Endangered, Threatened, and Protected Species of the High Seas

Main reference sources:

Stephanie D. Good, Shaun McLennan, Matt Gummery, Rebecca Lent, Timothy E. Essington, Bryan P. Wallace, Richard A. Phillips, Tom Peatman, G. Barry Baker, Keith Reid, Rohan J.C. Currey,

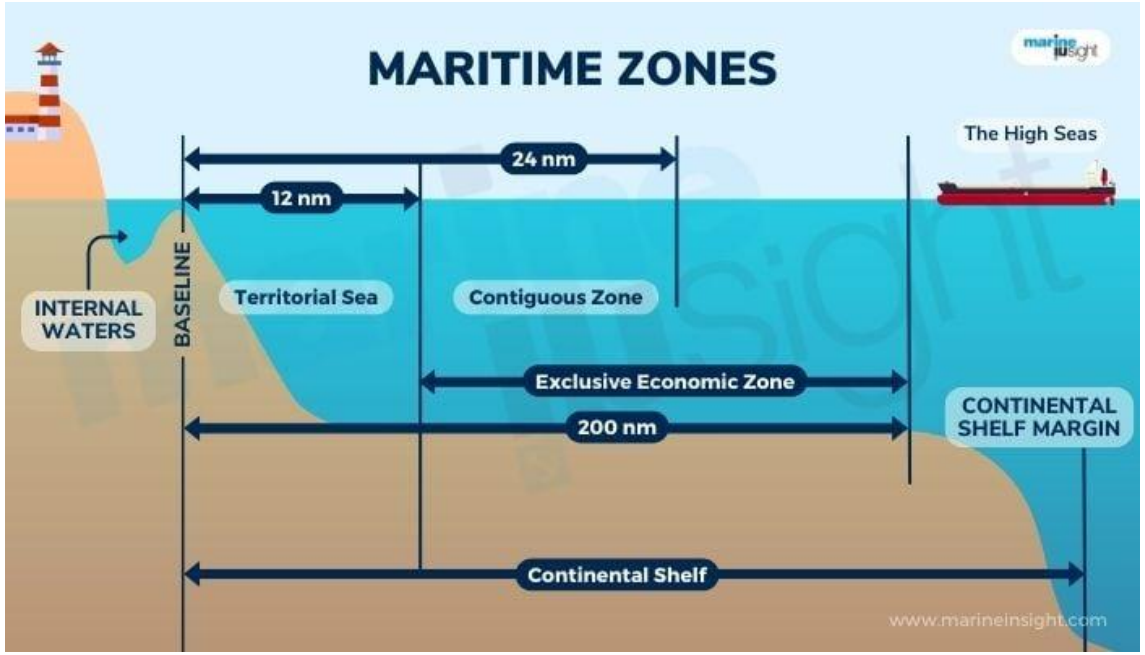
Updating requirements for Endangered, Threatened and Protected species MSC Fisheries Standard v3.0 to operationalise best practices,

Marine Policy, Volume 163, 2024, 106117

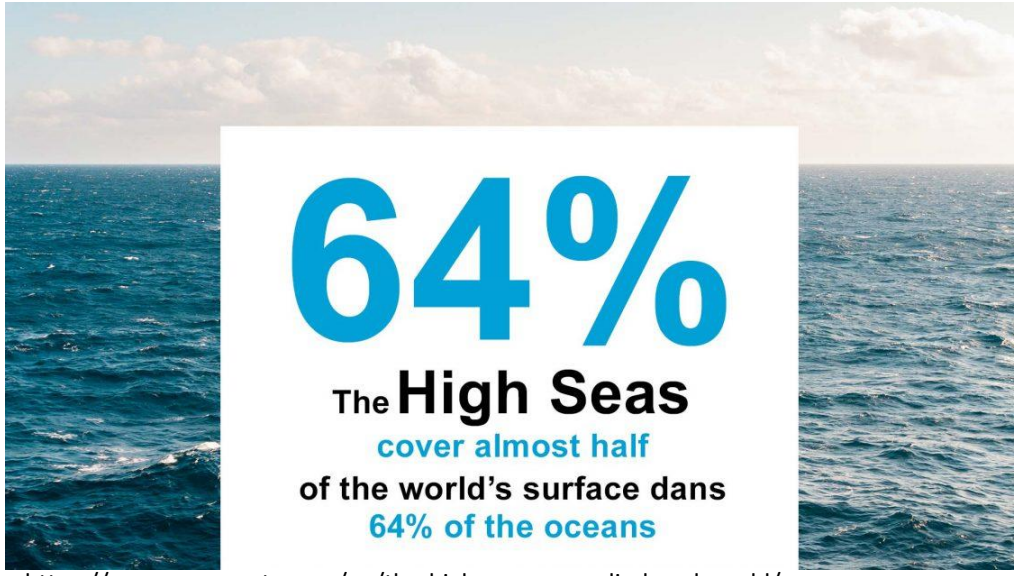
https://www.nature.com/articles/d41586-025-01665-0

