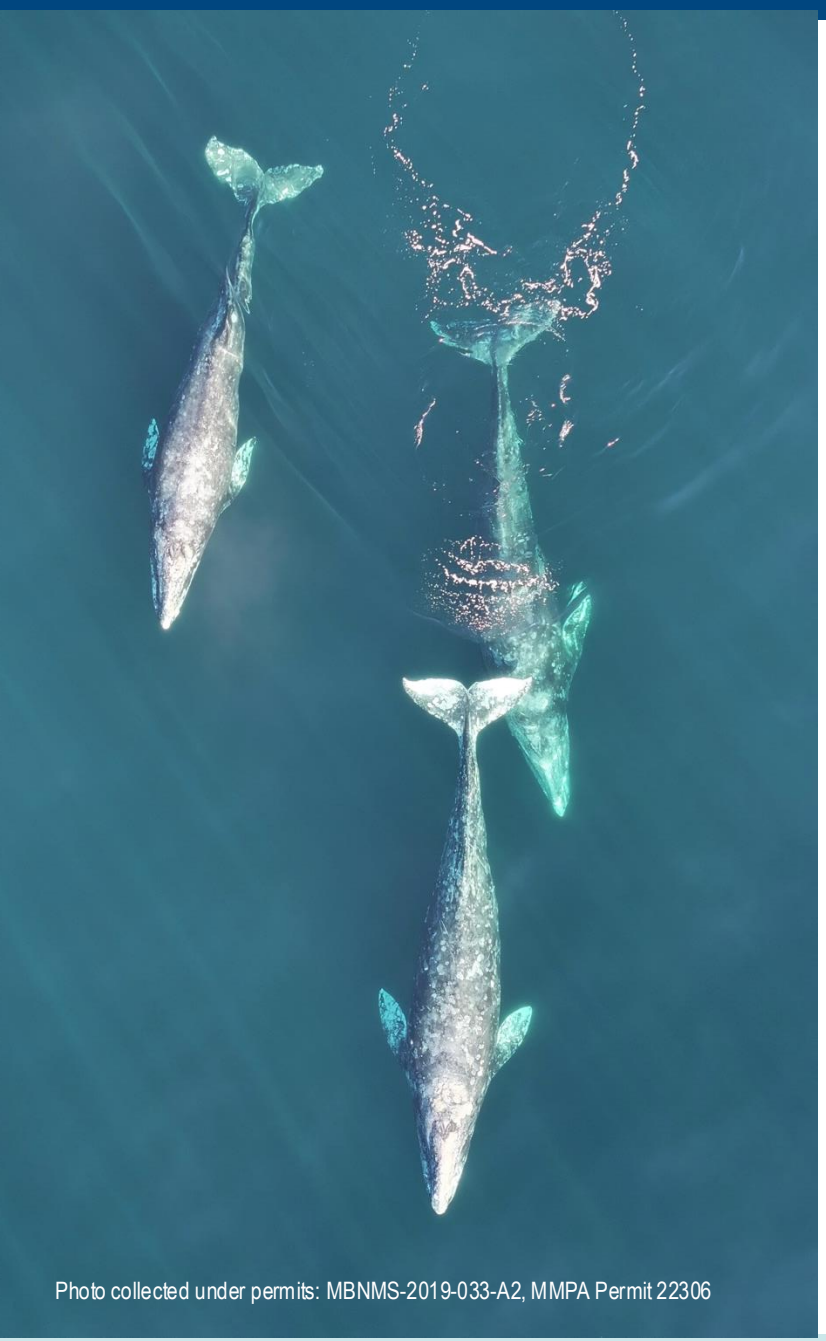


Photo collected under permits: MBNMS-2019-033-A2, MMPA Permit 22306

NOAA FISHERIES

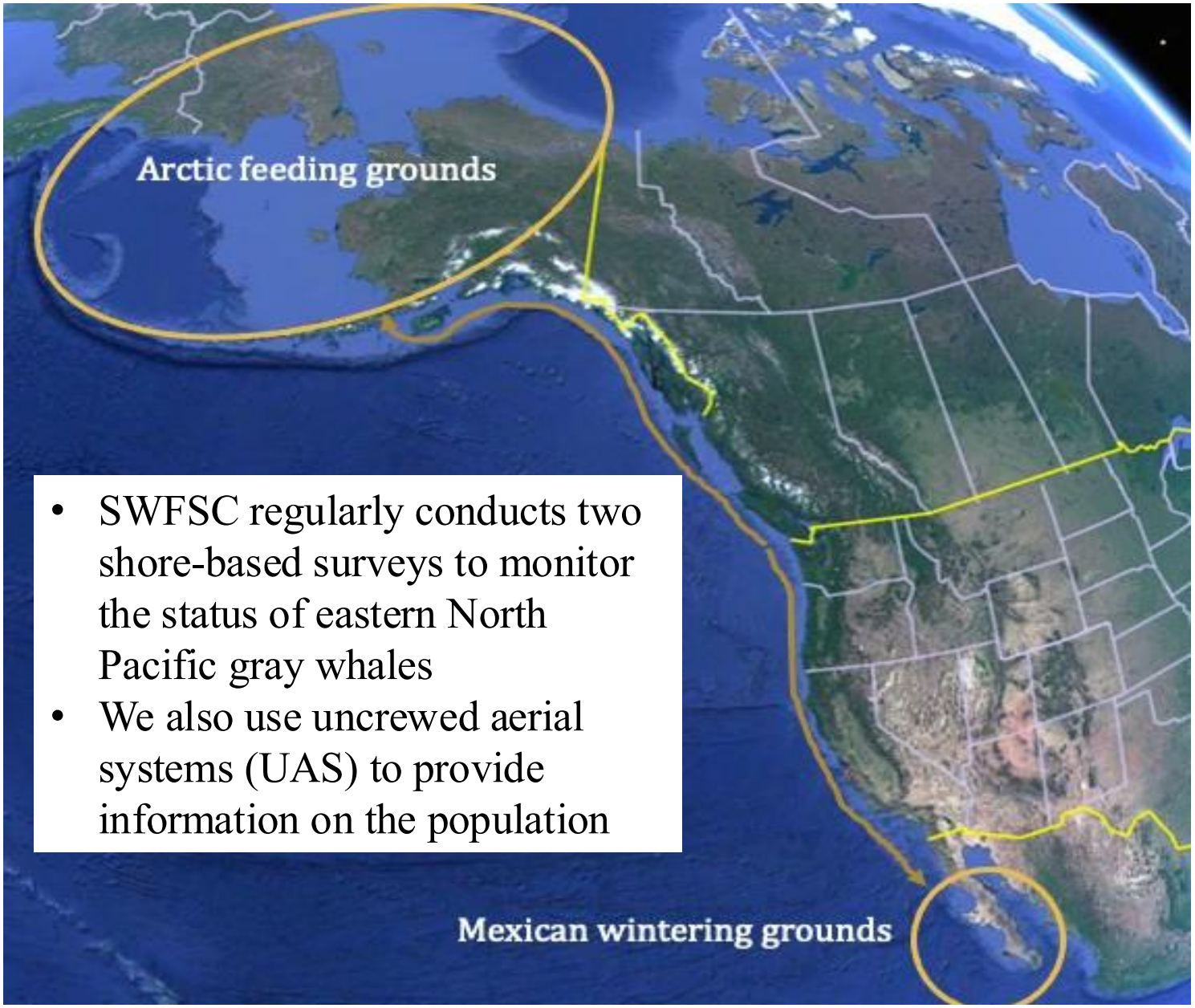
Monitoring the status of eastern North Pacific gray whales

Aimée Lang (presenter),

Tomo Eguchi, Trevor Joyce, and Dave Weller

Marine Mammal & Turtle Division

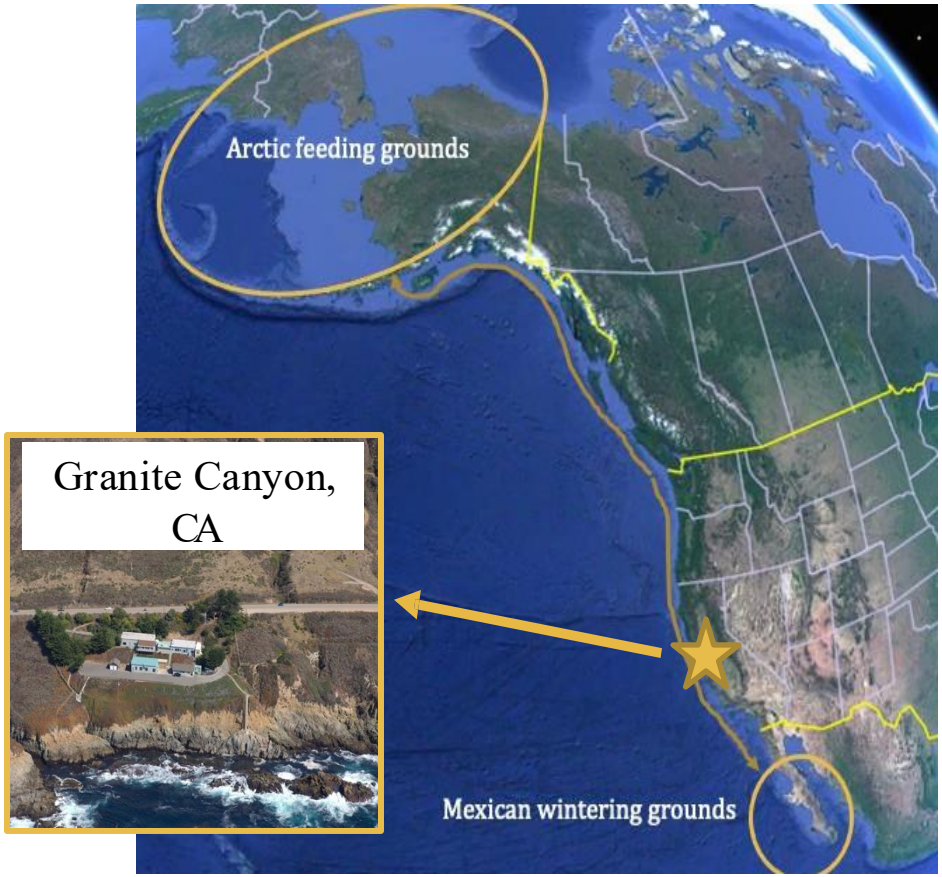
Southwest Fisheries Science Center



- SWFSC regularly conducts two shore-based surveys to monitor the status of eastern North Pacific gray whales
- We also use uncrewed aerial systems (UAS) to provide information on the population

