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The Pacific sleeper shark: unraveling an enigma

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Western Groundfish Conference
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Outline

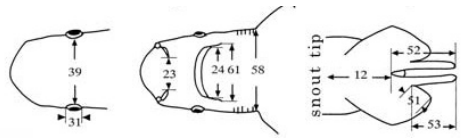
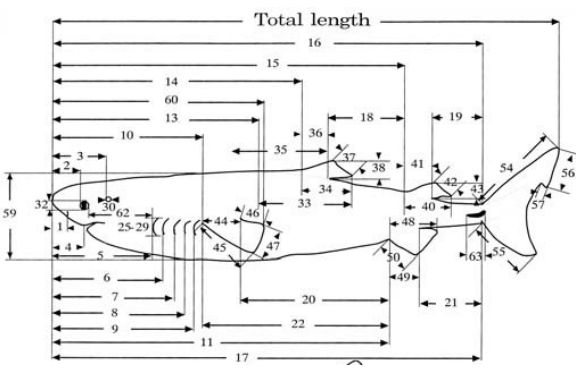
- Species description
- Trends in abundance
- Trophic ecology
- Life history
- Ongoing and future research



Species description



Species description



Yano et al. (2004)

Greenland shark
(*S. microcephalus*)



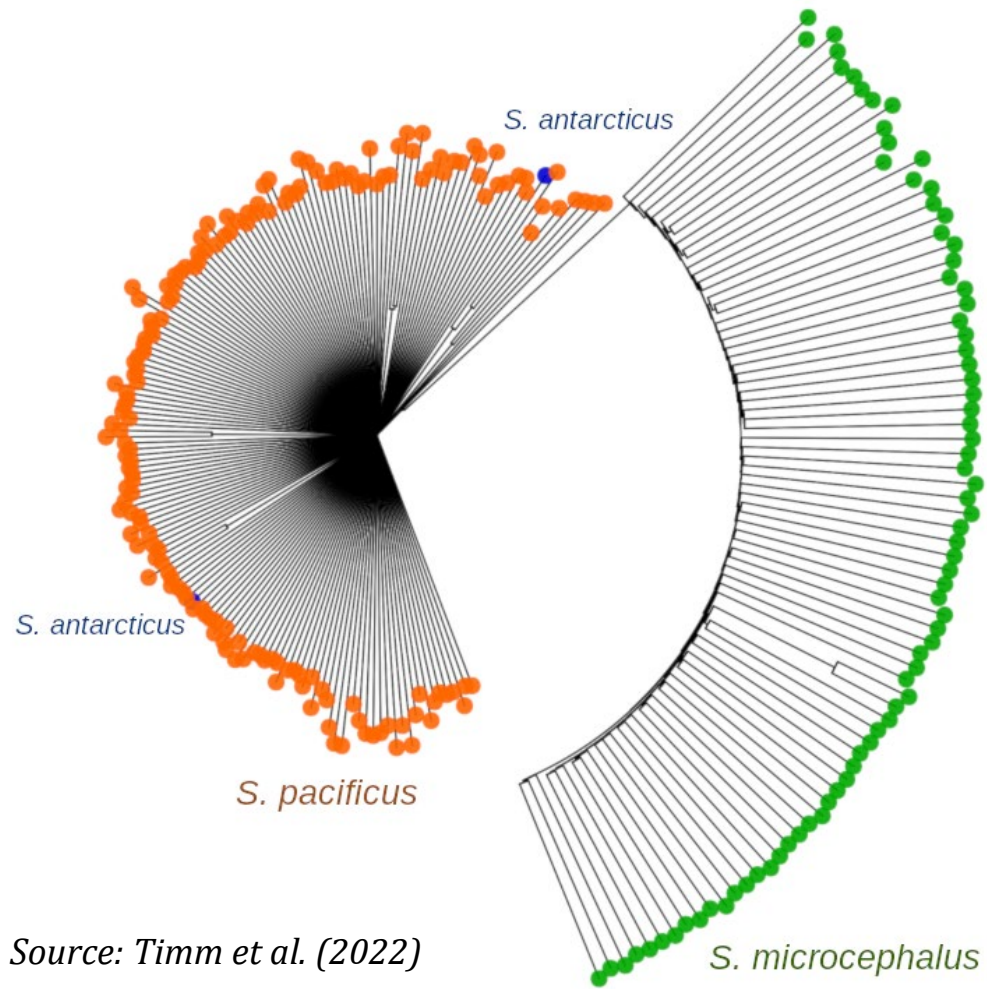
Pacific sleeper shark (*Somniosus pacificus*)



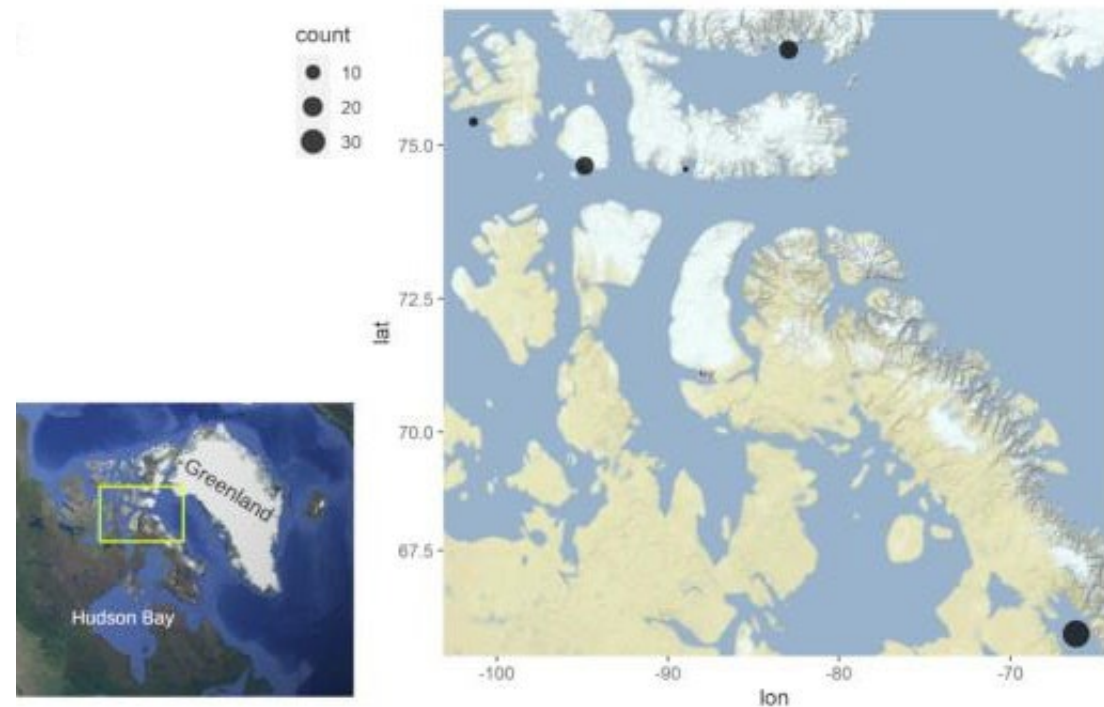
Southern sleeper shark
(*S. antarcticus*)



