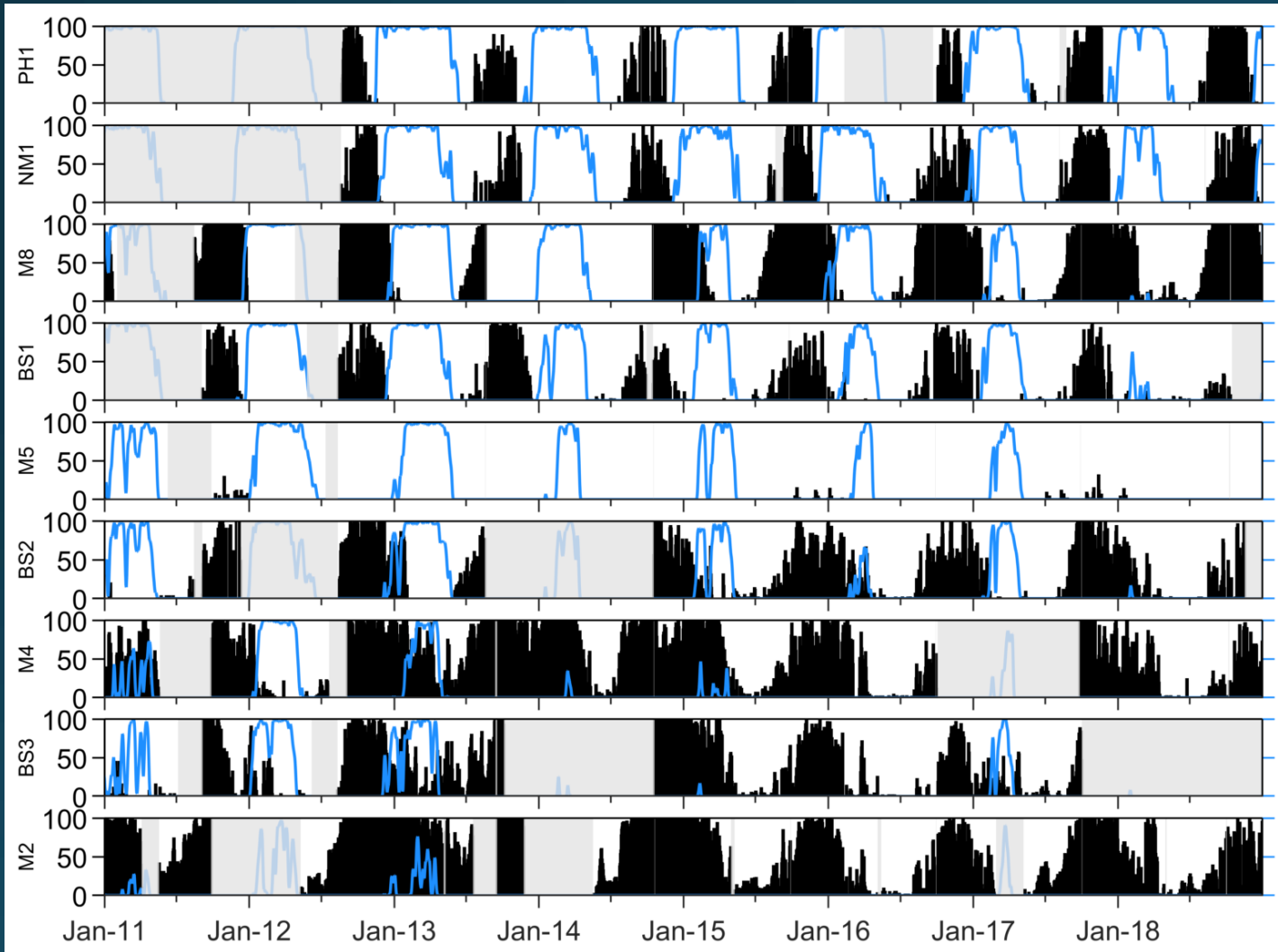
# Fin whales



Ubiquitous

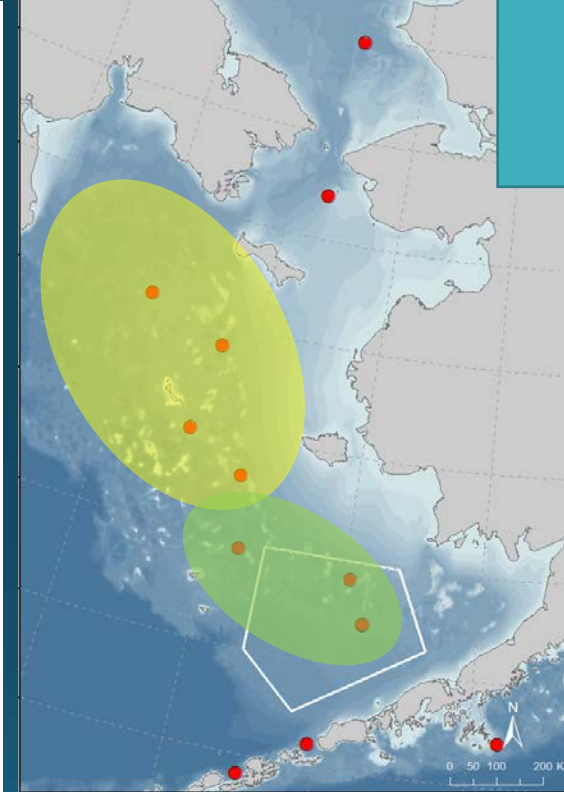
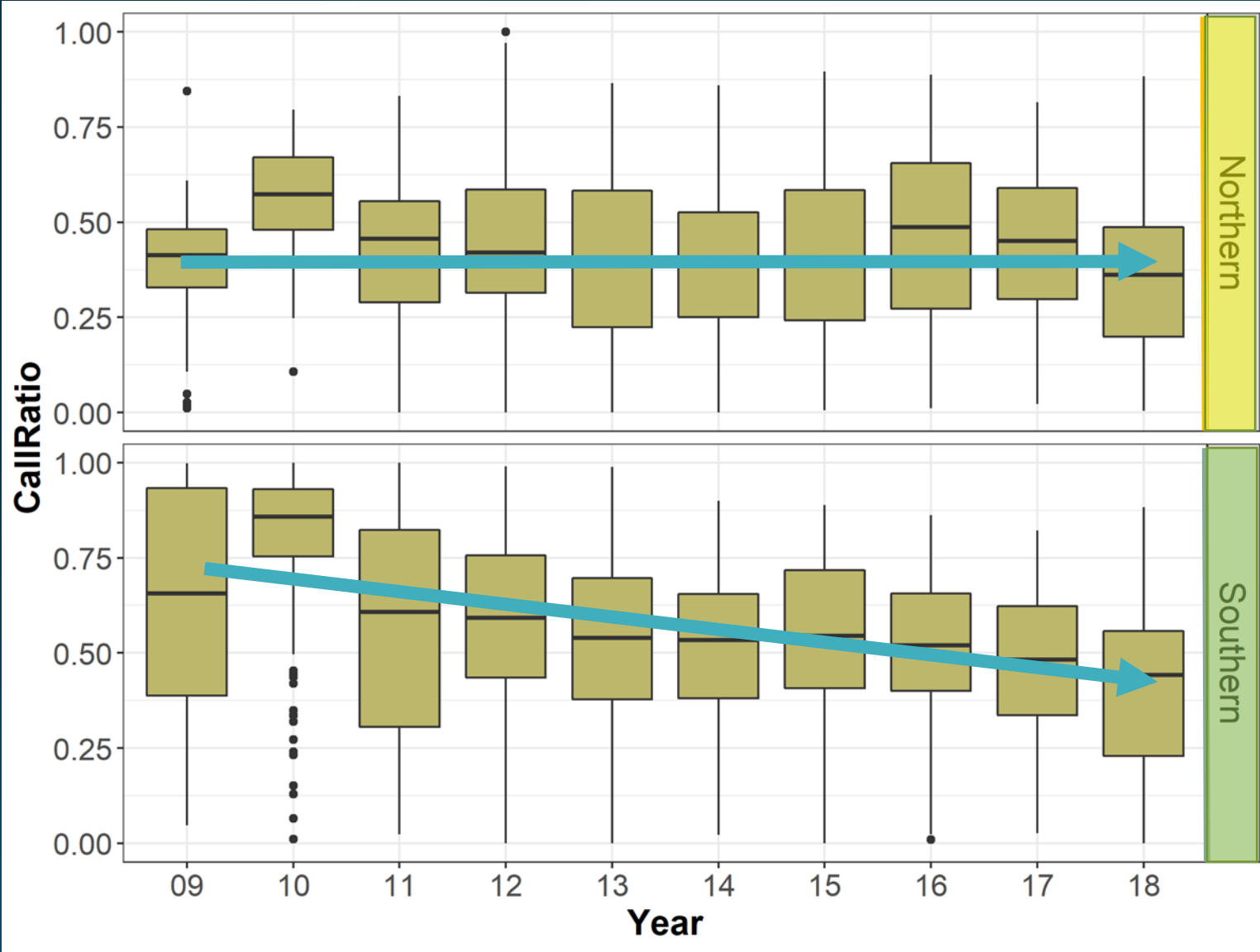