What is High Sea

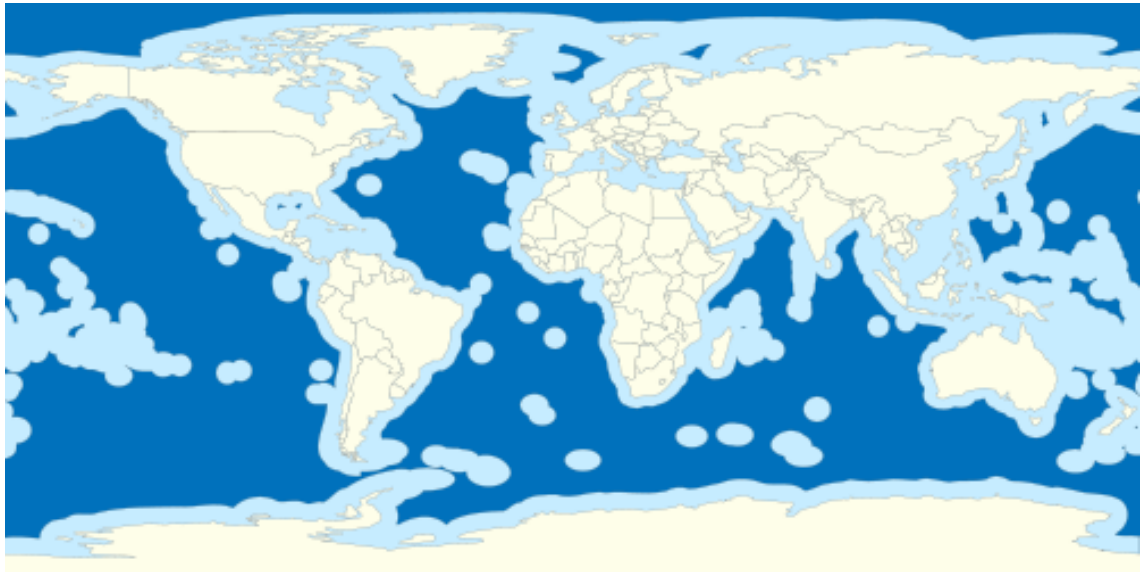
- The open, international waters of the ocean beyond the national jurisdiction (NJ), sovereignty, or territorial waters of any single country.



https://www.marineinsight.com/understanding-international-waters-boundaries-jurisdiction-and-legal-implications/