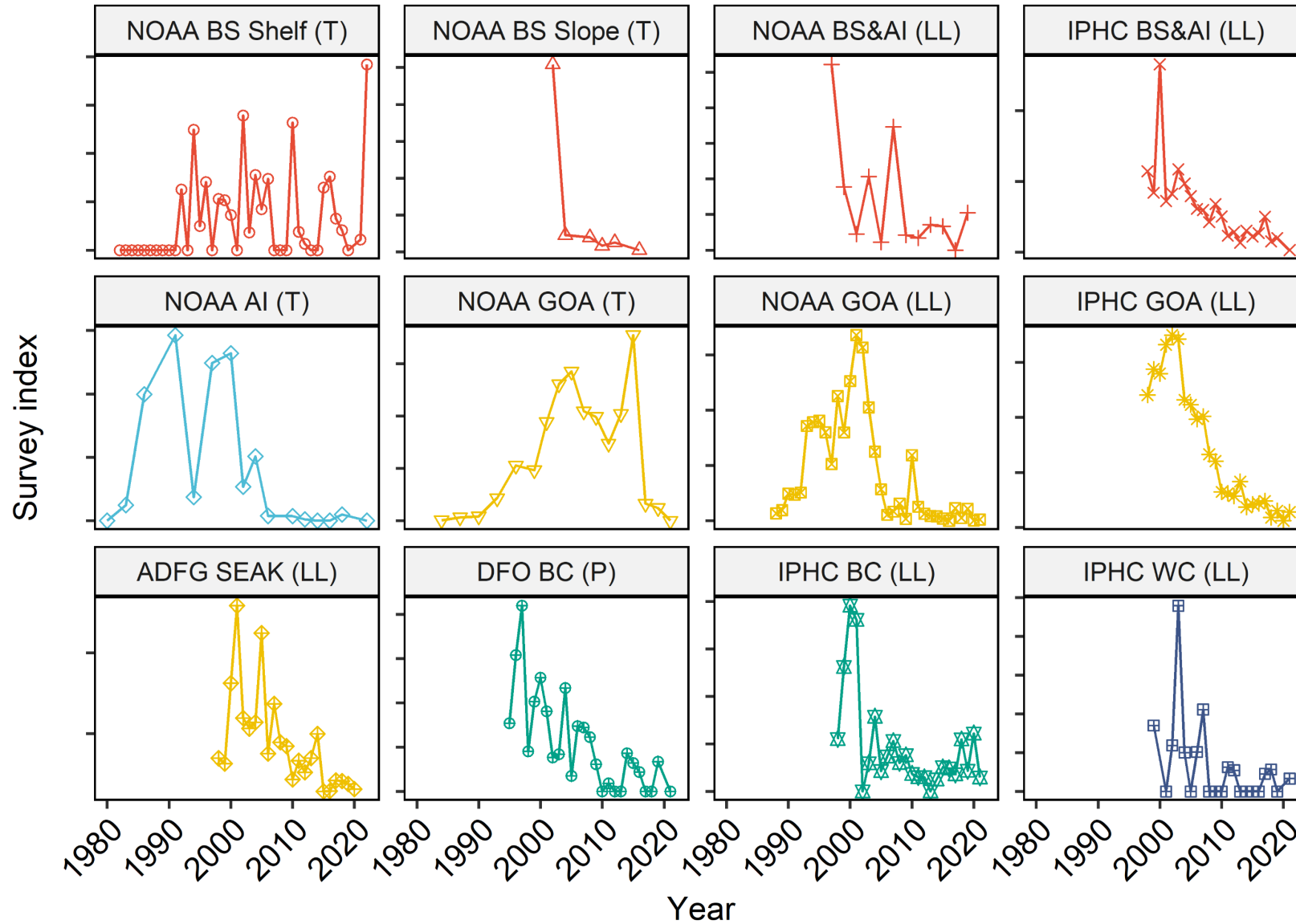
Species description



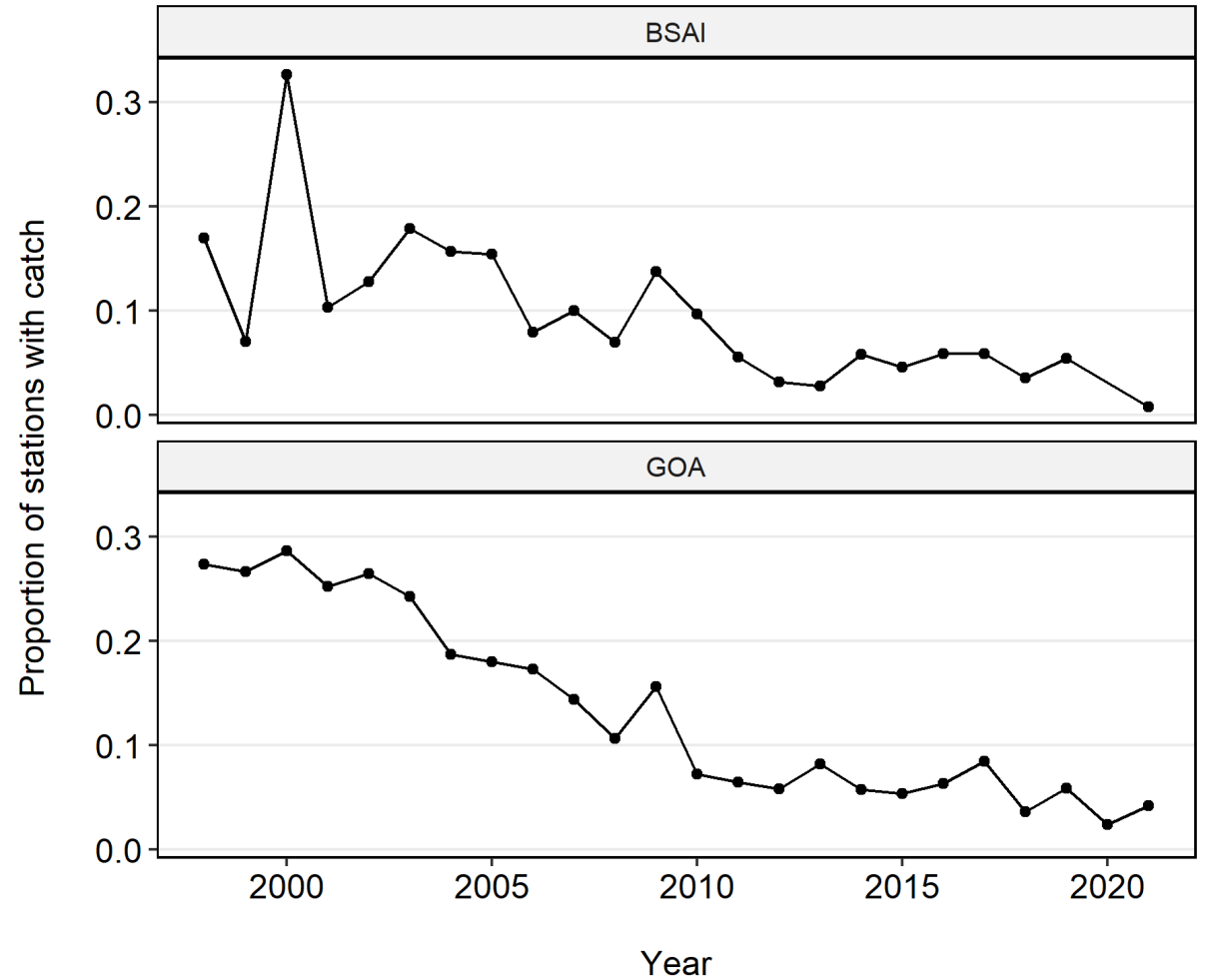
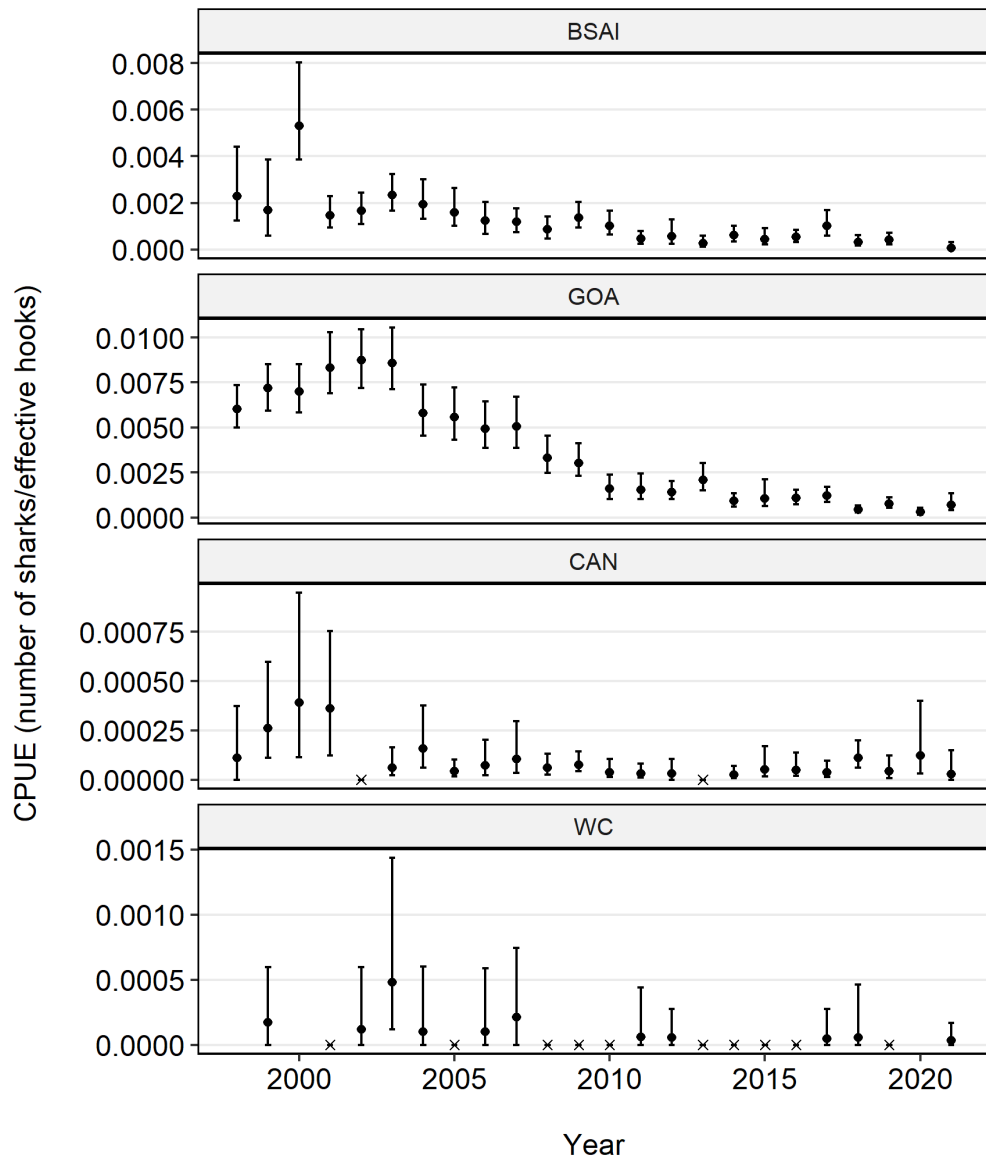
Source: Timm et al. (2022)