But not near St. Matts

# Fin whales



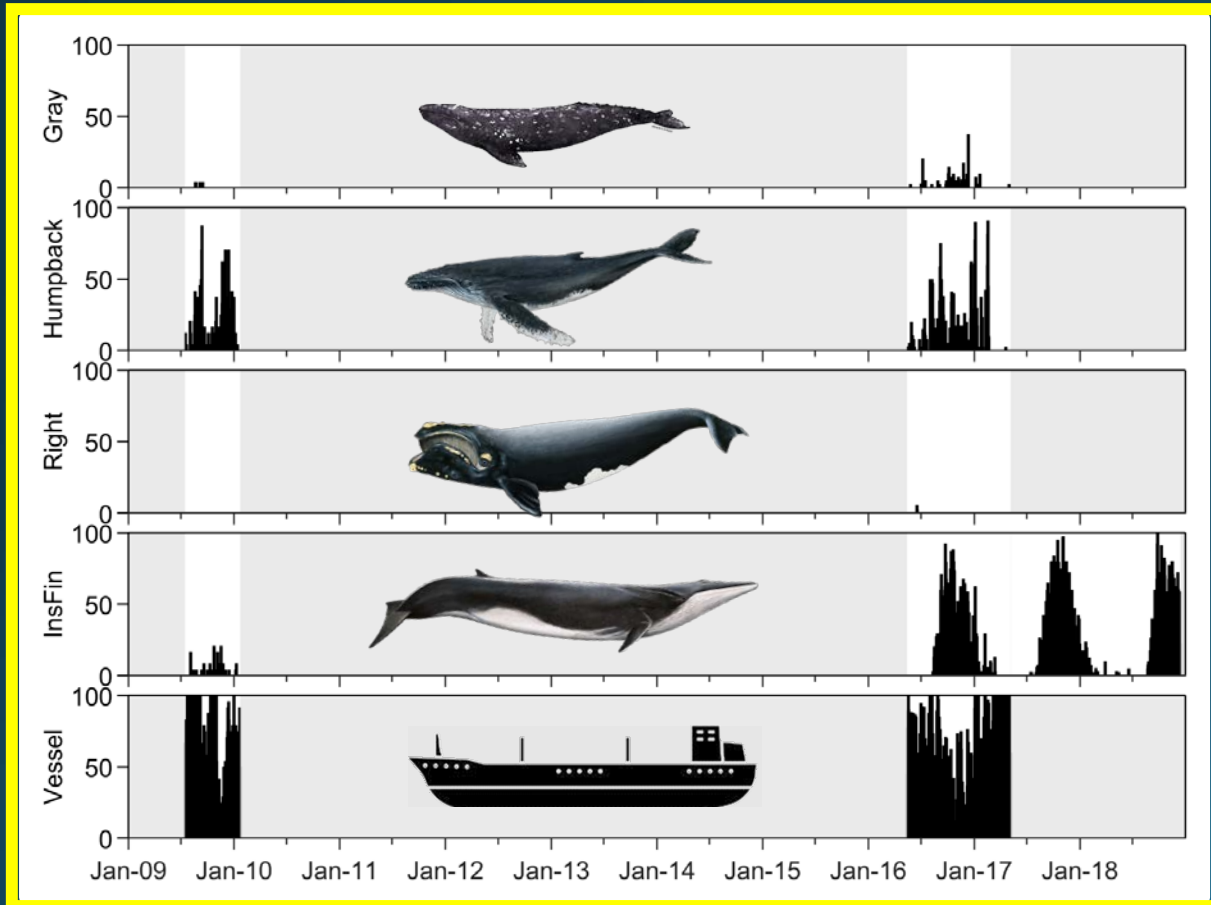
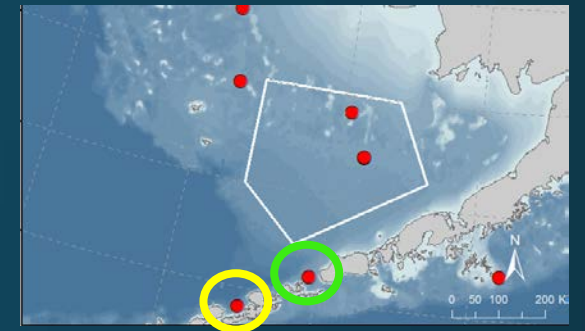
Autodetection capable