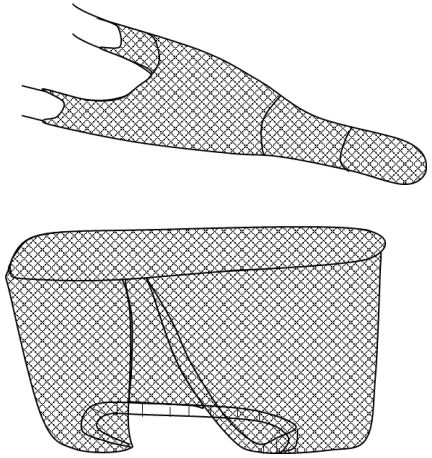


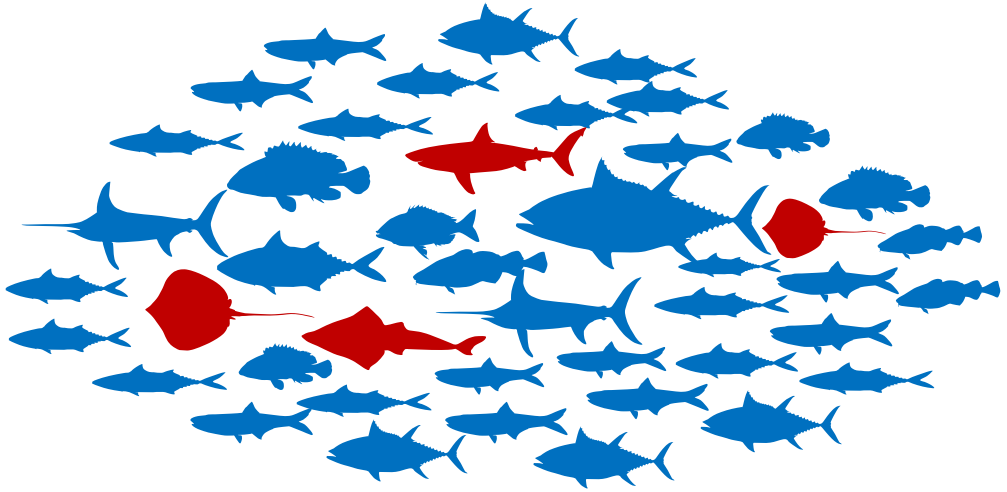
https://oceansconnectes.org/en/the-high-seas-an-undisclosed-world/

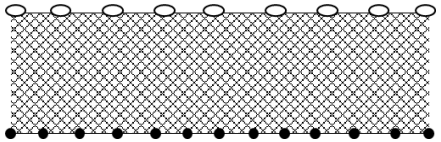


https://en.wikipedia.org/wiki/International_waters#/media/File:Exclusive_Economic_Zones.svg

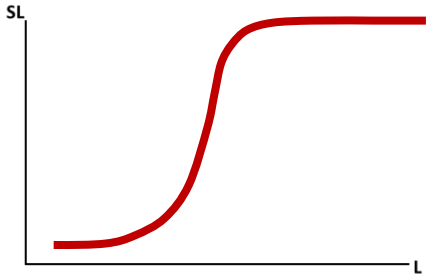
Fishing activities of the high seas



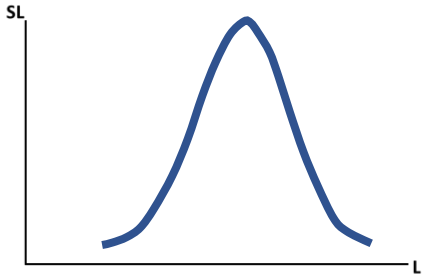




Active fishing gear
- Mobile, following fish school
- Low selectivity itself
- S-shaped or logistic size selectivity