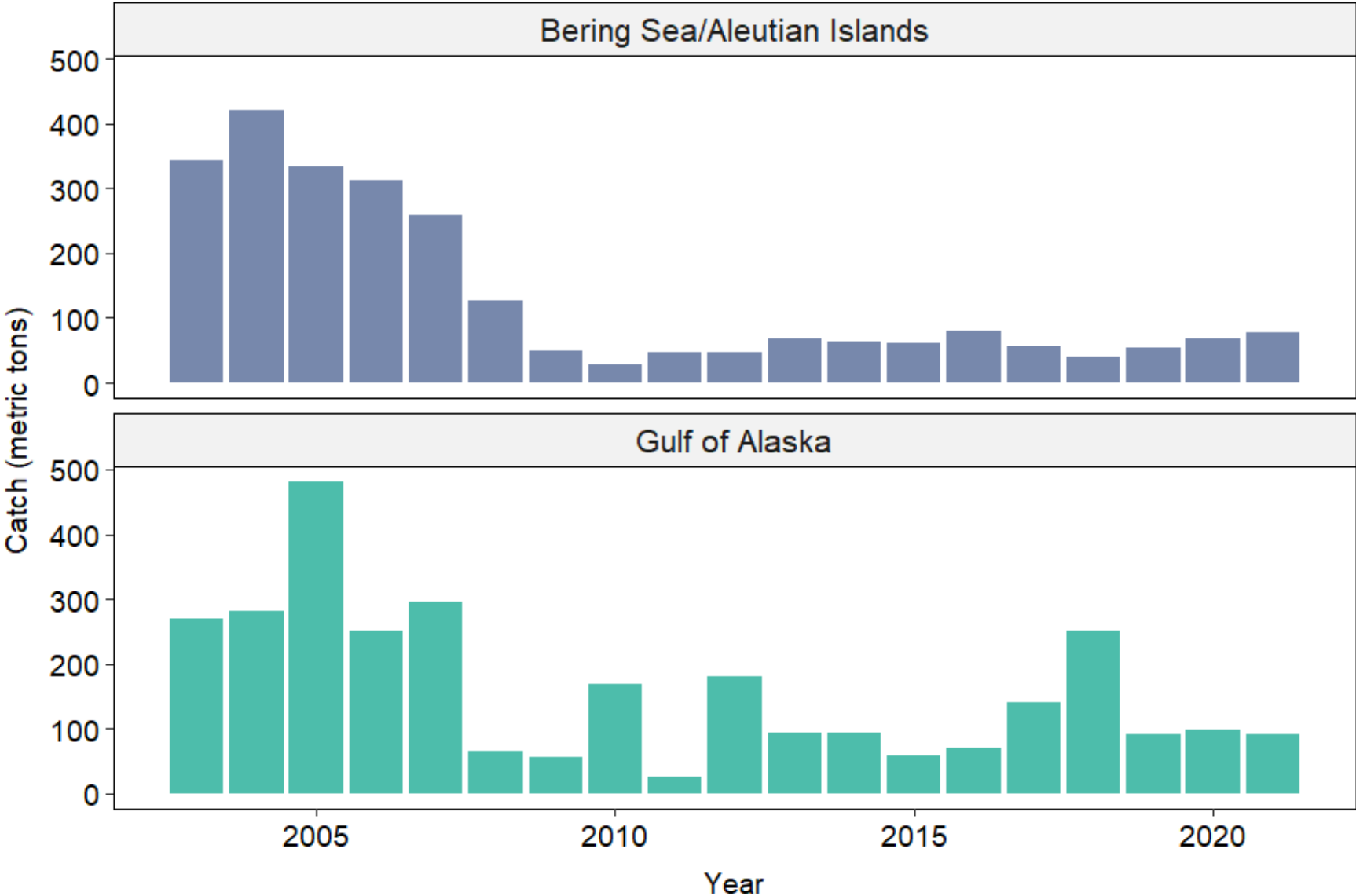
Trends in abundance



Trends in abundance

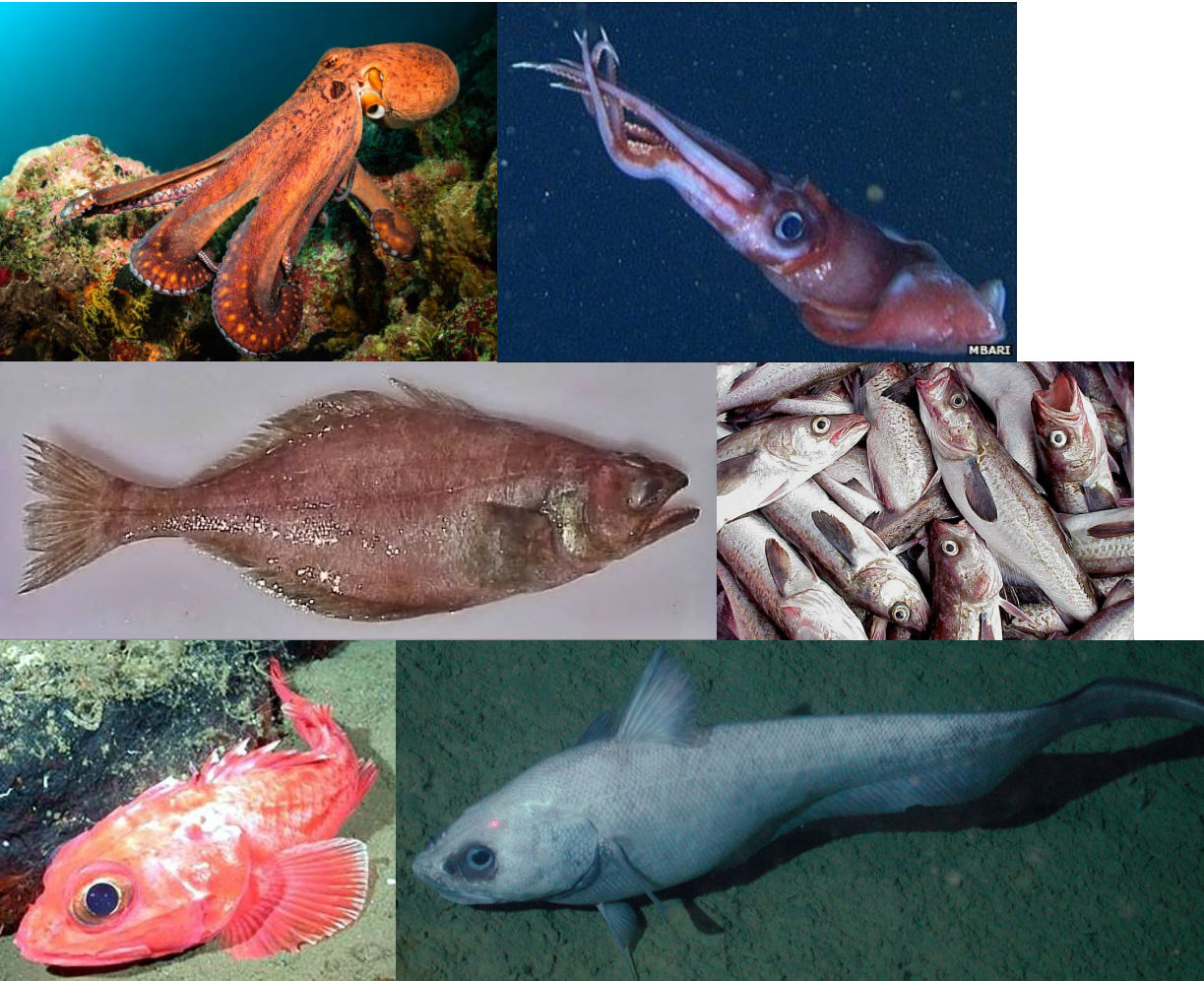


Fisheries bycatch (Alaska)