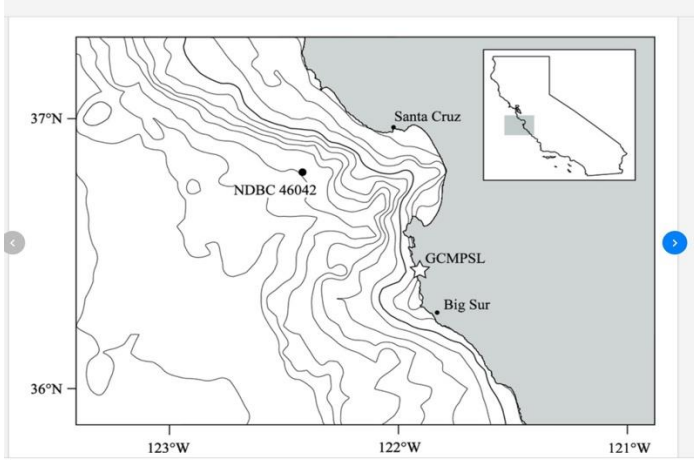
Shore-based surveys: Abundance Estimation (southward migration)

- Counts of gray whales migrating south between late December and mid-February
- Counts were first conducted in 1967/68
- Typically SWFSC has conducted counts in two of every five years; increased frequency recently

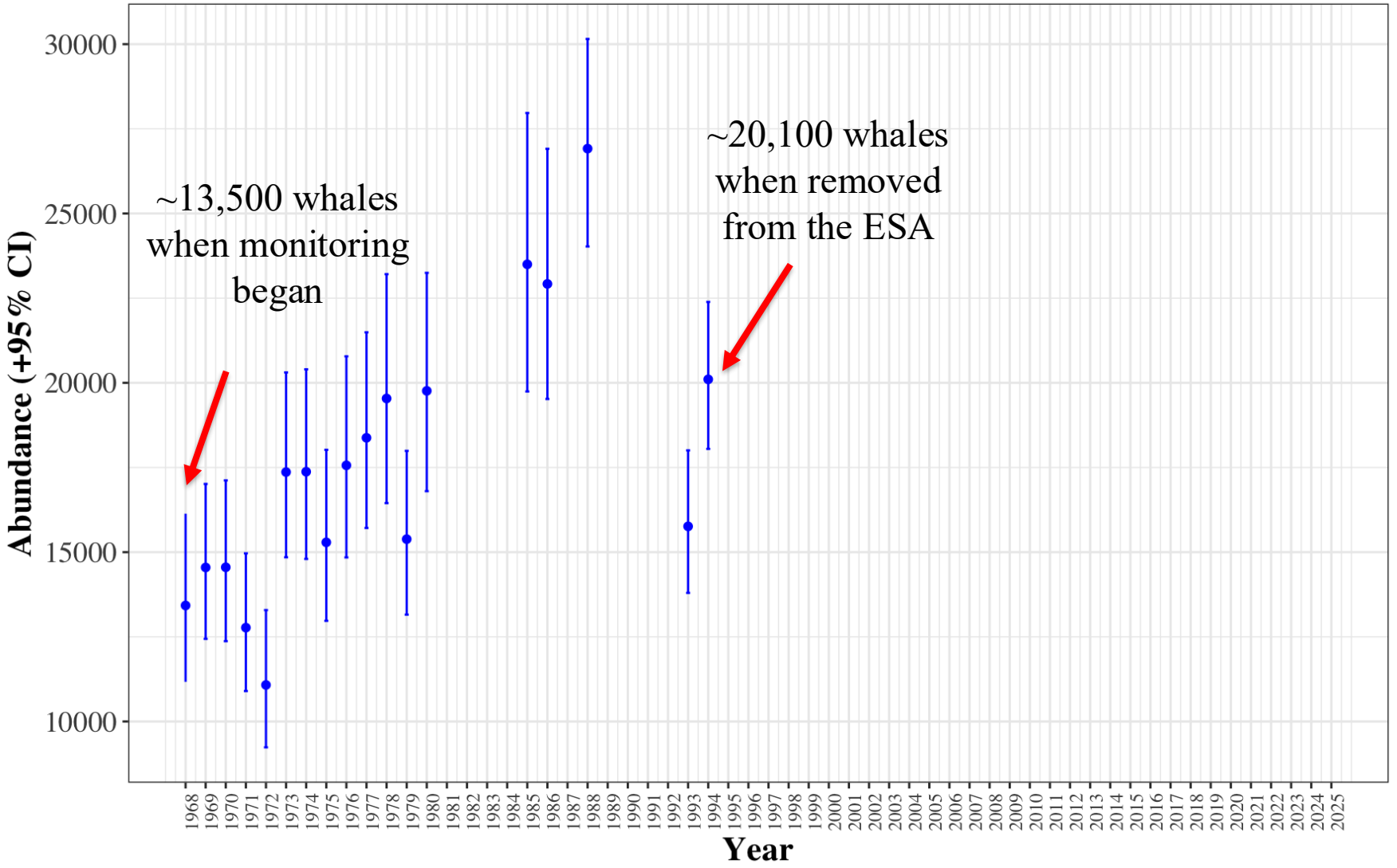


Shore-based surveys: Abundance Estimation (southward migration)

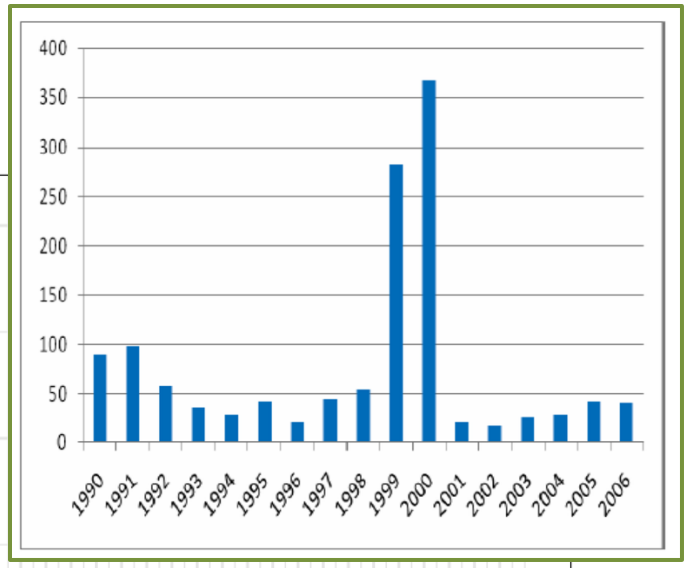
- Work in teams consisting of two observers counting whales by eye and hand-held binoculars
- Use specialized software to record location and number of whales as groups migrate through study area



ENP abundance:

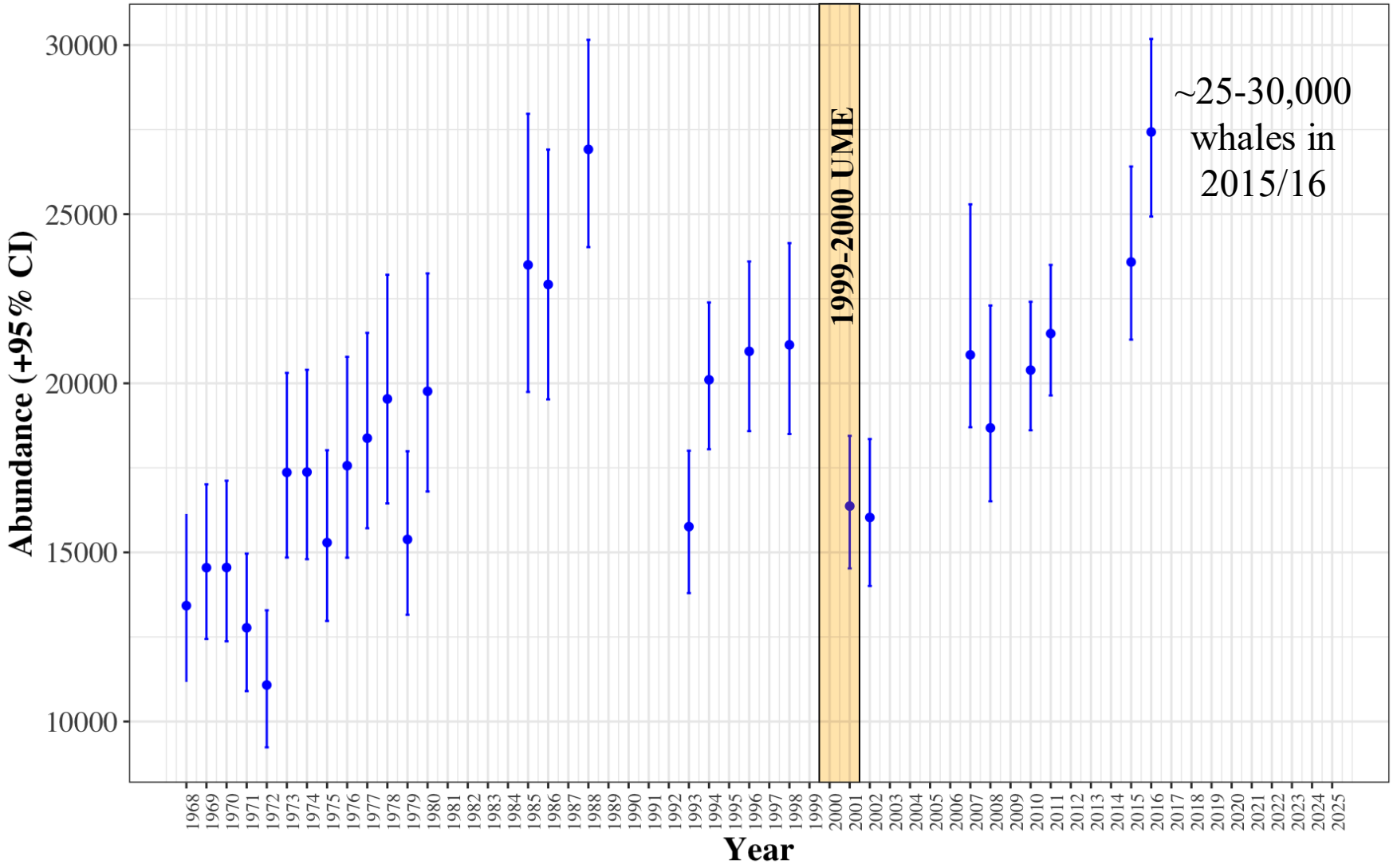


ENP abundance:

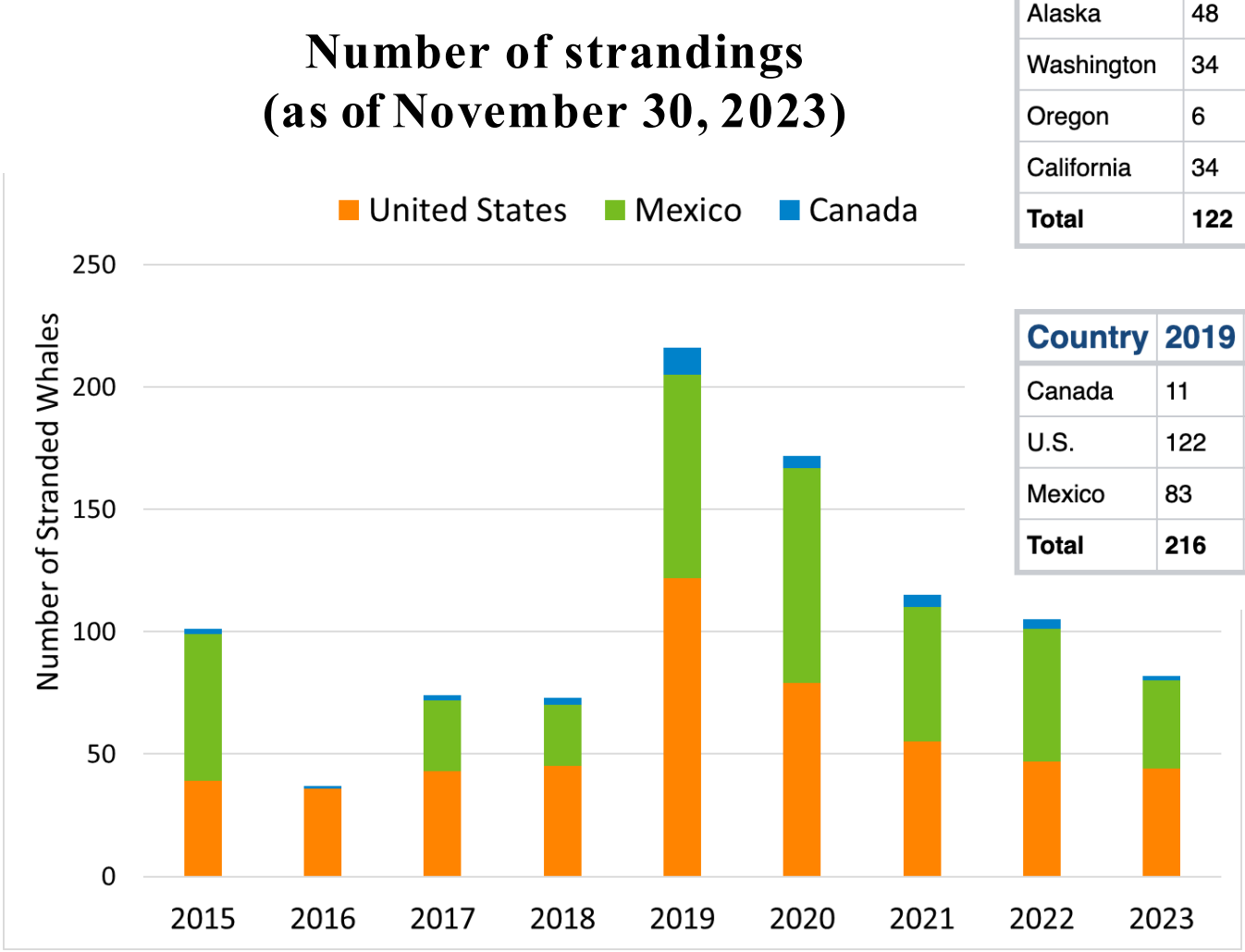


A UME is a stranding event that is unexpected and involves a significant die-off of a marine mammal population

ENP abundance:



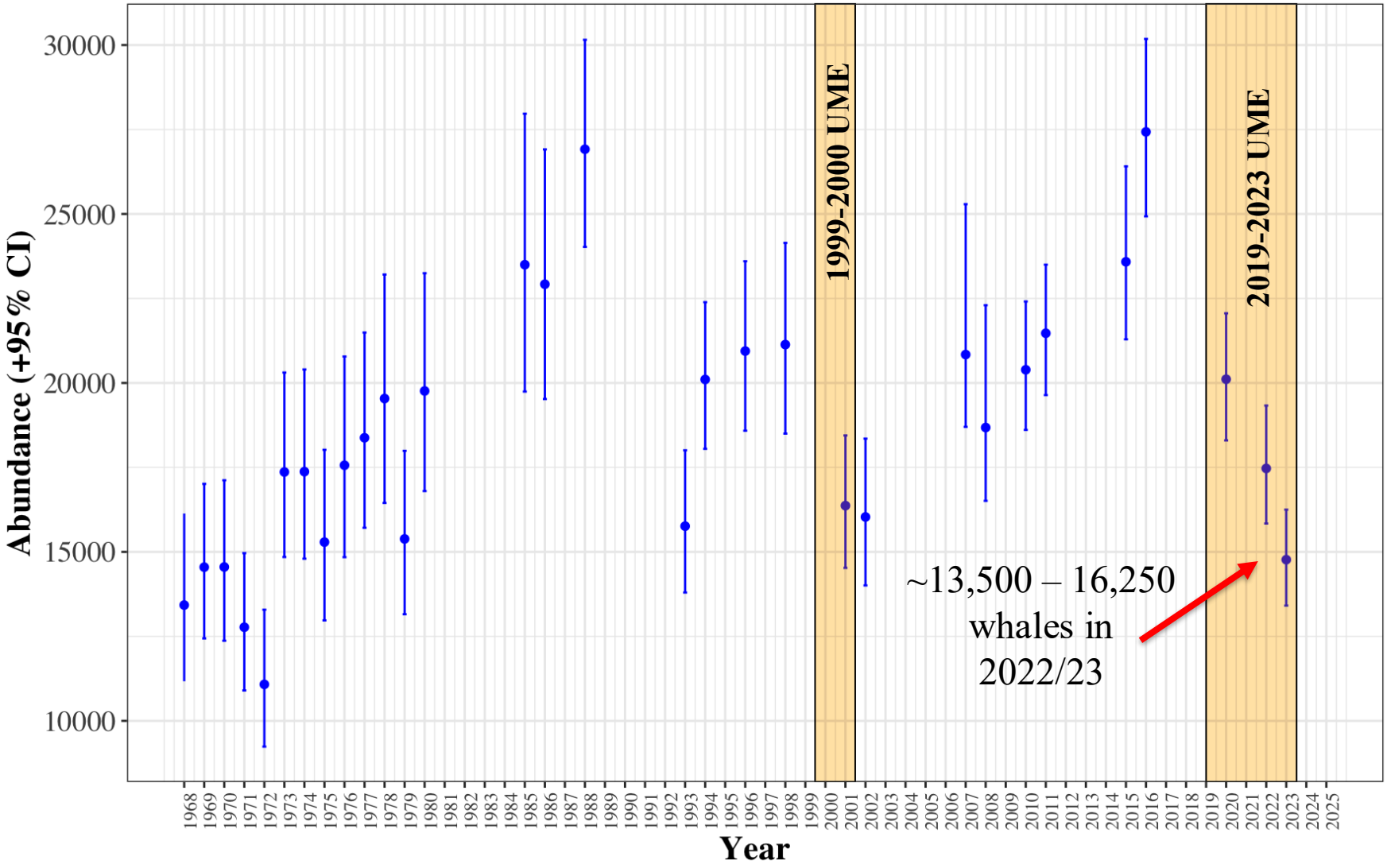
2019-2023 UME



U.S. State	2019	2020	2021	2022	2023
Alaska	48	45	24	18	11
Washington	34	13	9	15	13
Oregon	6	3	3	4	6
California	34	18	19	10	14
Total	**122**	**79**	**55**	**47**	**44**