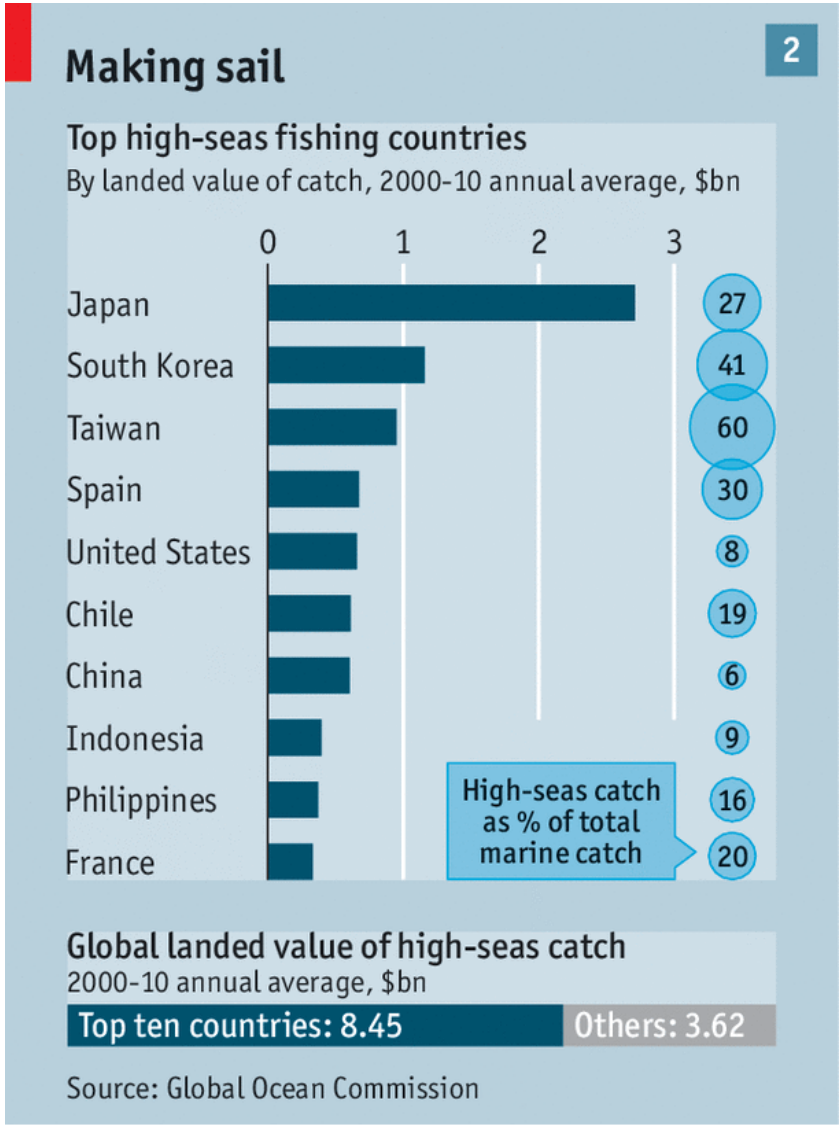


Passive fishing gear
- Immobile, stationary gear
- High selectivity itself
- Bell-shaped size selectivity



Legal Status and Rules

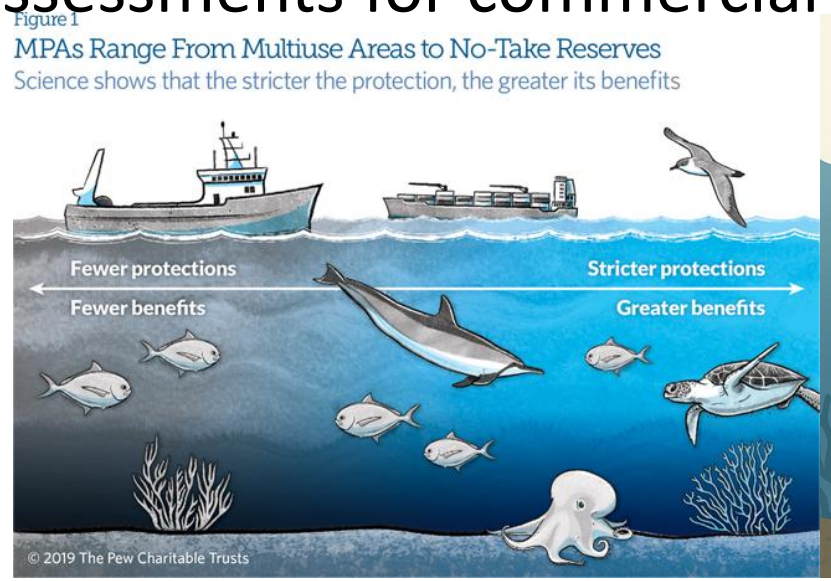
- No ownership
  - The high seas belong to no single nation and are open to use by all countries.
  - All nations have the right to navigate ships, fly aircraft, lay submarine cables, and fish in these areas (United Nations Convention on the Law of the Sea).
  - Ships sailing on the high seas are generally governed by the laws of the country where the ship is registered (its flag state).