# Fin whales

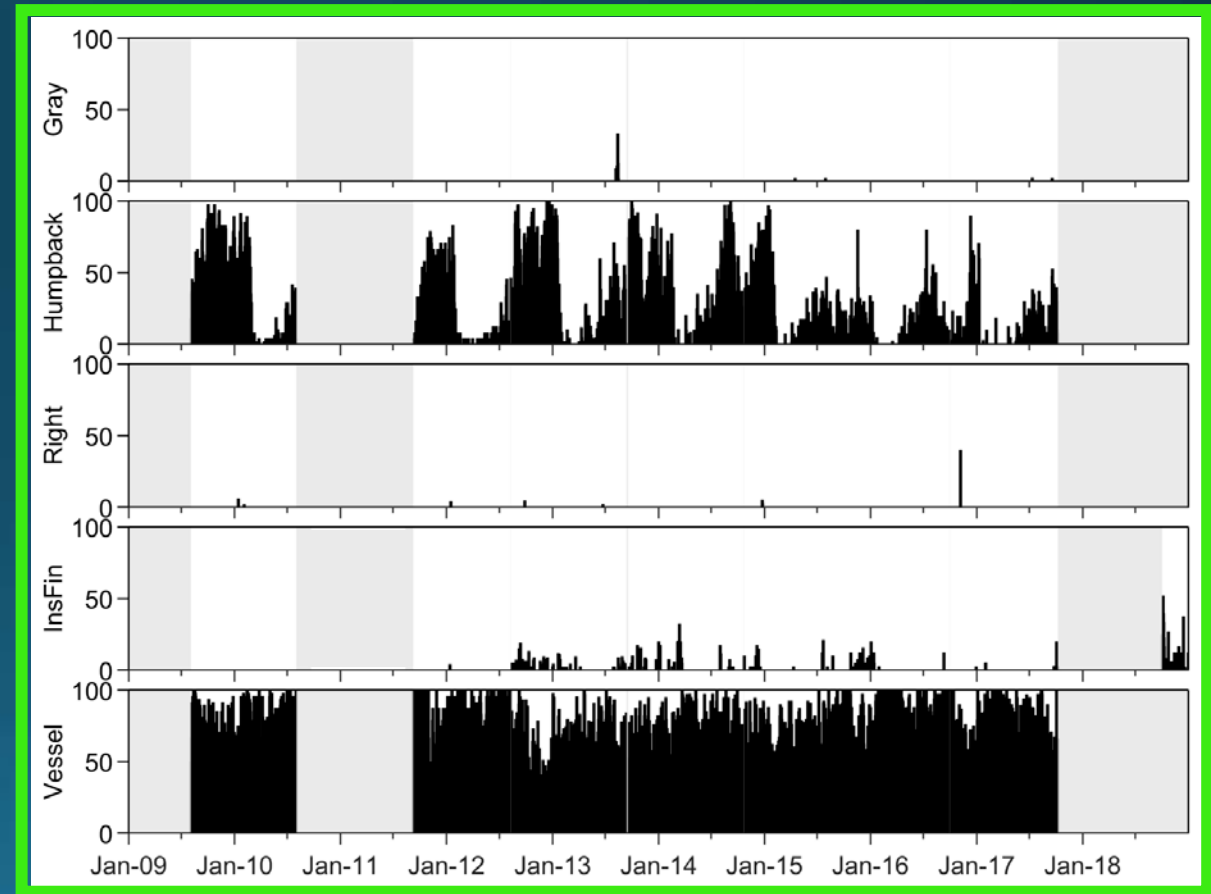


BC proportion on the SE Bering has decreased, stayed constant in N. Bering

# Aleutian Passes

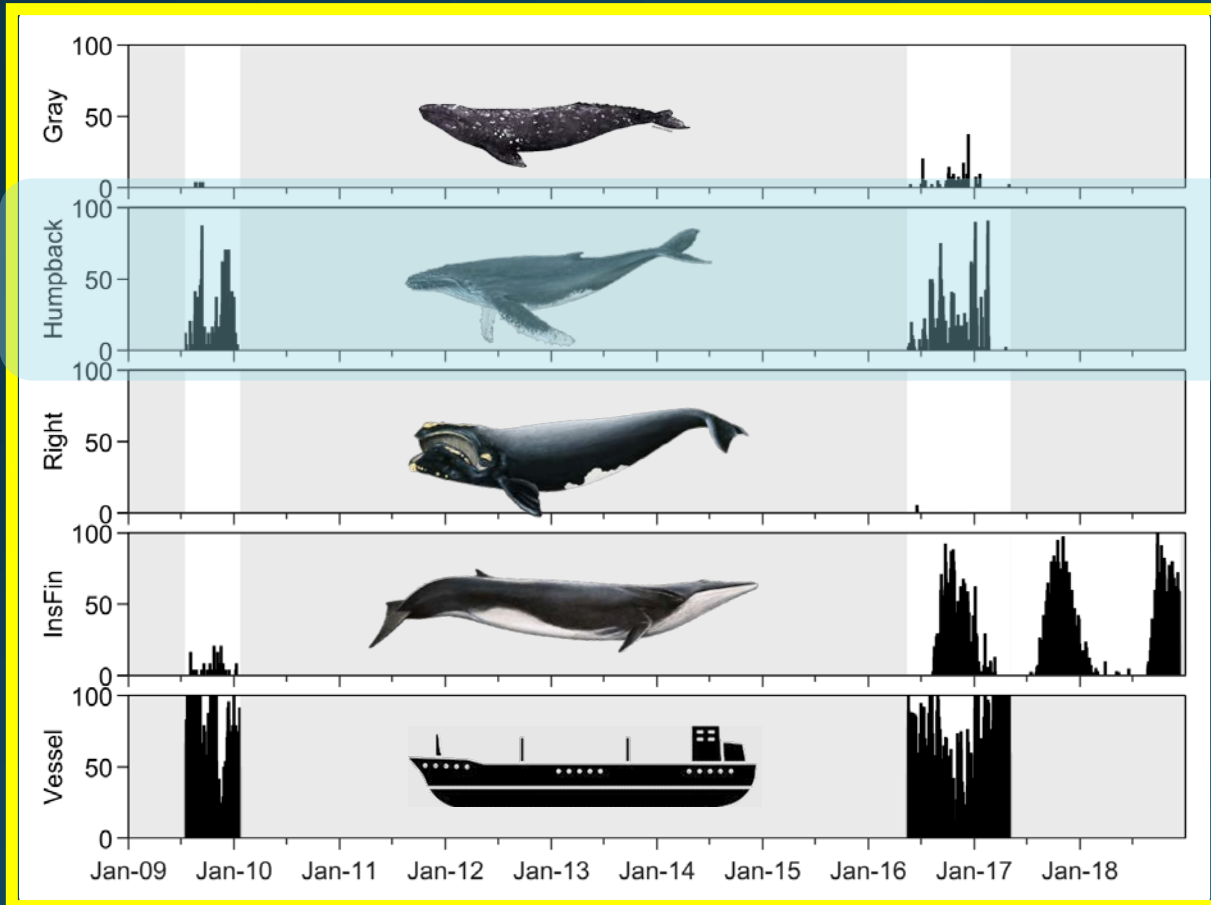
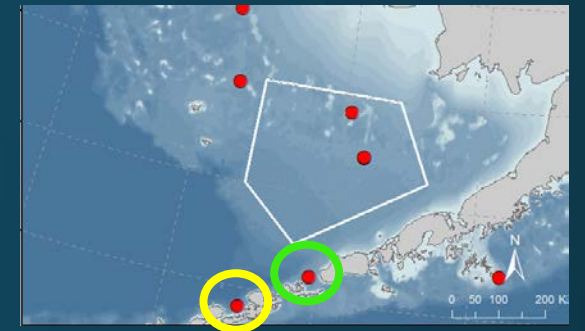