Country	2019	2020	2021	2022	2023	Total
Canada	11	5	5	4	2	27
U.S.	122	79	55	47	44	347
Mexico	83	88	55	54	36	316
Total	**216**	**172**	**115**	**105**	**82**	**690**

ENP abundance:



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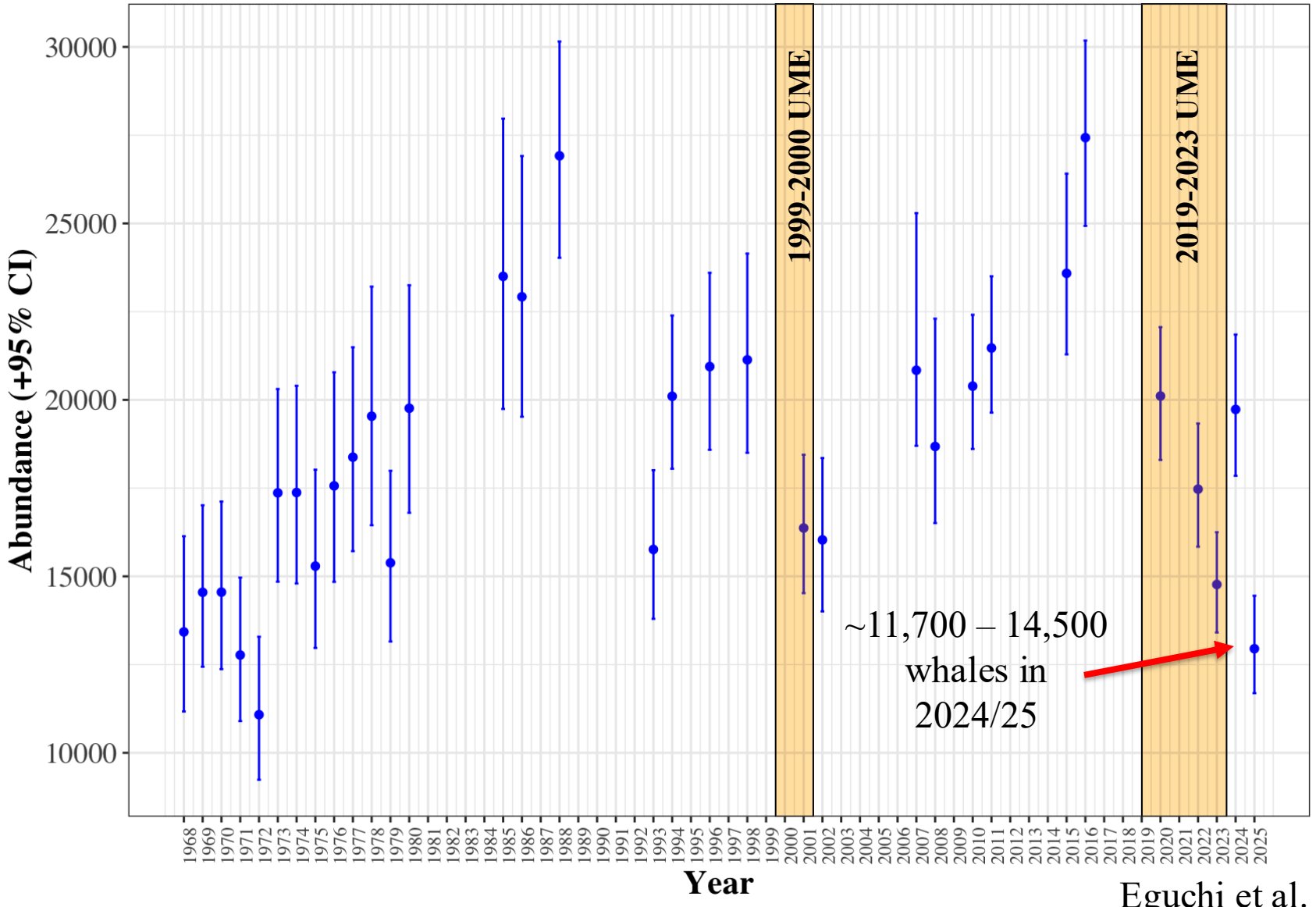
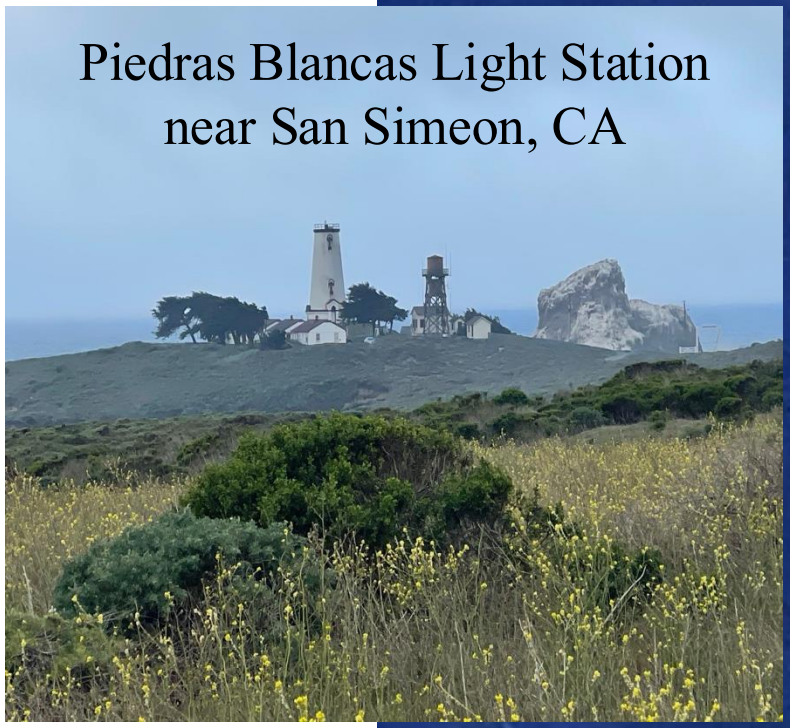


Eguchi et al. 2025



Arctic feeding grounds

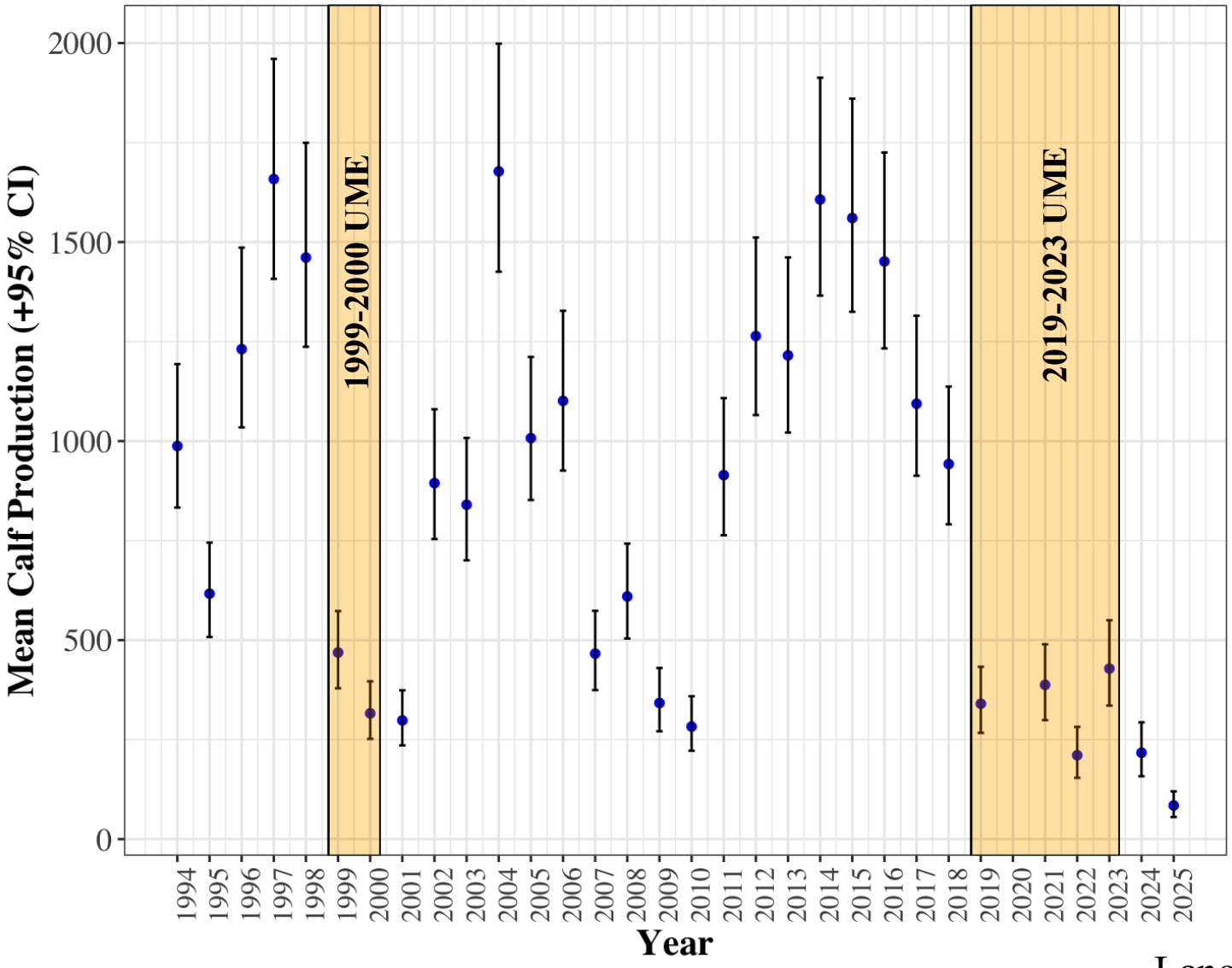
Mexican wintering grounds

NOAA FISHERIES

Shore-based surveys: Calf production (northward migration)