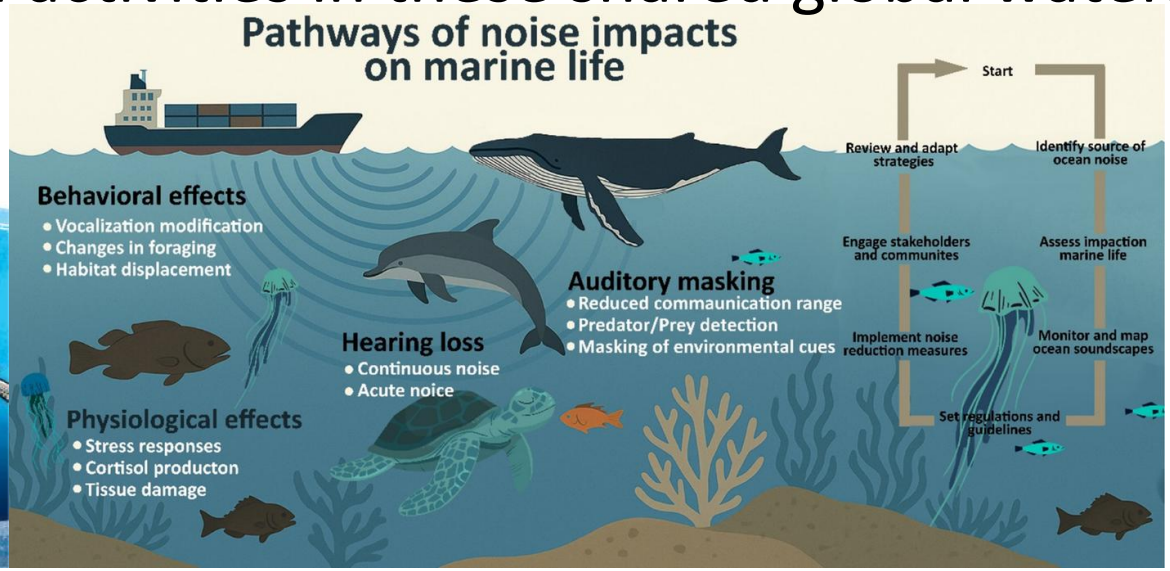
Economist.com
https://www.economist.com/briefing/2017/05/26/getting-serious-about-overfishing

Environmental Protection and Conservation

- Global commons: Because they are outside individual borders, these waters have historically faced heavy pressures from industrial fishing and shipping.
- New governance: International frameworks provide tools to establish marine protected areas and require environmental impact assessments for commercial activities in these shared global waters.



https://www.pew.org/en/research-and-analysis/issue-briefs/2019/08/how-mpas-safeguard-the-high-seas