Umnak Pass

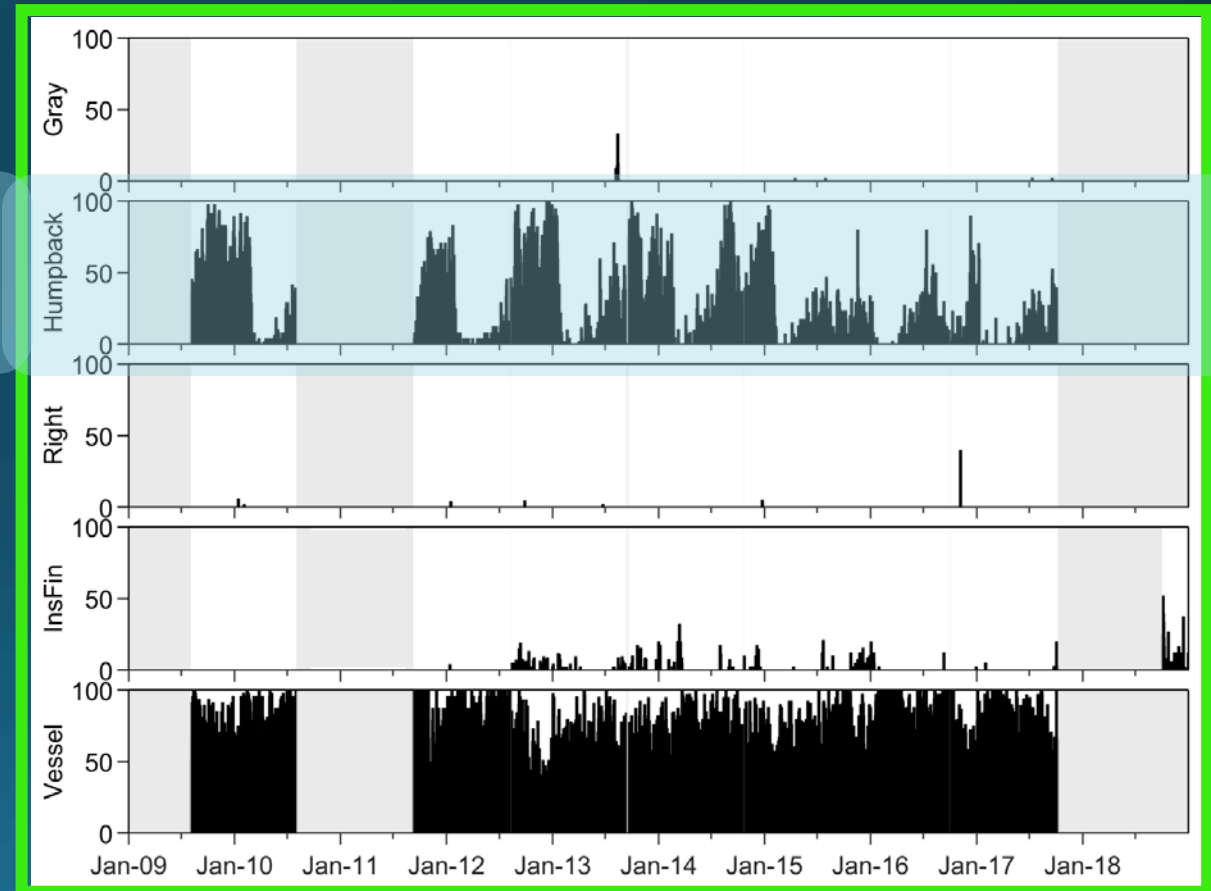


Unimak Pass

# Aleutian Passes

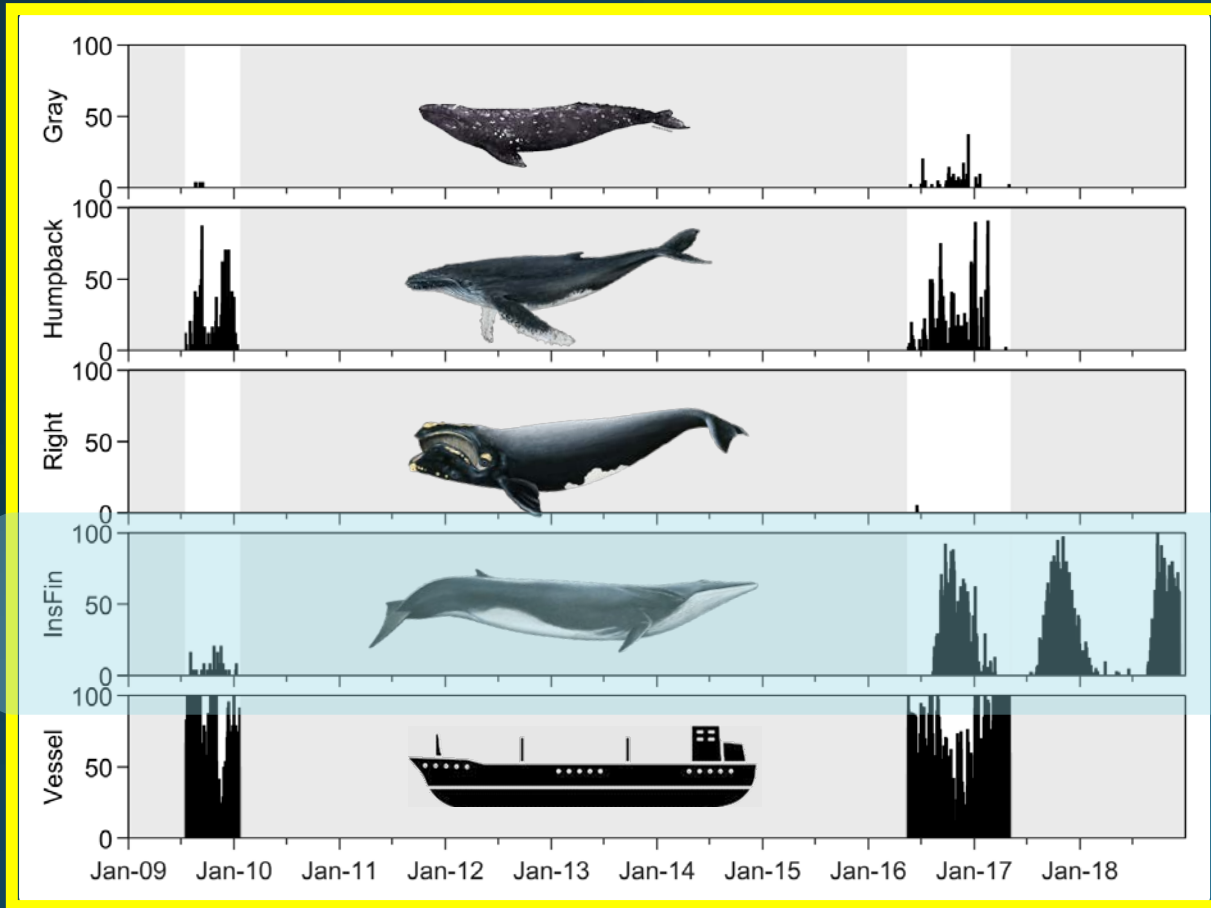
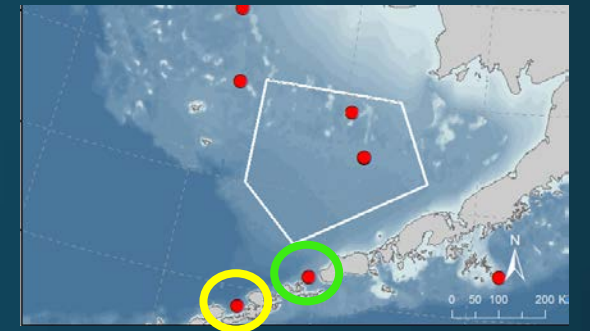