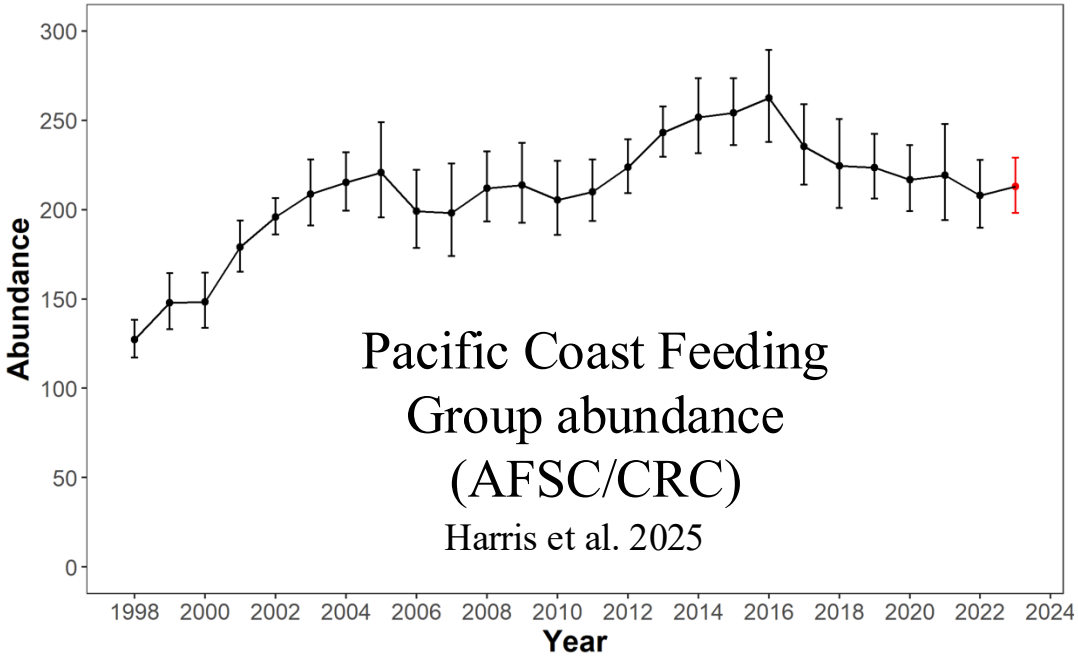
- We count mother-calf pairs as they migrate north past our field station between late March and the end of May
- We have conducted these counts annually since 1994 (except 2020 due to COVID)

ENP calf production:



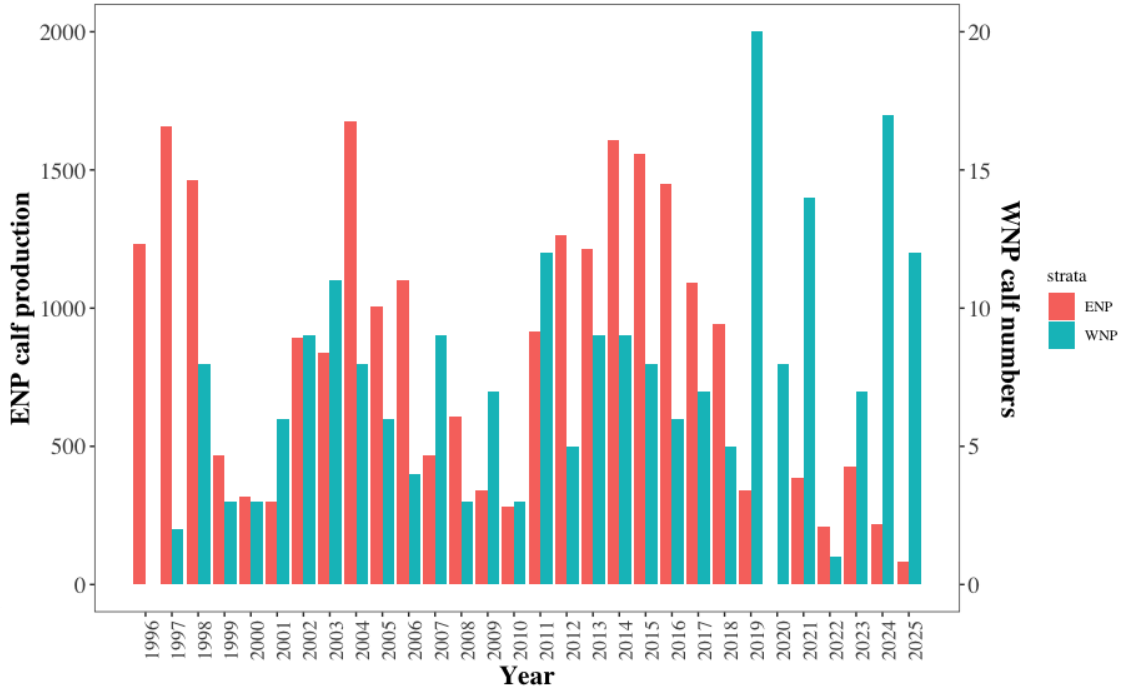
Lang et al. 2025

Comparison to trends observed for whales using other feeding grounds:



Pacific Coast Feeding Group abundance (AFSC/CRC)

Harris et al. 2025



Western North Pacific stock calf production (Alexander Burdin, Russian Gray Whale Project)

Burdin et al. 2024

What is driving the variation in abundance and calf production in the eastern North Pacific gray whale stock?