https://link.springer.com/article/10.1007/s44218-025-00107-8

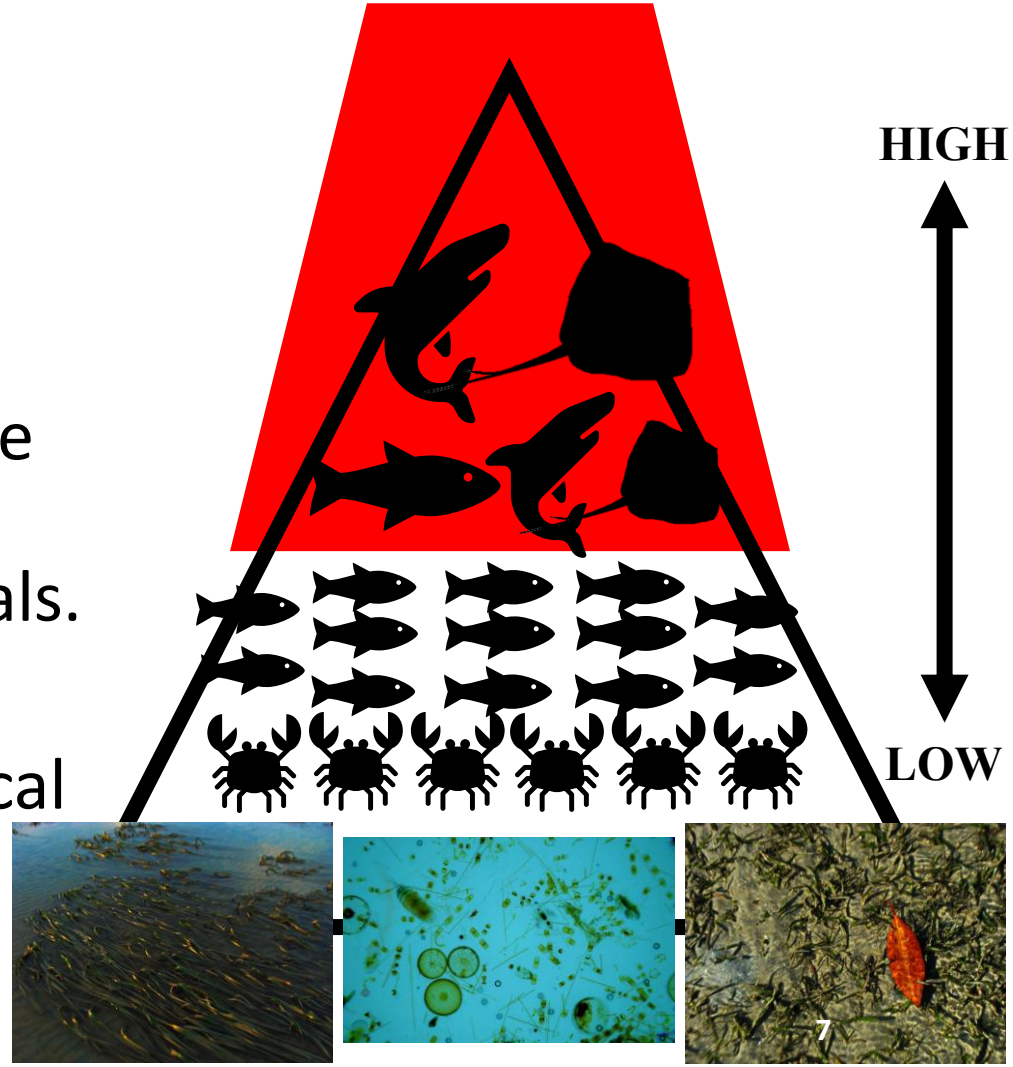
What is ETP Species

- ETP species stand for Endangered, Threatened, and Protected species.
- This term is used in fishing and marine management to describe vulnerable animals that are at risk of harm or accidental capture (bycatch) during commercial fishing.

https://www.forbes.com/sites/melissacristinamarquez/2026/01/18/how-the-high-seas-treaty-could-shape-ocean-conservation-by-2030/

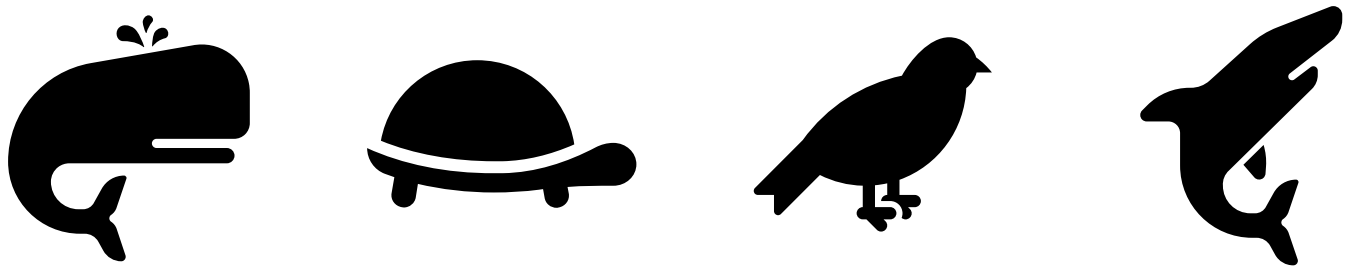
Why ETP species matter?

- Bycatch Risk: They often get accidentally trapped in nets, hooked on longlines, or tangled in ropes.
- Strict Rules: Groups like the Marine Stewardship Council require fisheries to use specific safety tools and clear proof of protection to prevent harming these animals.
- Global Laws: They are protected by international agreements like CITES and local conservation laws.