Trophic ecology

Sources: Bizzarro et al. (2017), Bright (1959), Courtney & Foy (2012), Ebert et al. (1987), Gotshall & Jow (1965), Orlov & Moiseev (1999), Schaufler et al. (2005), Sigler et al. (2006), Smith & Baco (2003), Wang & Yang (2004), Yang & Page (1999), Yano et al. (2007)



earth IS blue



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Trophic ecology

Sources: Bizzarro et al. (2017), Bright (1959), Courtney & Foy (2012), Ebert et al. (1987), Gotshall & Jow (1965), Orlov & Moiseev (1999), Schaufler et al. (2005), Sigler et al. (2006), Smith & Baco (2003), Wang & Yang (2004), Yang & Page (1999), Yano et al. (2007)

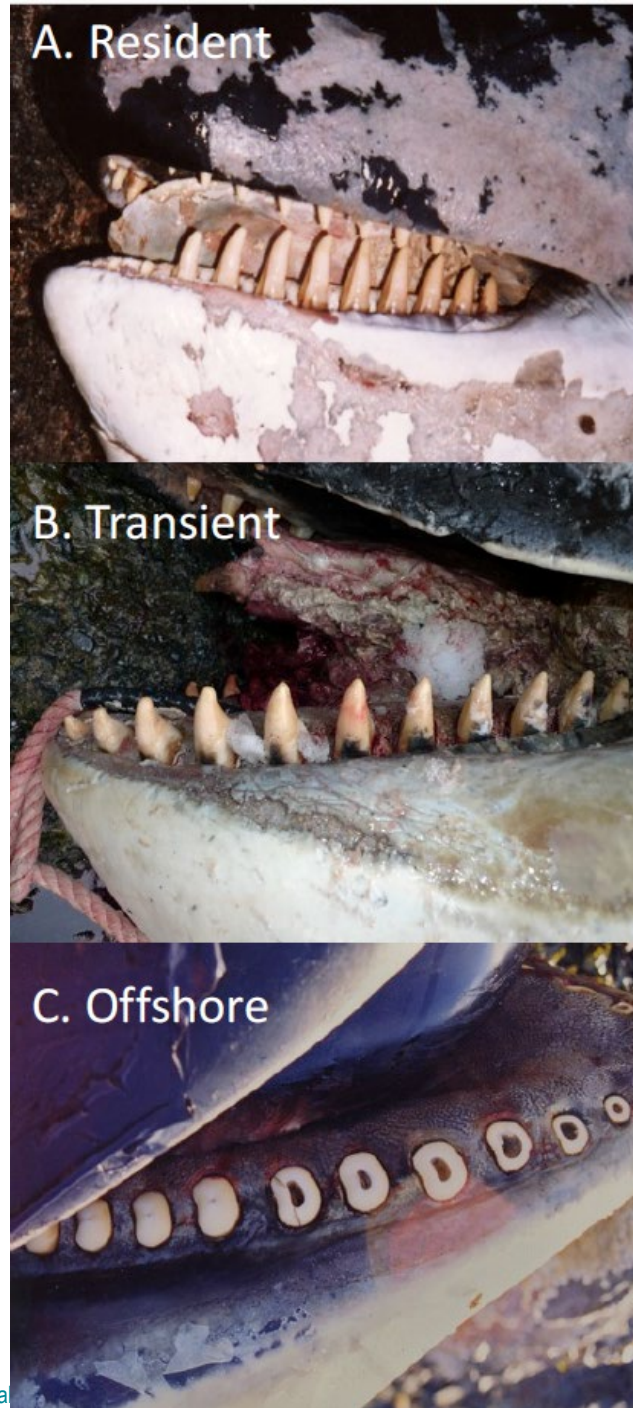


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Trophic ecology



Offshore killer whales are shark-feeding specialists

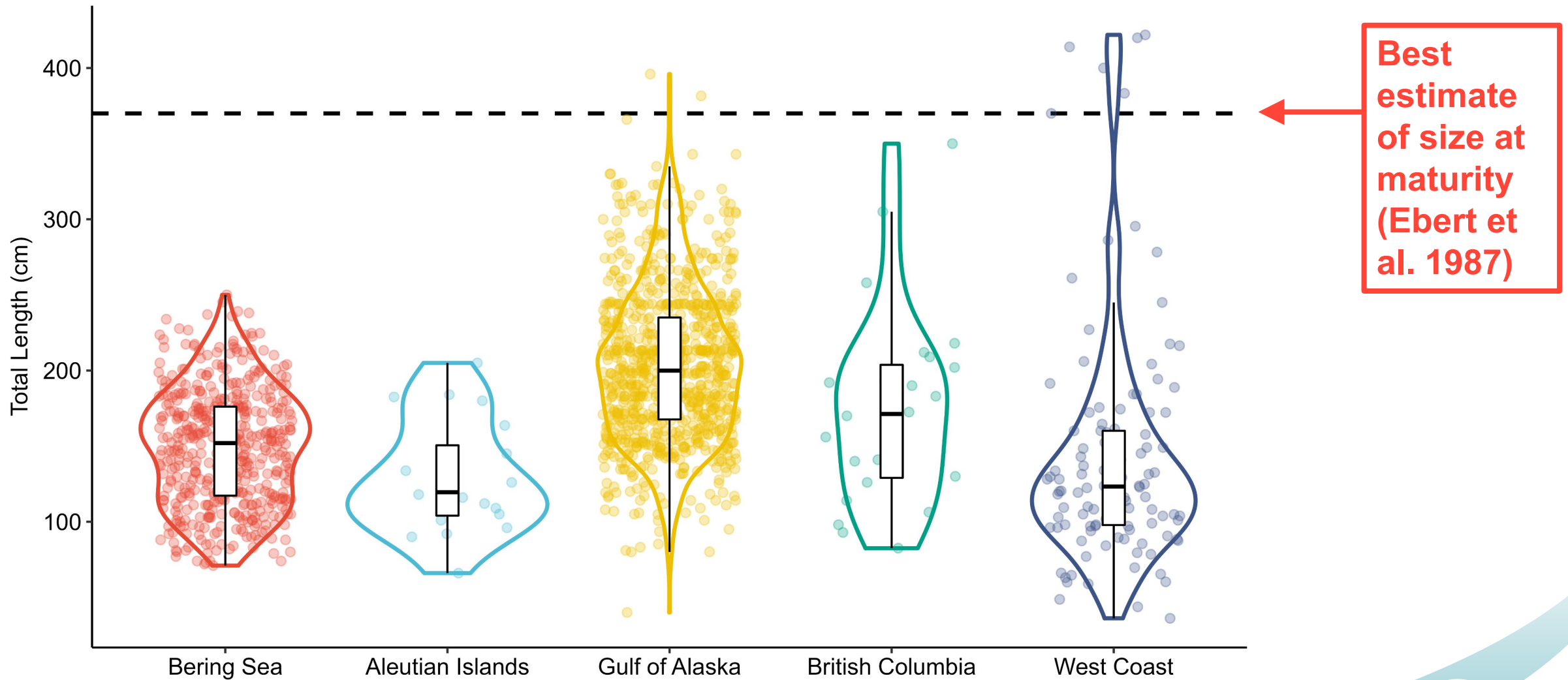


Source and photo credits:
Ford et al. (2011, 2014)