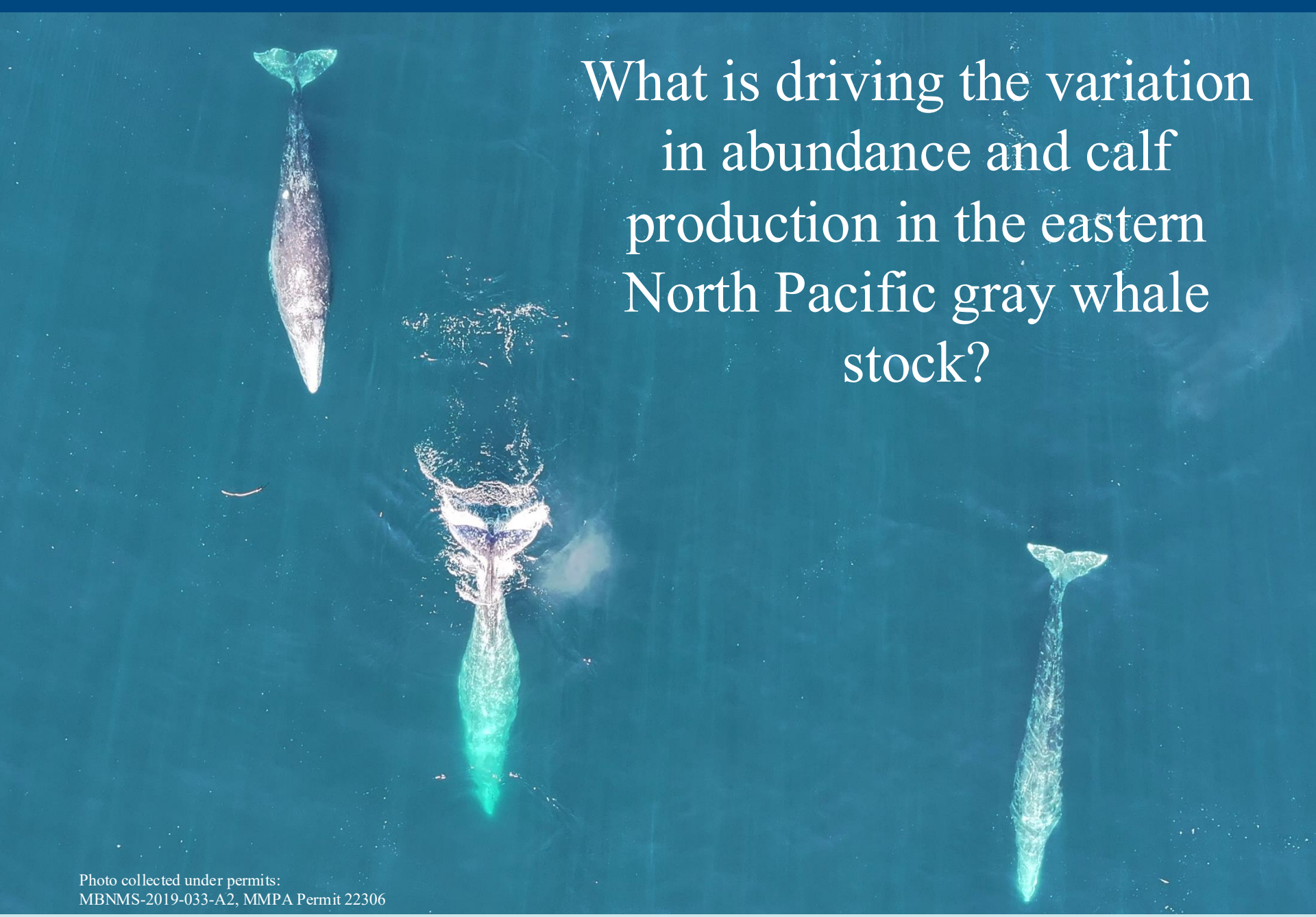
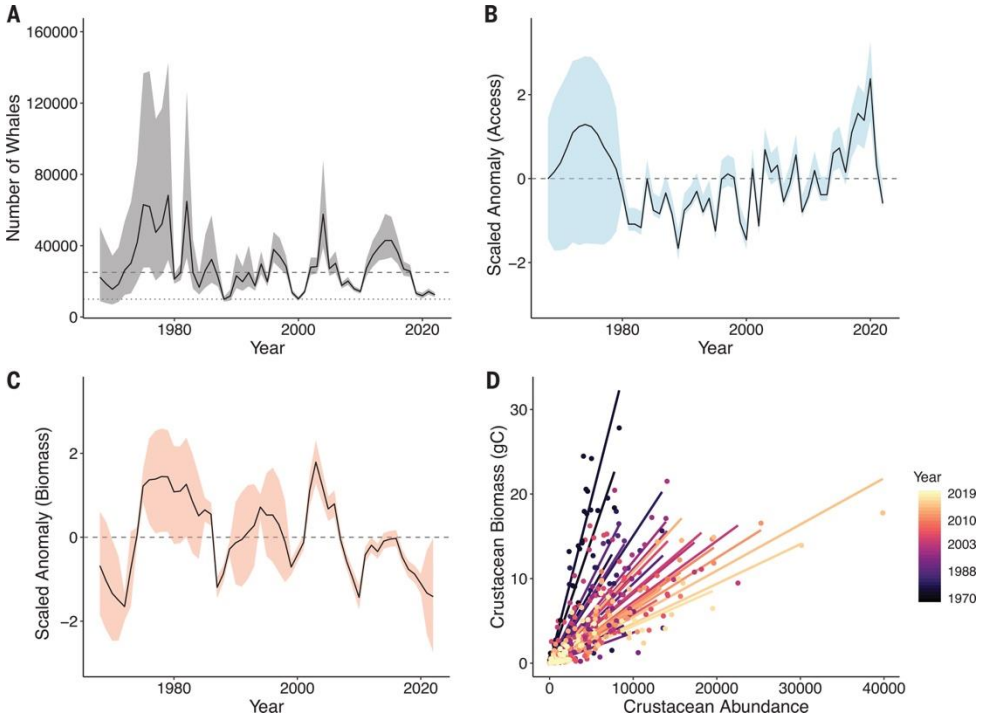


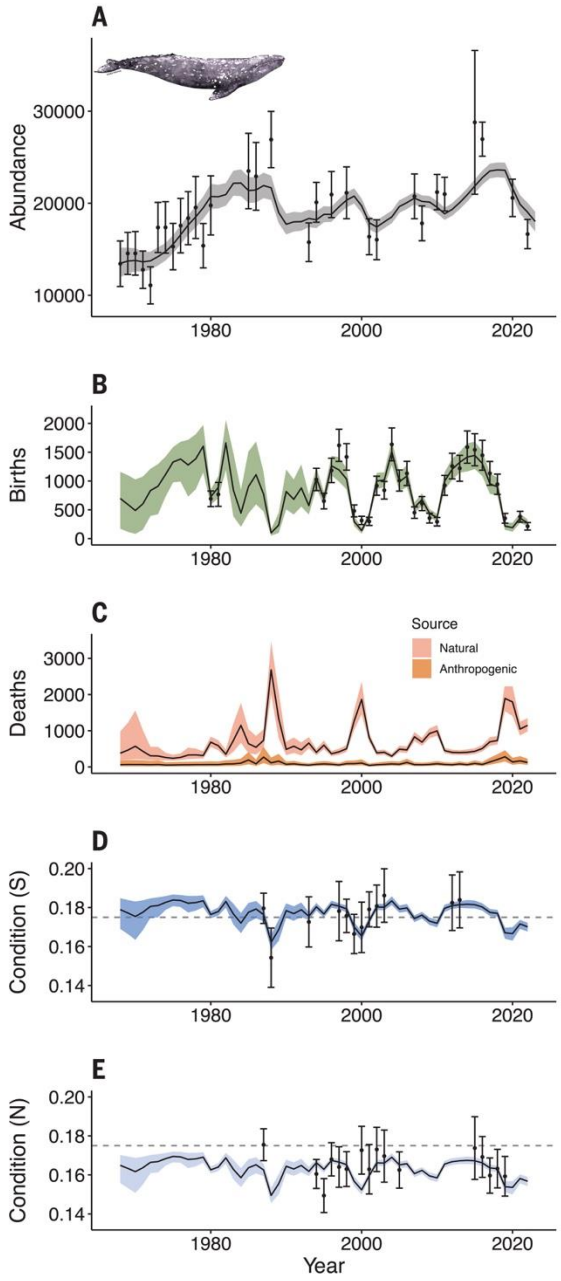
Photo collected under permits:
MBNMS-2019-033-A2, MMPA Permit 22306

POPULATION DYNAMICS

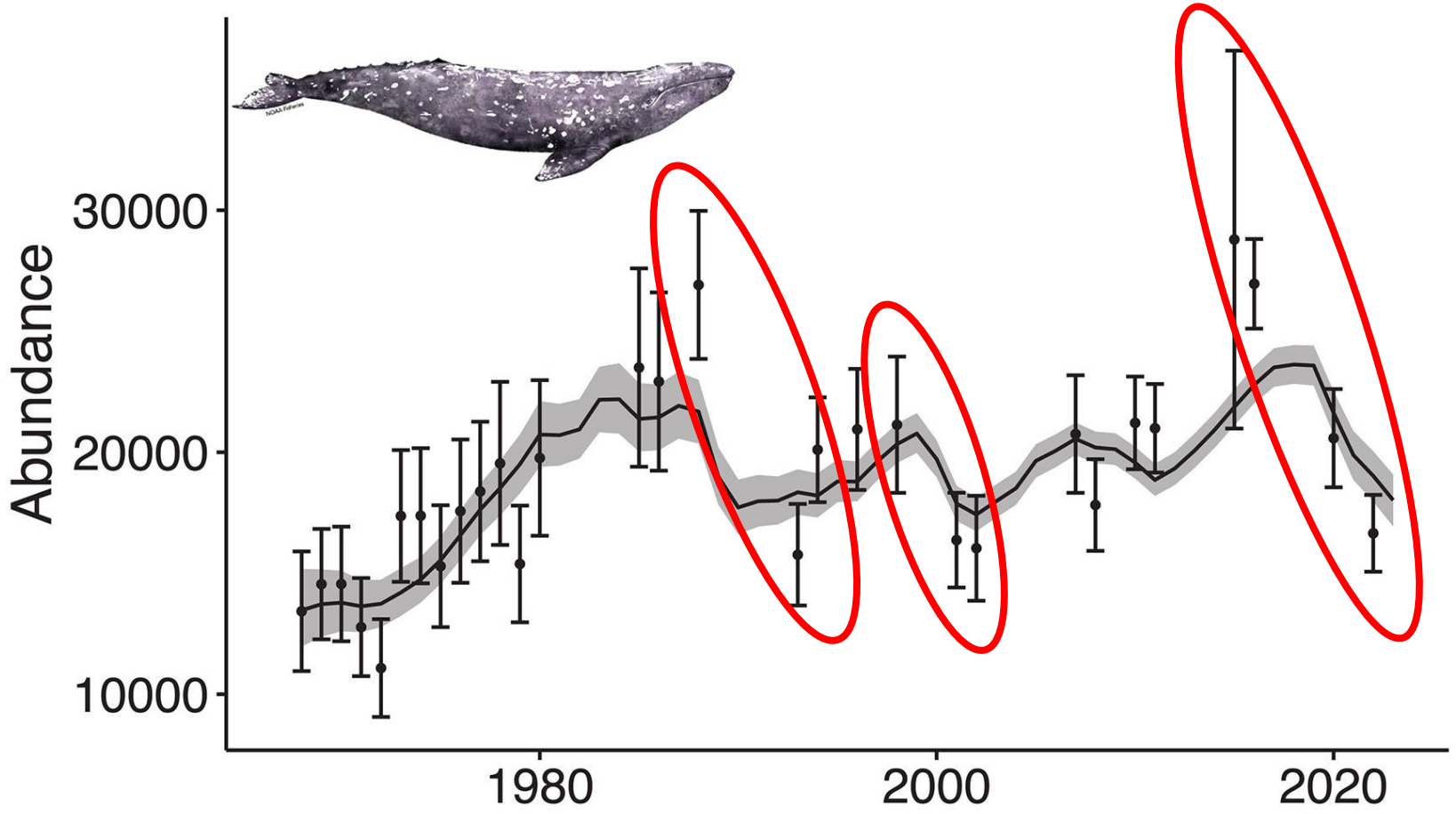
Boom-bust cycles in gray whales associated with dynamic and changing Arctic conditions