Umnak Pass

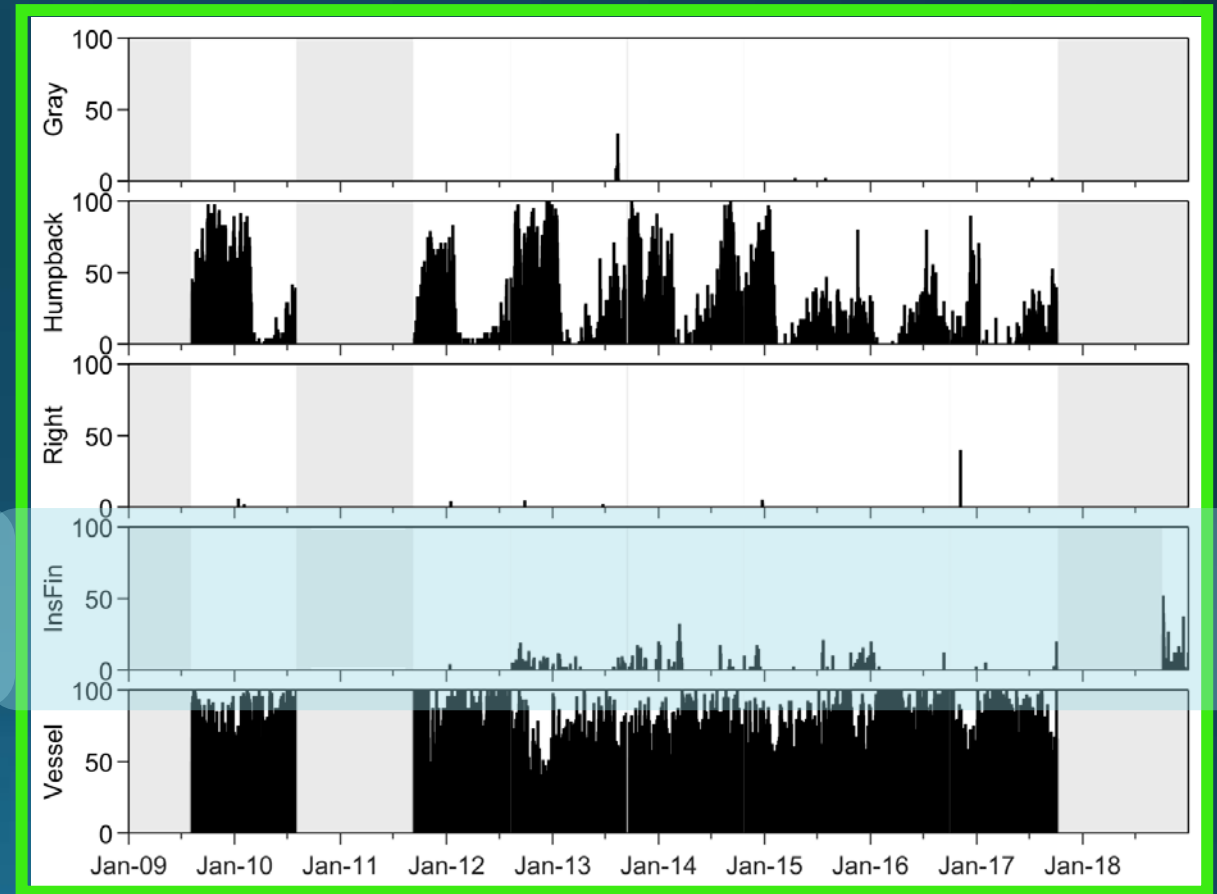


Unimak Pass

# Aleutian Passes



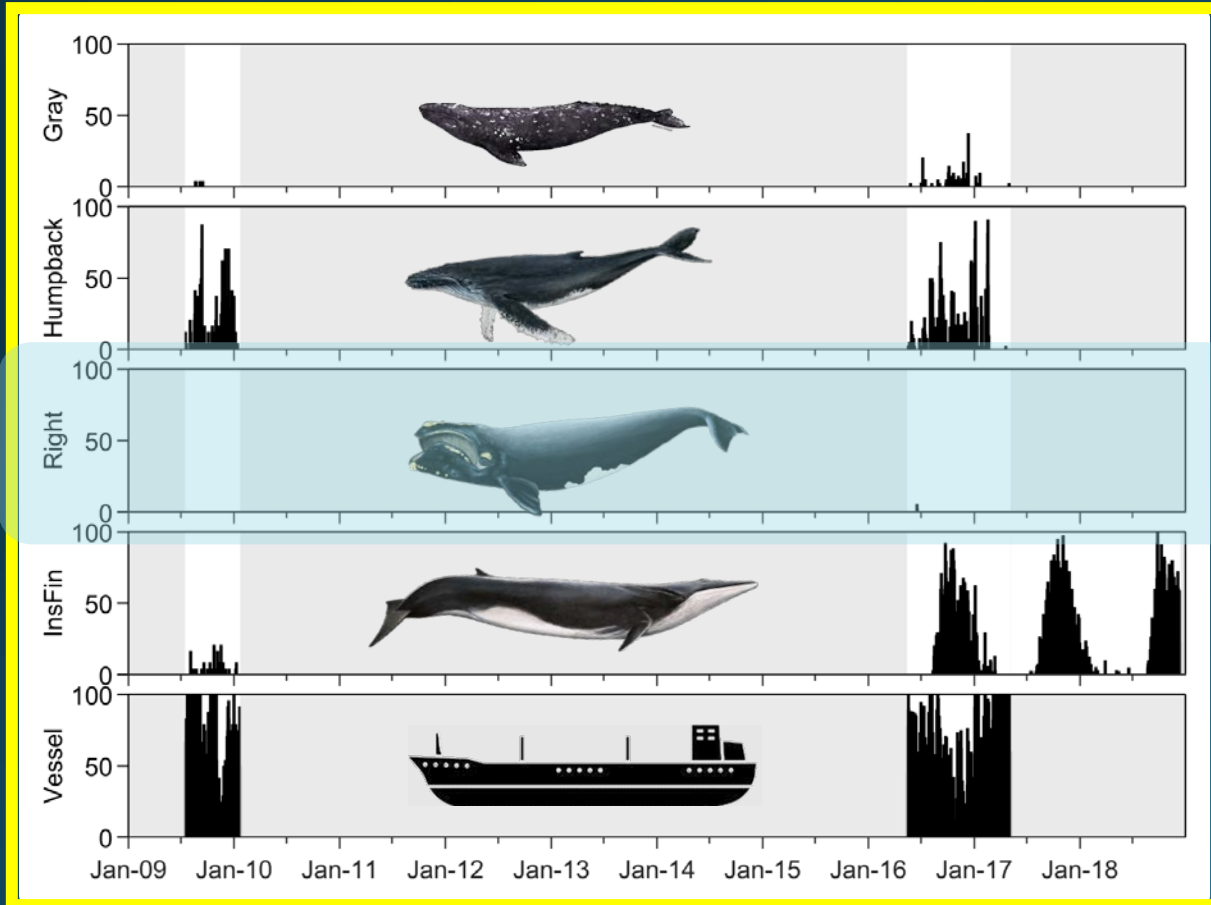
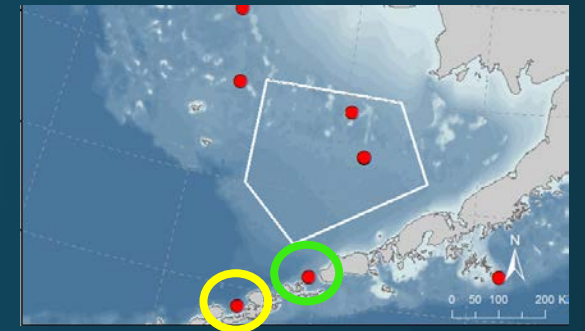
Umnak Pass