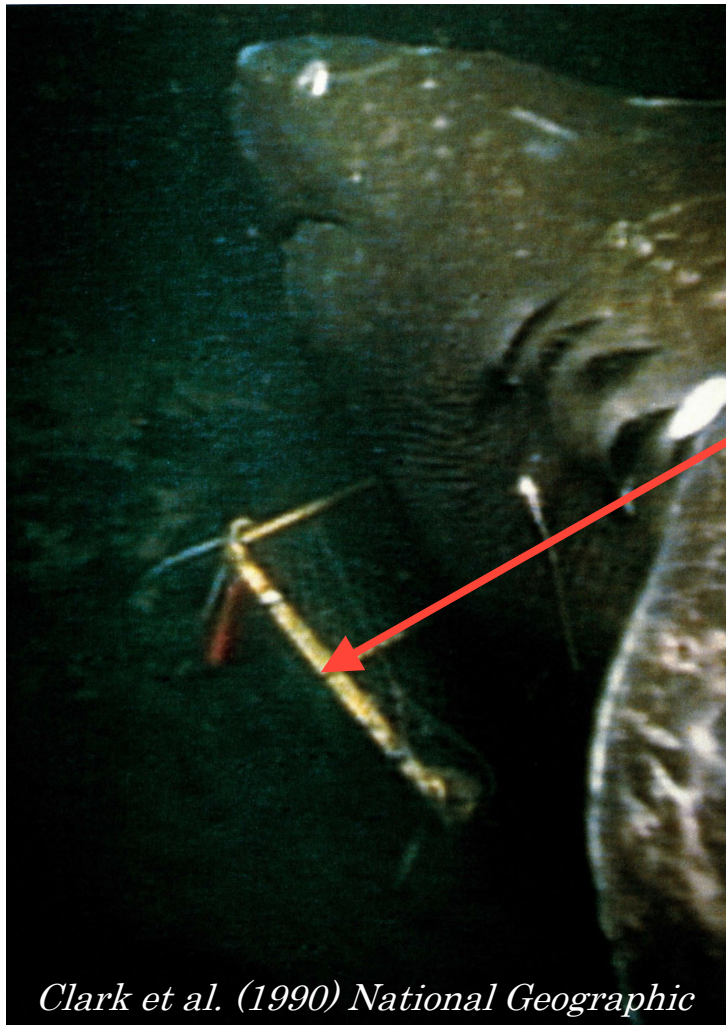


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Life history



Life history



2' x 2'
bait cage

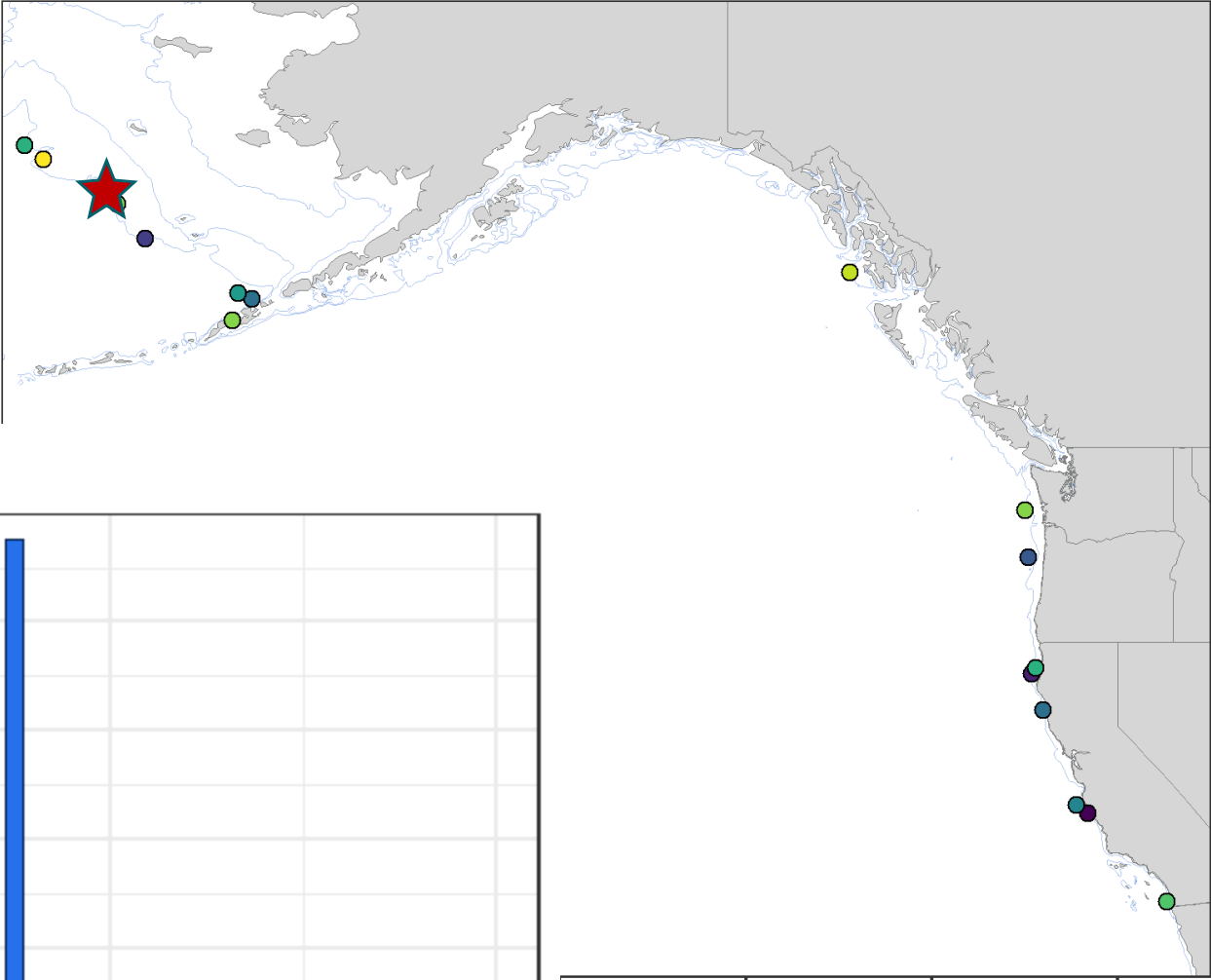


Estimated length of Suruga Bay shark:
660-720 cm TL

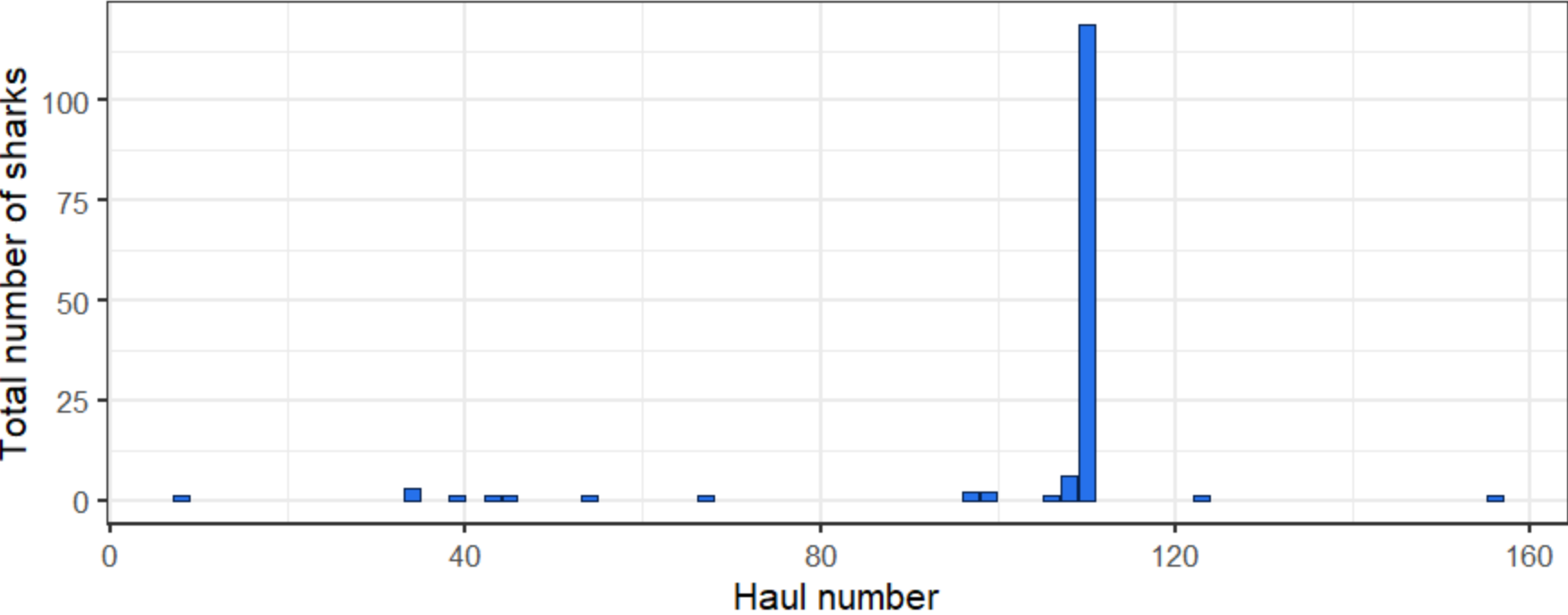
Life history



Sleeper Sharks < 75 cm TL



2002 EBS Slope Survey Sleeper Shark Catch



Life history

- Lecithotrophic viviparity (embryos nourished by yolk, live birth)
- Large numbers (300+) of big, yolked ovarian eggs



Life history

- Size at birth ~40 cm TL
- Litter size ~10?
- Unknown gestation time

2. A Uterine Foetus

and the Uterus from a Greenland Shark.