Joshua D. Stewart[1]*, Trevor W. Joyce[2,3], John W. Durban[3,4], John Calambokidis[5], Deborah Fauquier[6], Holly Fearnbach[4], Jacqueline M. Grebmeier[7], Morgan Lynn[3], Manfredi Manizza[8], Wayne L. Perryman[3], M. Tim Tinker[9,10], David W. Weller[3]



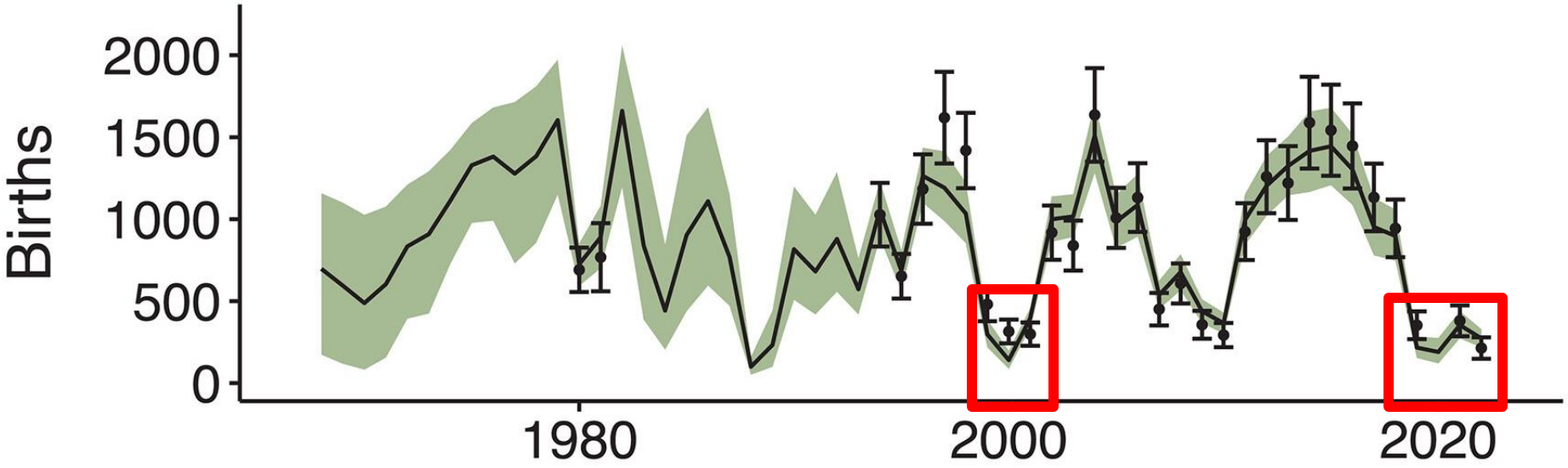


Population declines are associated with high sea ice cover and low benthic prey availability



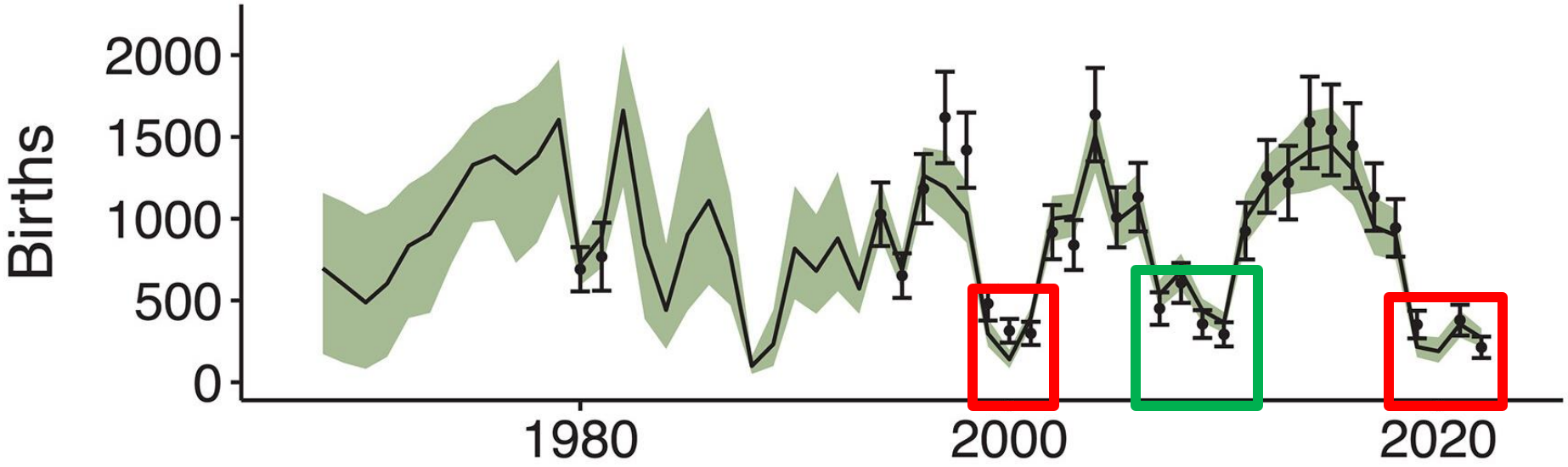
Stewart et al. 2023

Periods of low calf production during the UMEs are also associated with high sea ice cover and low benthic prey availability



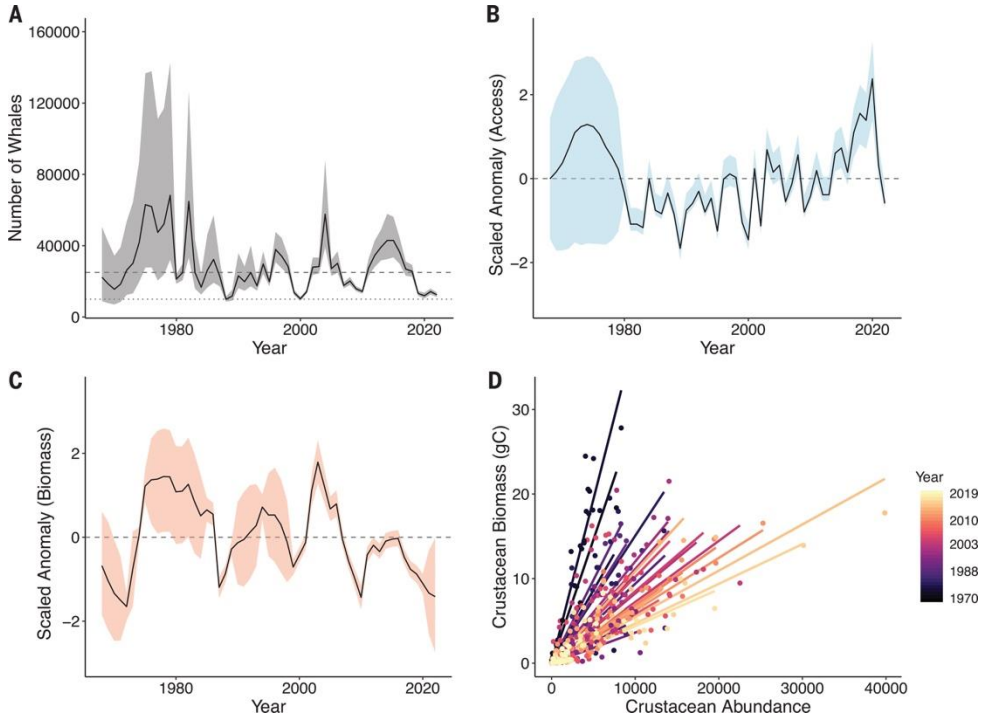
Stewart et al. 2023

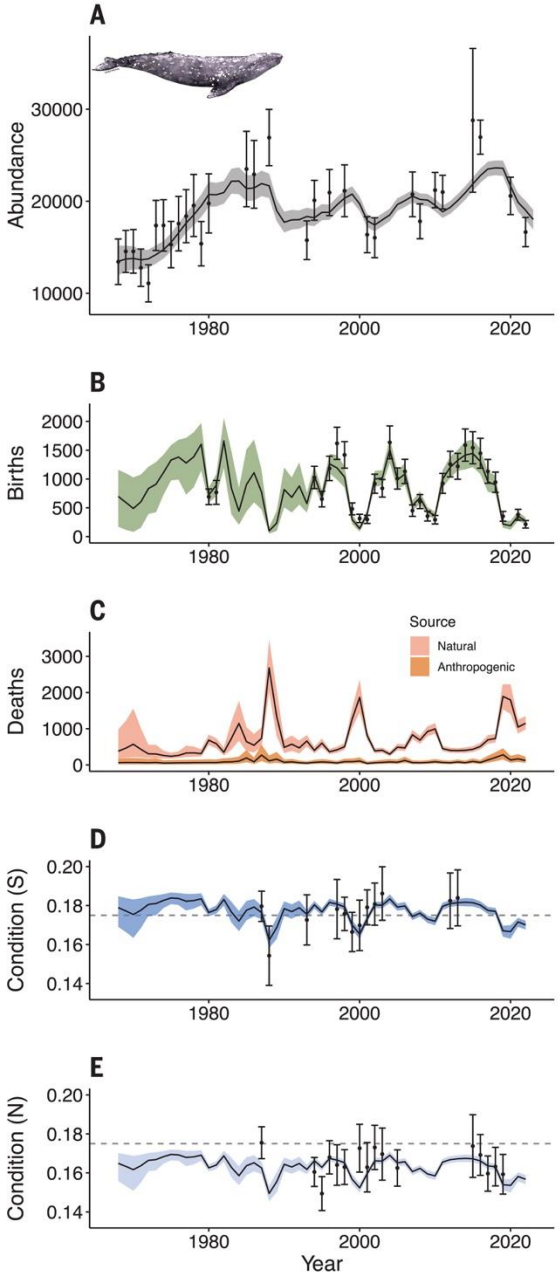
Period of low calf production 2006-2010 was associated with low prey availability but average ice access