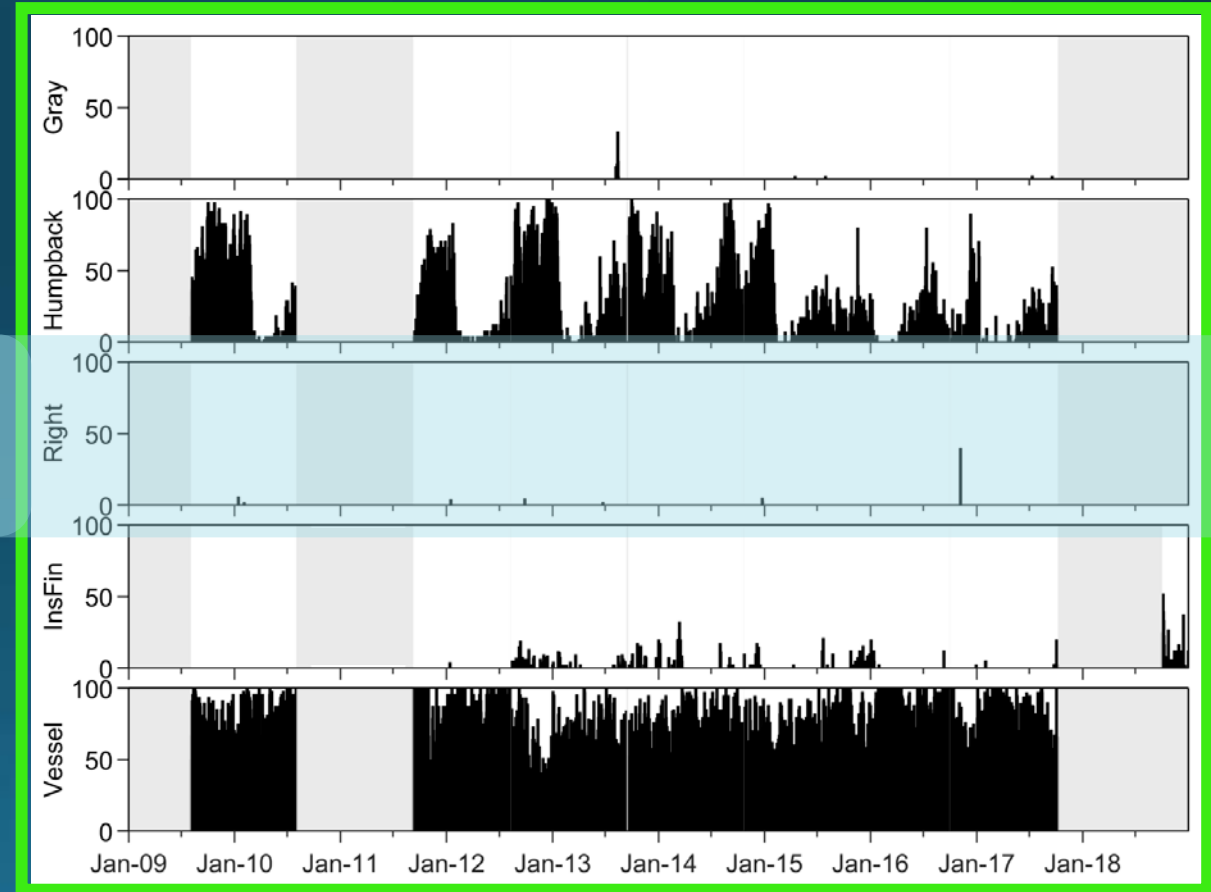
Unimak Pass



# Aleutian Passes

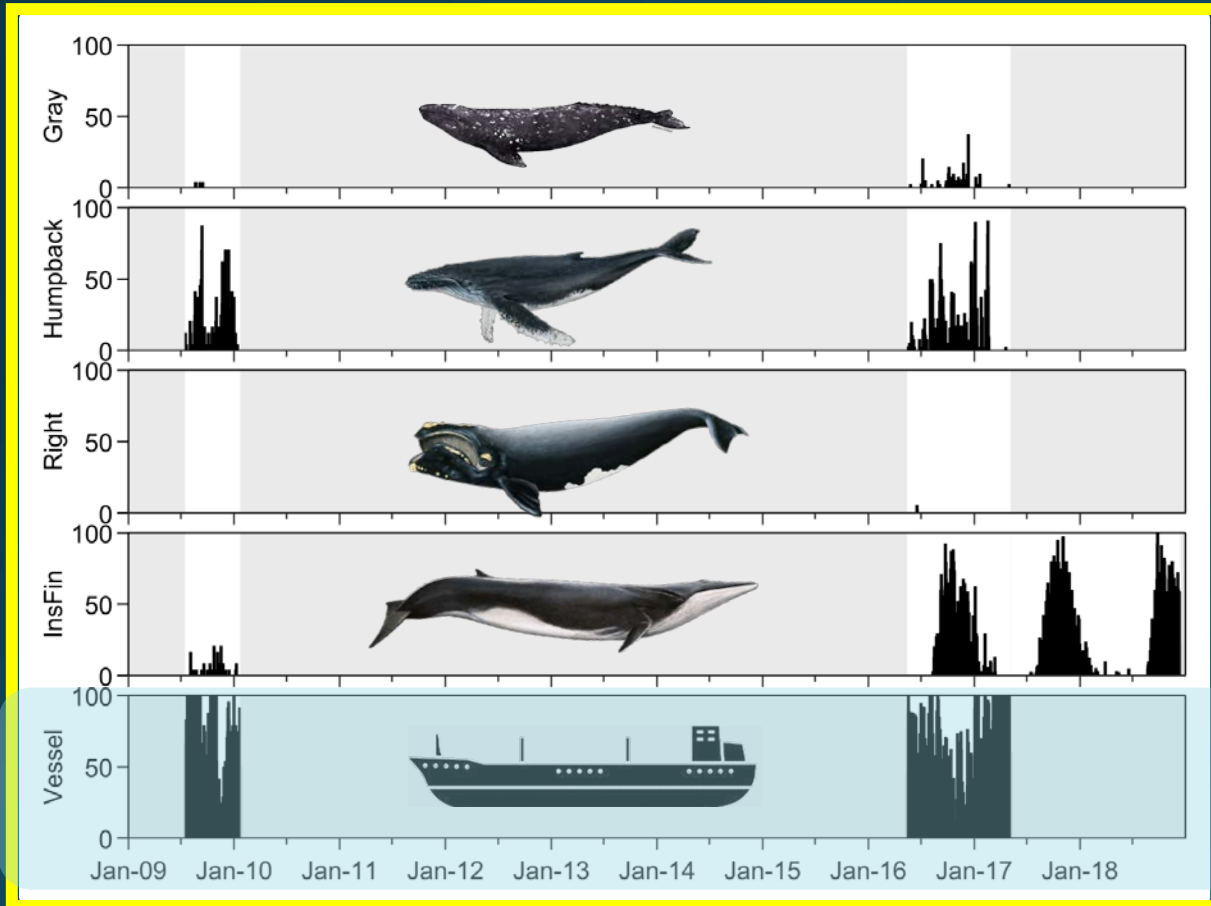
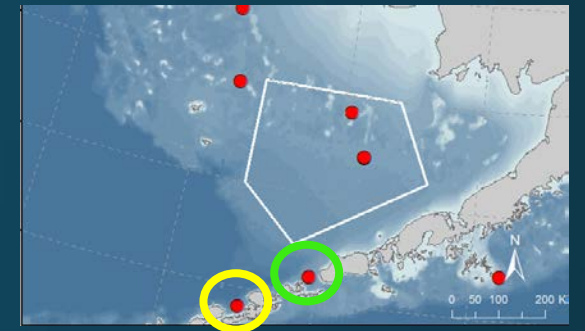