By Einar Koefoed.

The find.

A female Greenland shark (Norw. «Håkjerring», *Acanthorhinus carcharias* Gunn.), 5 m. long and 1000–1200 kg. by weight, was caught by M/S «Joffre», skipper *Olav Støbakk* at N. 60°4', W. 6°35' ca. 80 n. m. S. to W. of the Sudrey on the 24th August 1954.

The right uterus was reported to contain 10 foeti, all of the same size. The left uterus was said to be empty. The uteri were out of situ sheared off on board, and certainly not by an anatomist. The uteri were salted and a single foetus preserved in formalin; another foetus is kept in Alesund Museum. The material was kindly forwarded to «Fiskeridirektoratets Havforskningsinstitutt» by Mr. *Levy Carlson*, Alesund, to whom our thanks are due. The following descriptions are based on the single foetus preserved in formalin, and on the salted uteri.

The foetus.

The foetus of the *Acanthorhinus carcharias* Gunner is exactly like a small specimen of this species. The shape and proportions of the fish are not at all different from the adult, but its small size makes it convenient for an examination (figs. 1 & 2).

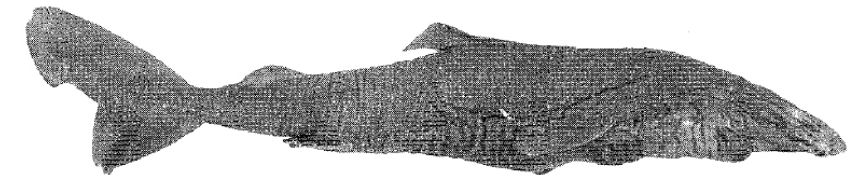
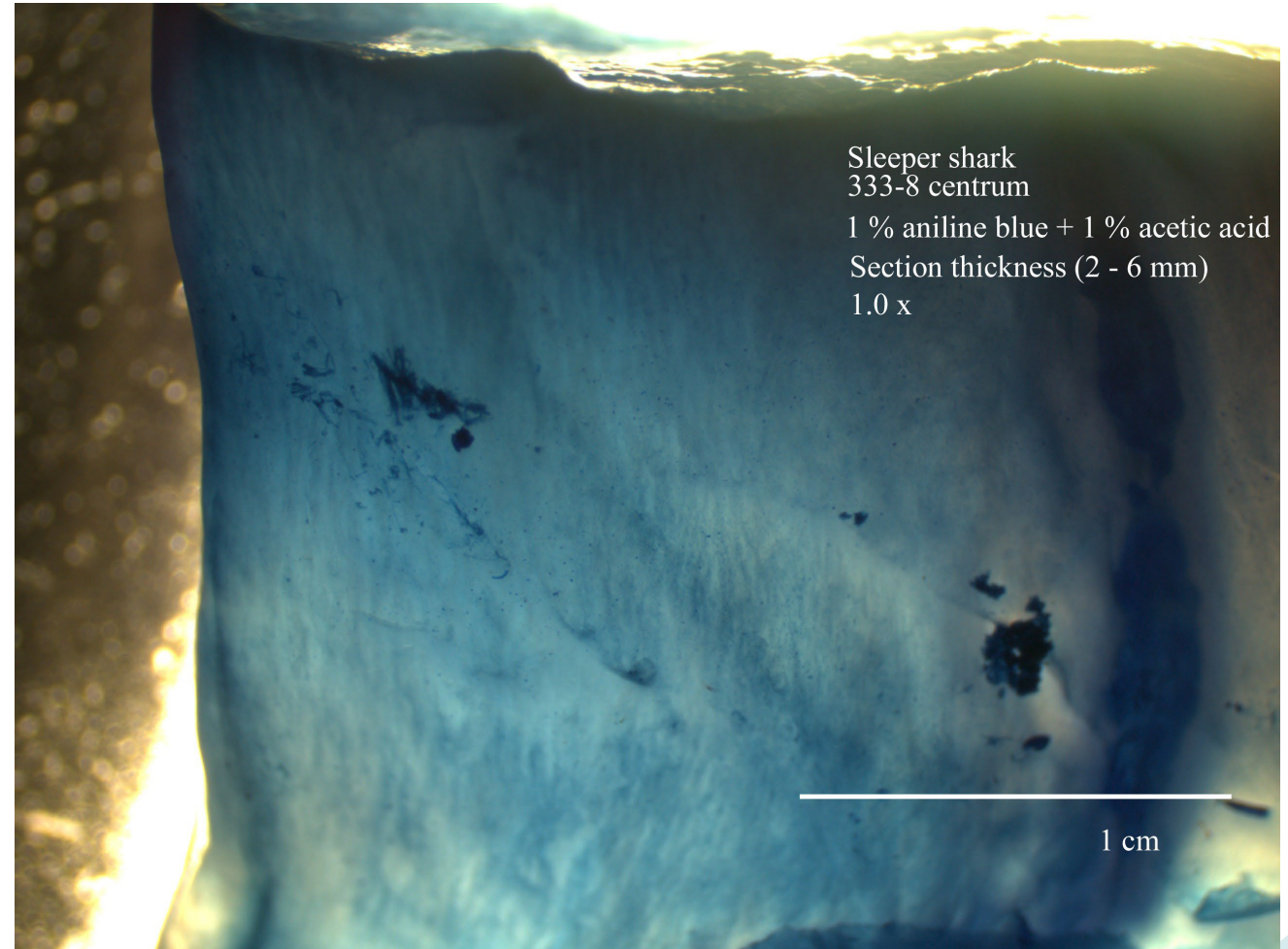
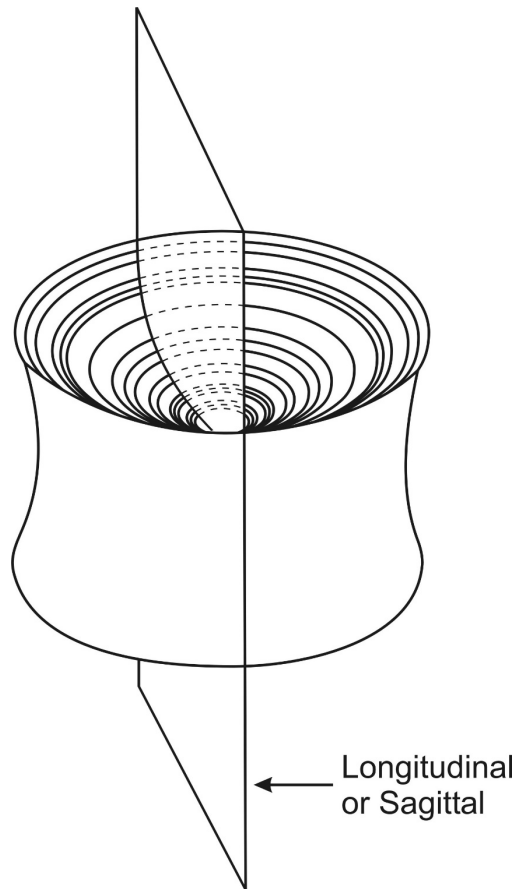


Fig. 1.