Stewart et al. 2023

These results point to the value of long-term data series and integration of multiple data types to elucidate patterns in the population dynamics of these whales





NOAA FISHERIES

Assessing the accuracy and precision of group size estimates in a gray whale abundance survey using paired visual and Uncrewed Aerial System (UAS) observations

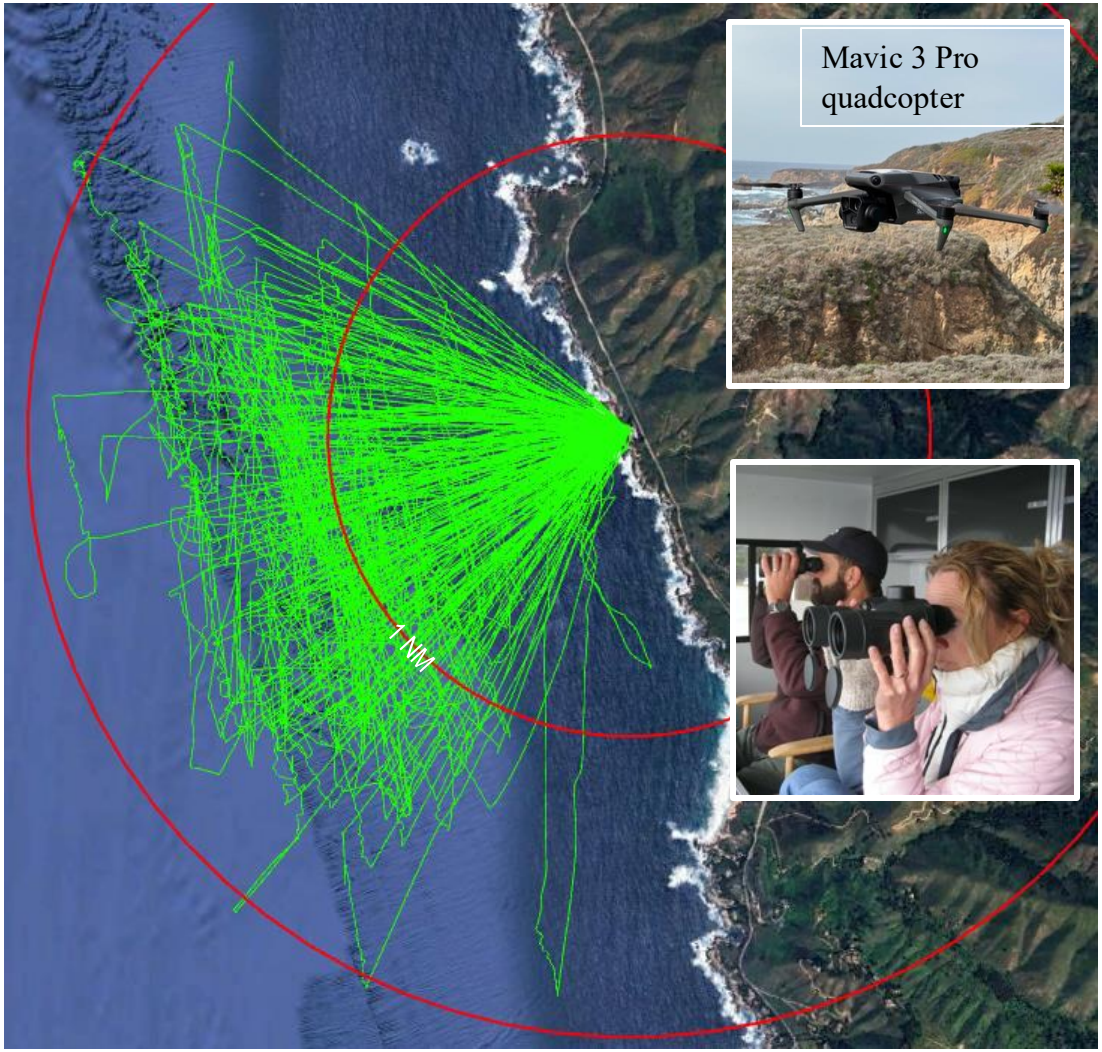
Trevor Joyce, Ph.D.
MMTD
Cetacean Health and Life History Program

Photo collected under permits: MBNMS-2019-033-A2, MMPA Permit 22306

NOAA FISHERIES

Long-range Focal Tracking Missions:

- Conducted during 2024 and 2025 seasons
- Take advantage of FAA Certificate of Authorization for flying small UAS Beyond Visual Line of Sight
- N=148 completed (not all paired with visual survey efforts)



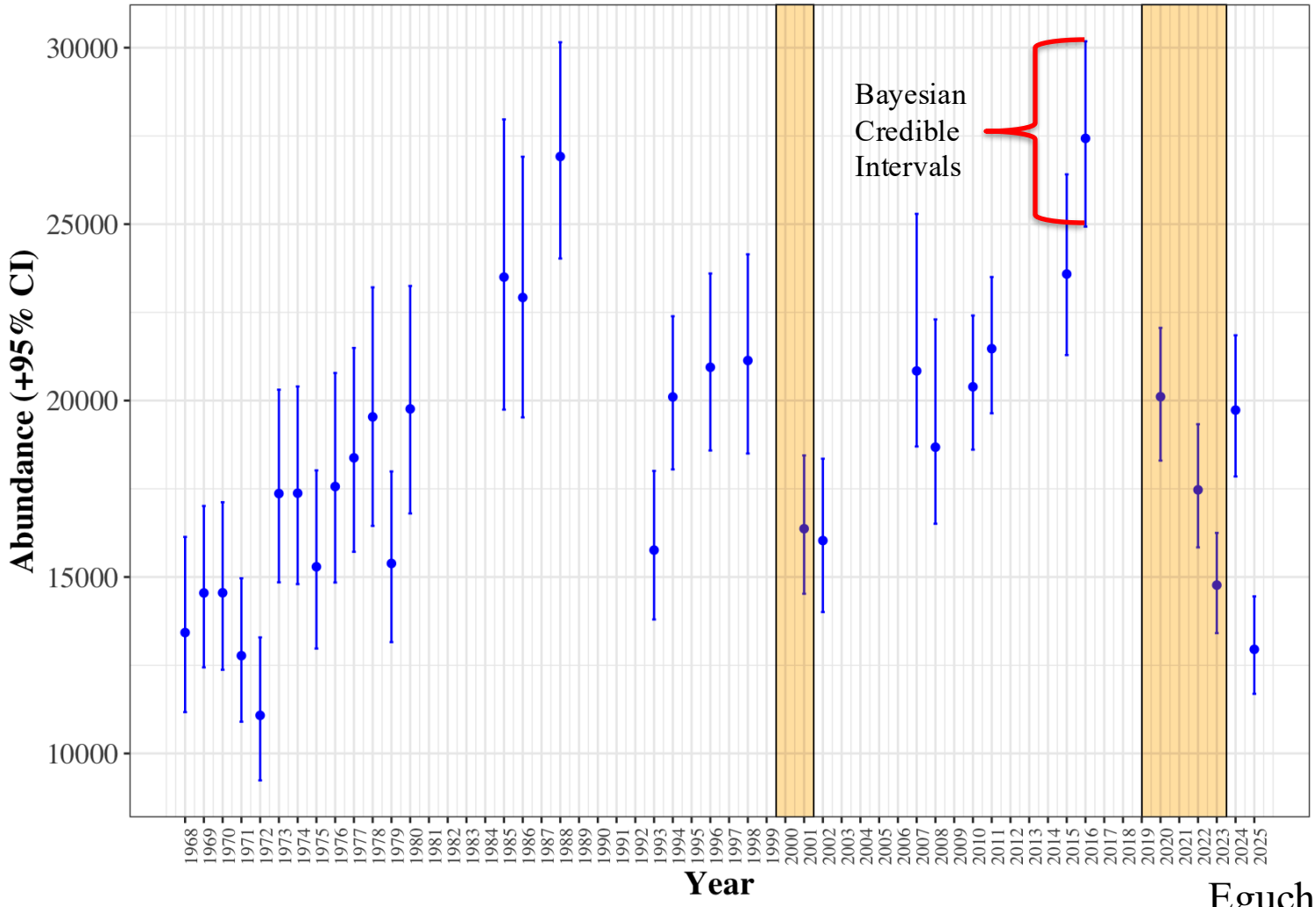
Challenge: Matching sightings made by two platforms

n=51 linked sightings (further review in progress)

Challenge: Matching sightings made by two platforms

Preliminary results indicate that in majority of linked sightings, UAS group size estimates exceed those of the visual observers

Future Development: Revised Abundance Model



Eguchi et al. 2025

Future plans …

We are currently in the process of planning the 2025/26 abundance survey in Granite Canyon