Umnak Pass

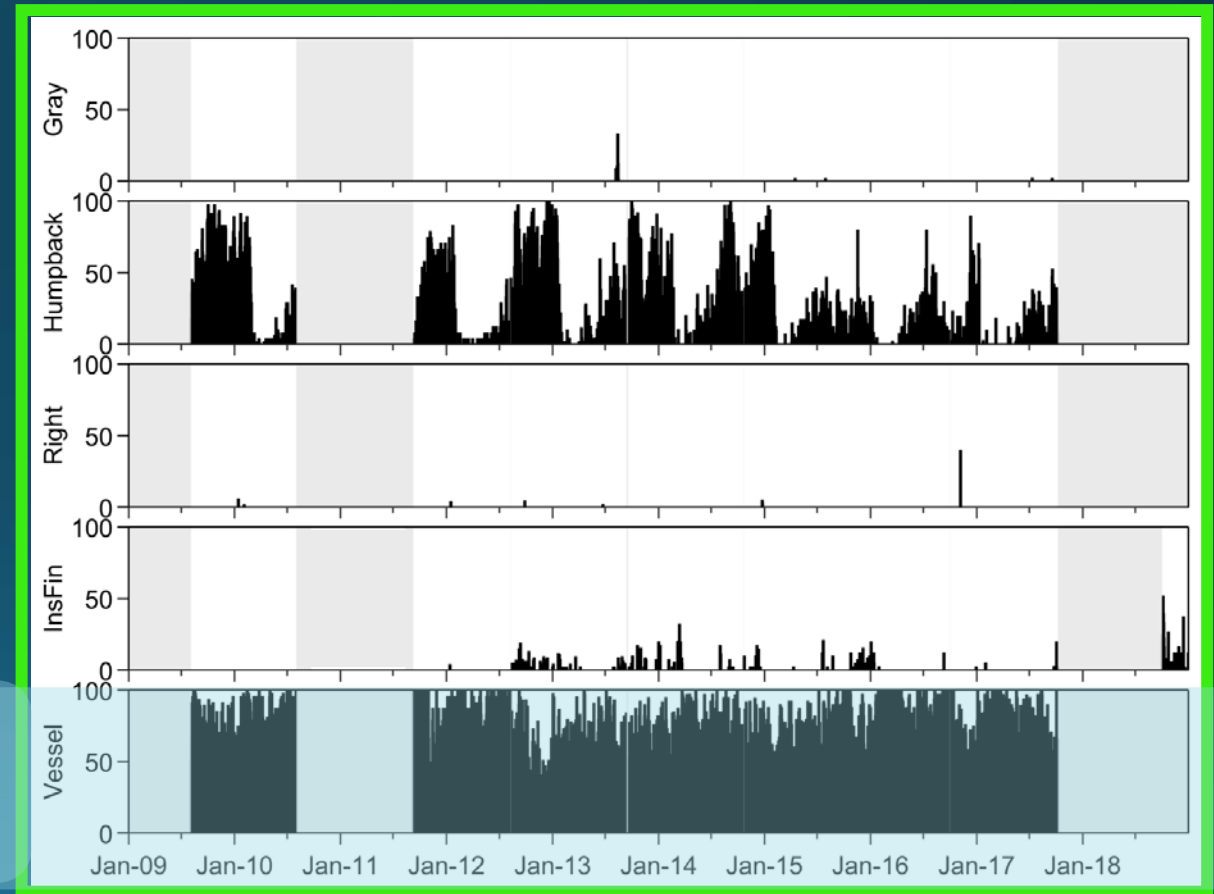


Unimak Pass

# Aleutian Passes



Umnak Pass



Unimak Pass

# Summary

Thanks to:

- Ice associated species (bowheads/walrus)
  - Shifting north w/ice edge
  - Overwintering in Chukchi
  - But bowheads reversing trend?
- Ice avoidant species (humpbacks/rights/fins)