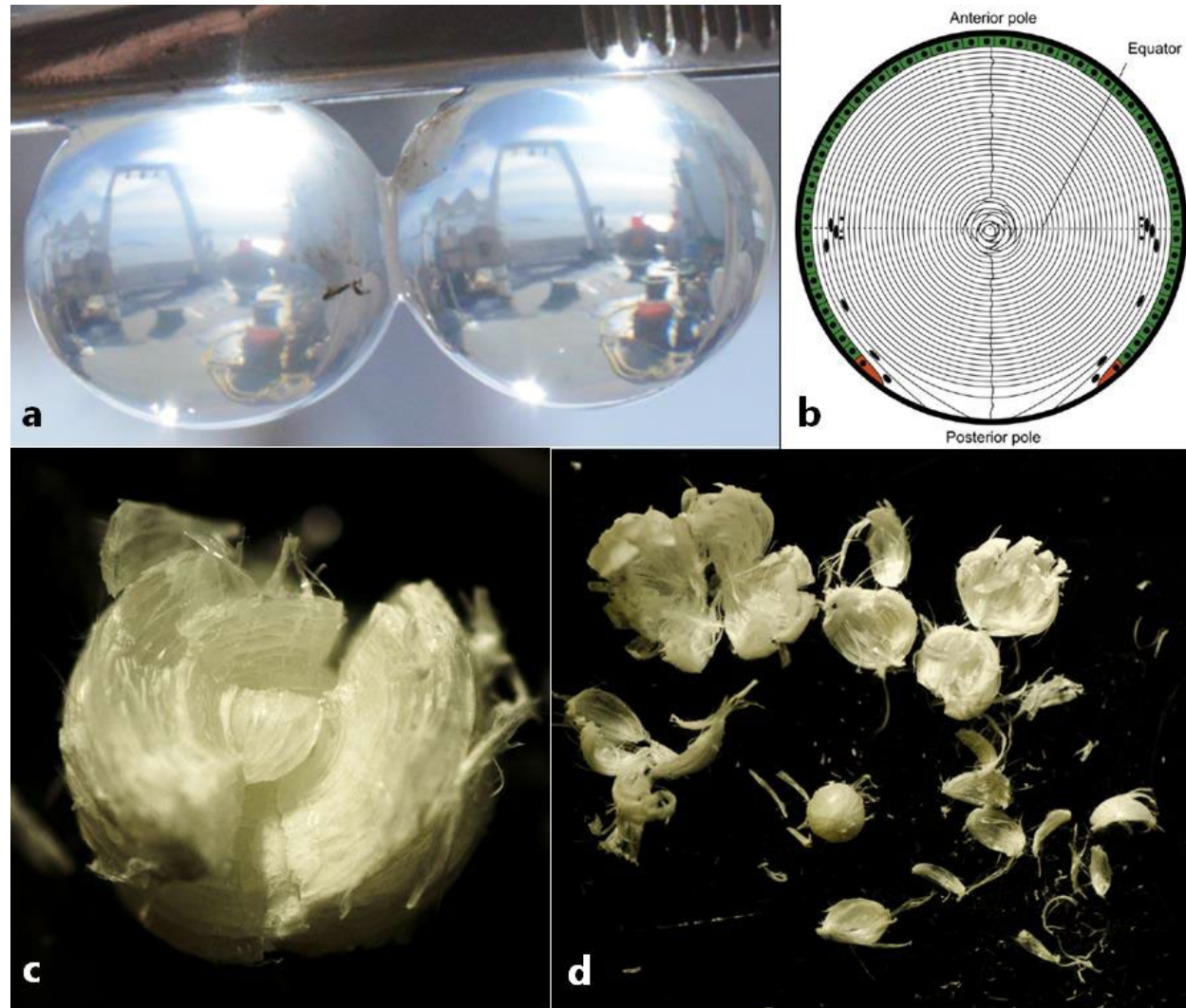


Fig. 2

Age estimation



Age estimation



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Science

400-year-old Greenland shark 'longest-living vertebrate'

12 August 2016



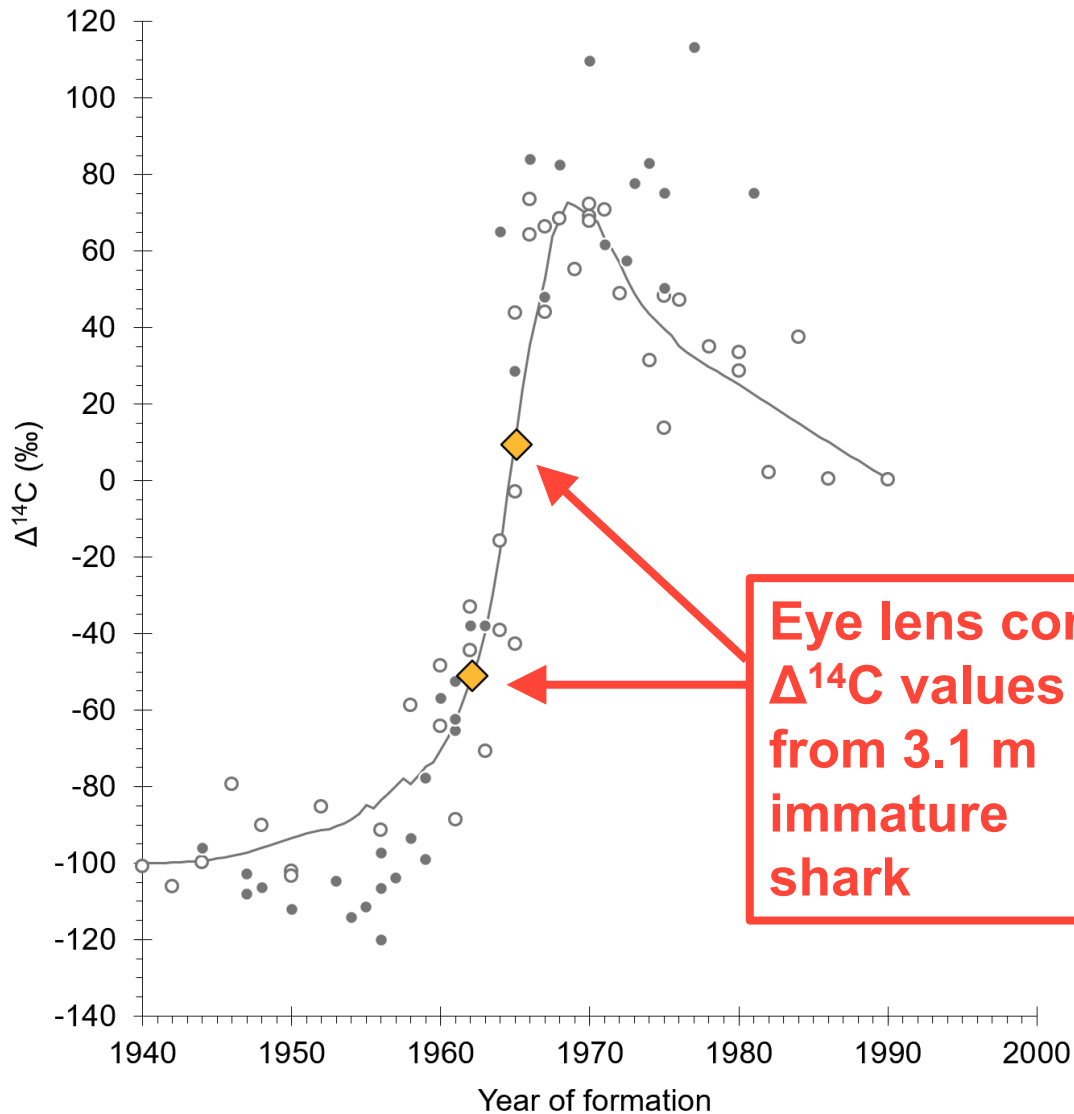
Video courtesy of Julius Nielsen

By Rebecca Morelle

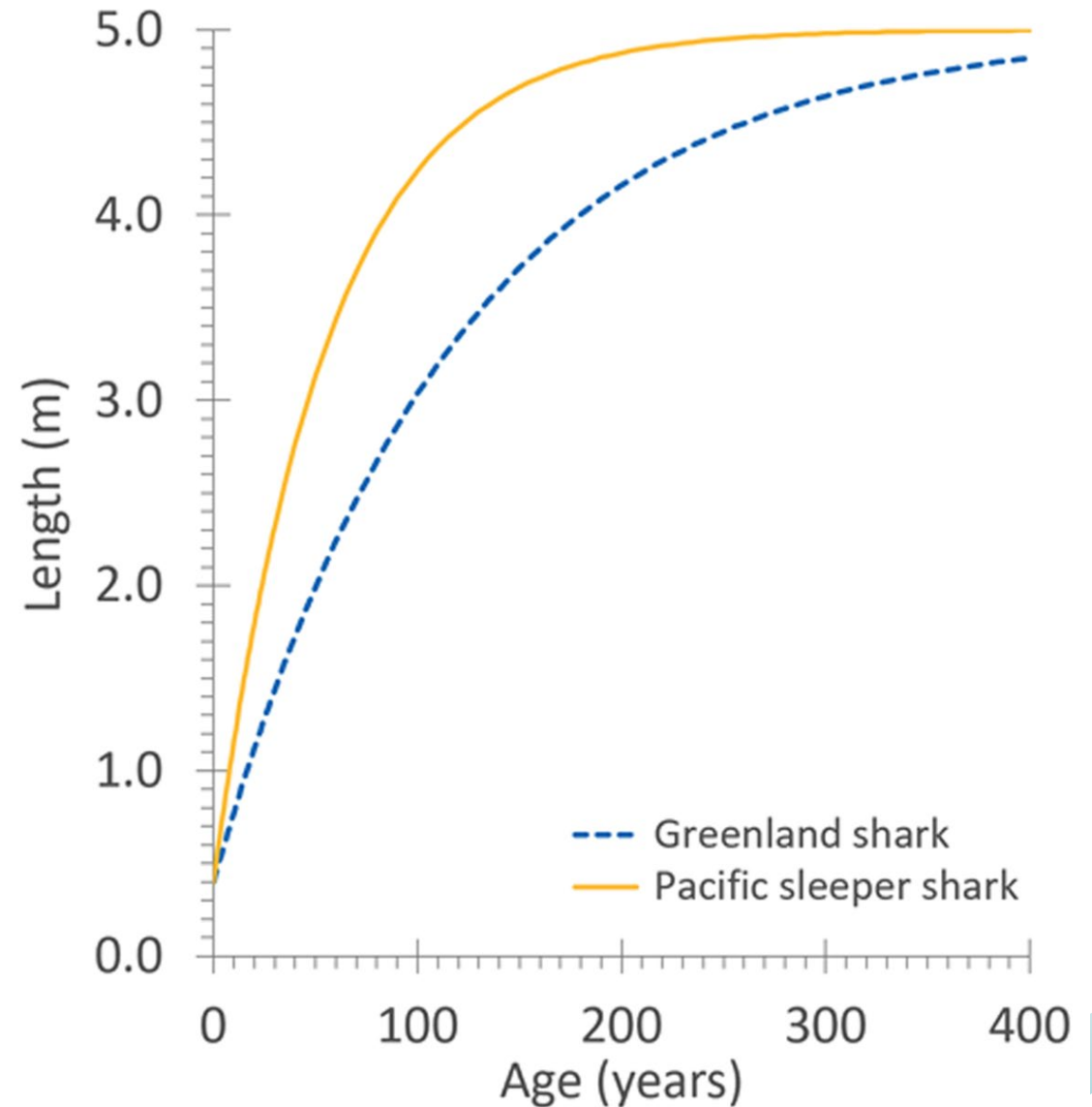
Science Correspondent, BBC News

Greenland sharks are now the longest-living vertebrates known on Earth, scientists say.

Age estimation



**Eye lens core
 $\Delta^{14}\text{C}$ values
from 3.1 m
immature
shark**



Exciting new and ongoing research!

- Improving estimates of catch (electronic monitoring)
- Determining estimates of age (expand upon pilot)
- Refining estimates of maturity (survey, tag, and camera data)
- Estimating movements (tagging)

Questions left unanswered

- Where are all the big sharks?
- How old can they get?
- What is their reproductive cycle?
- Do they migrate for reproduction or utilize nursery areas?
- To what extent do they utilize the deep ocean?

Thank you!

Alaska Fisheries Science Center
Alaska Regional Office (NOAA)
Alaska Department of Fish and Game
Department of Fisheries and Oceans
International Pacific Halibut Commission
Northwest Fisheries Science Center
Alaska Sea Life Center

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Cara Rodgveller
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Susanne McDermott

Our deepest appreciation goes to fisheries observers and scientific survey crews! We also thank *Somniosus* researchers past and present for their contributions to our ever-growing knowledge.

Questions?



Photo credit: IPHC

Inspiration...

- Updated life history section of Shark Stock Complex stock assessment (2020)
- Stock structure analysis (2022)
- Review paper (2023)

19. Assessment of the shark stock complex in the Bering Sea and Aleutian Islands

Cindy A. Tribuzio, Mary Elizabeth Matta, Katy Echave, and Cara Rodgveller
November 2020

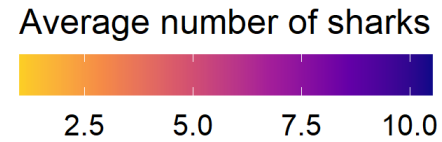
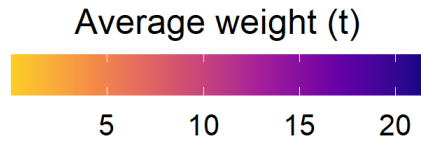
Evaluation of stock structure for the Pacific sleeper shark in the Gulf of Alaska and Bering Sea/Aleutian Islands

Beth Matta, Cindy Tribuzio, Ingrid Spies, Sharon Wildes, Wes Larson, Katy Echave, Laura Timm

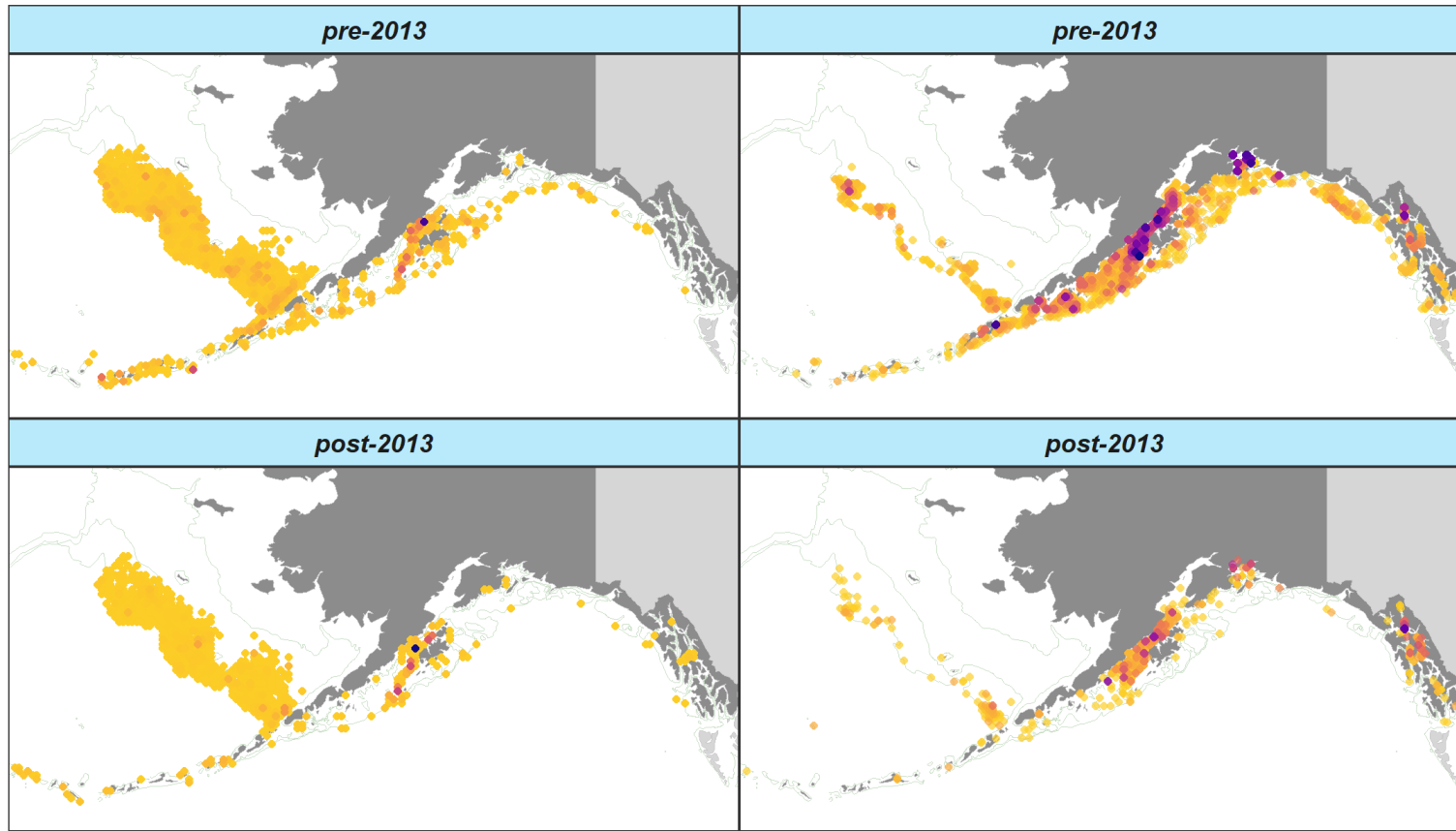
A review of the Pacific sleeper shark: biology and fishery interactions

Mary Elizabeth Matta, Cindy A. Tribuzio, Lindsay N.K. Davidson, Keith R. Fuller, Garrett C. Dunne, and Allen H. Andrews

Spatial extent of catch



FISHERY
(non-
confidential)



IPHC SURVEY