  - Shifting north in open water season
  - Evidence of overwintering in Bering
- Gray whales showing decrease since 2017



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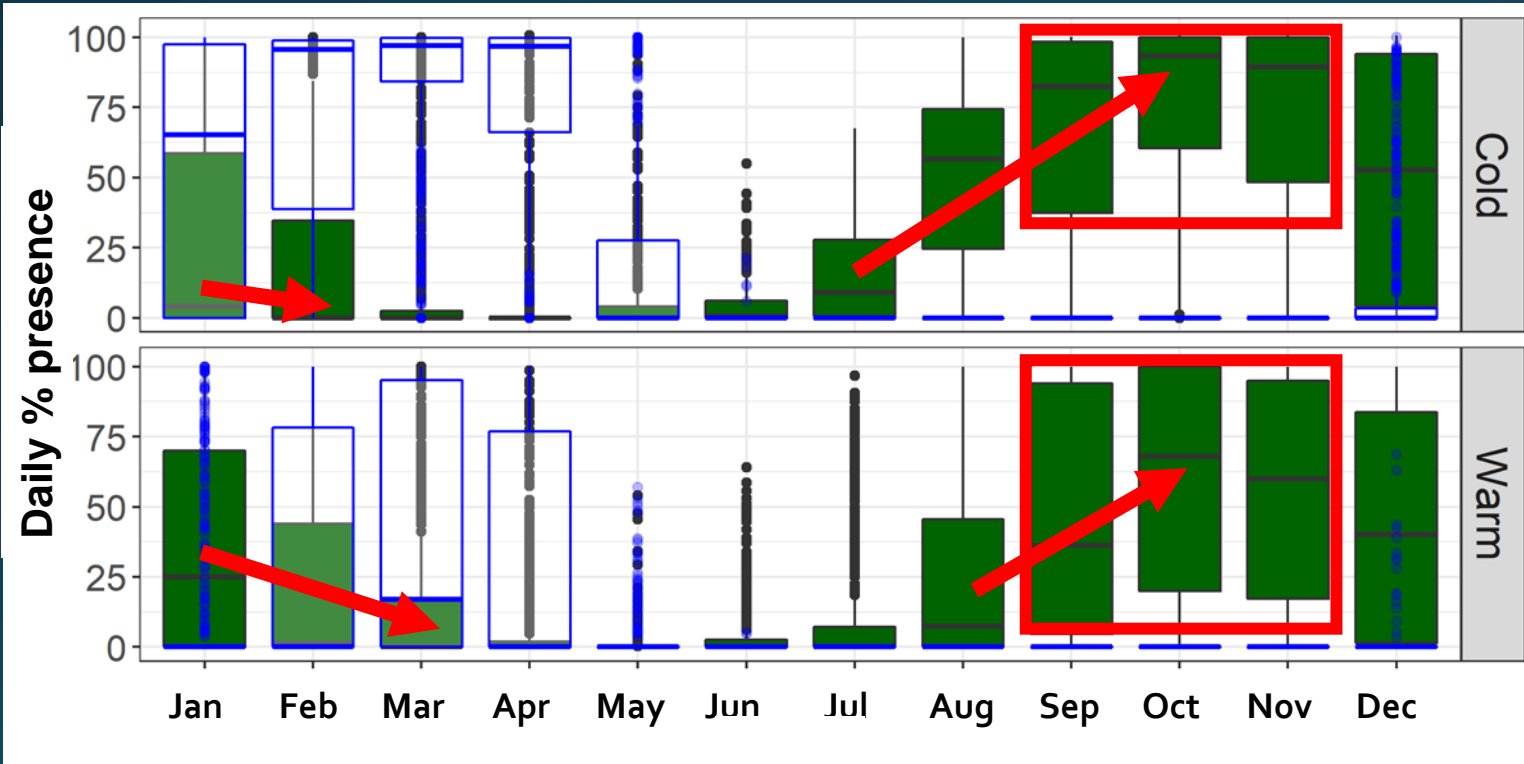






# Fin whales

Cold (2009-2013) vs. Warm (2014-2018) years



Seasonal occurrence peak starts later, ends later, and has higher variance