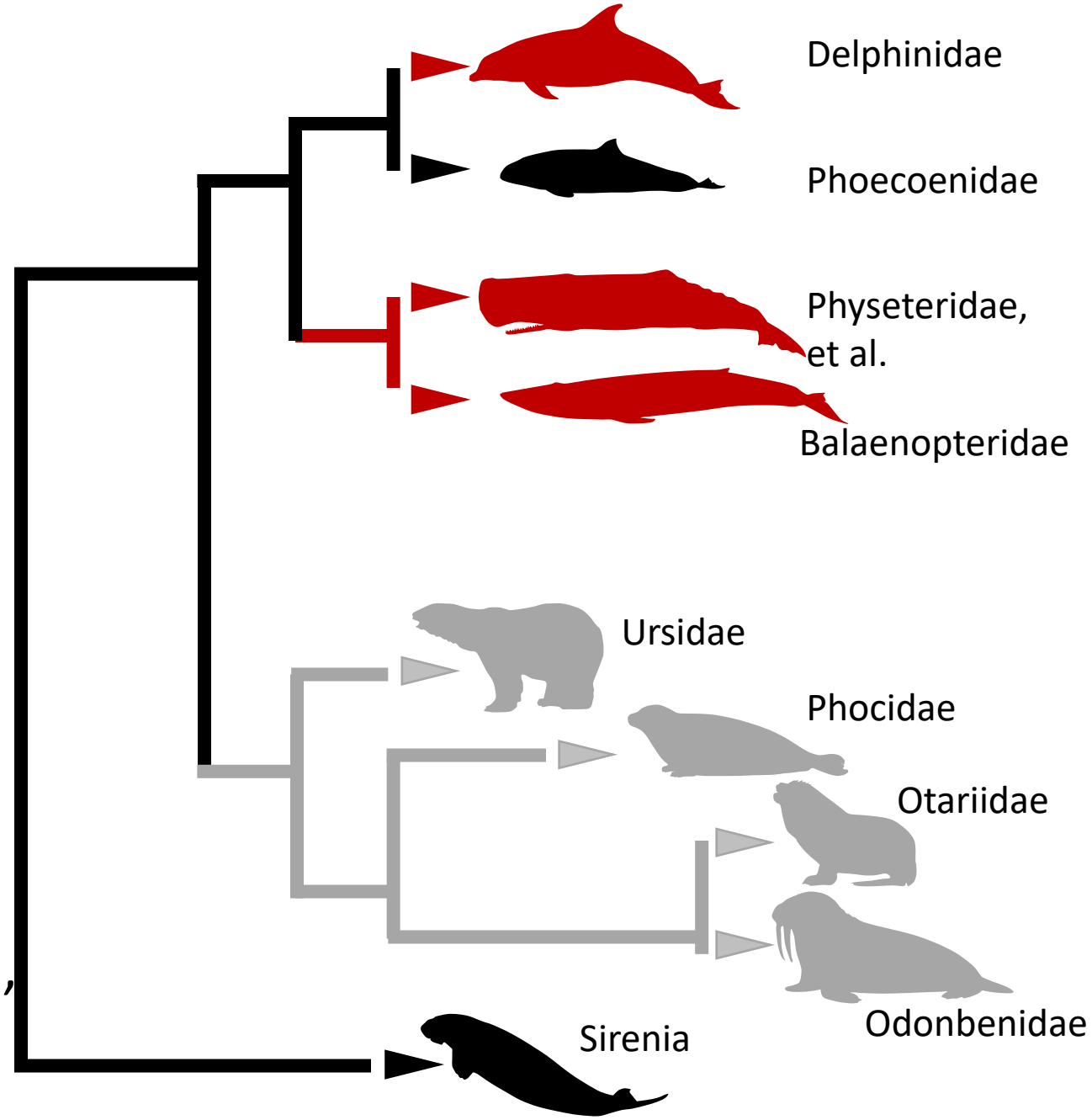
ETP Species Classification

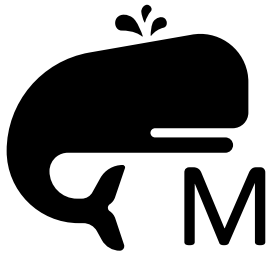
- Marine Mammals: Whales, dolphins, porpoises, and dugongs.
- Reptiles: All sea turtles (such as green turtles and olive ridleys).
- Seabirds: Albatrosses, petrels, and other birds that dive for bait.
- Fish and Elasmobranchs: Certain vulnerable sharks (like whale sharks and sawfish) and rays.



Marine mammals

- The mammal associated with the marine environment
- Almost 90% are carnivores (including piscivores and planktivores), except Sirenia
- Only Delphinidae, Phoecoenidae, Physeteridae, Balaenopteridae, and Sirenia are found in SEA
- Only Delphinidae, Physeteridae, and Balaenopteridae are found in the high seas.





Marine mammals

- **All cetaceans (dolphins and whales) found in the high seas are considered ETP species** according to conservation status and the CITES list (appendix I and II)
- This includes all dolphins, toothed whales (sperm whale, false sperm whale, pilot whale, and beaked whale species), and baleen whales (Bryde's whale, Omura whale, Fin whale, and Blue whale)

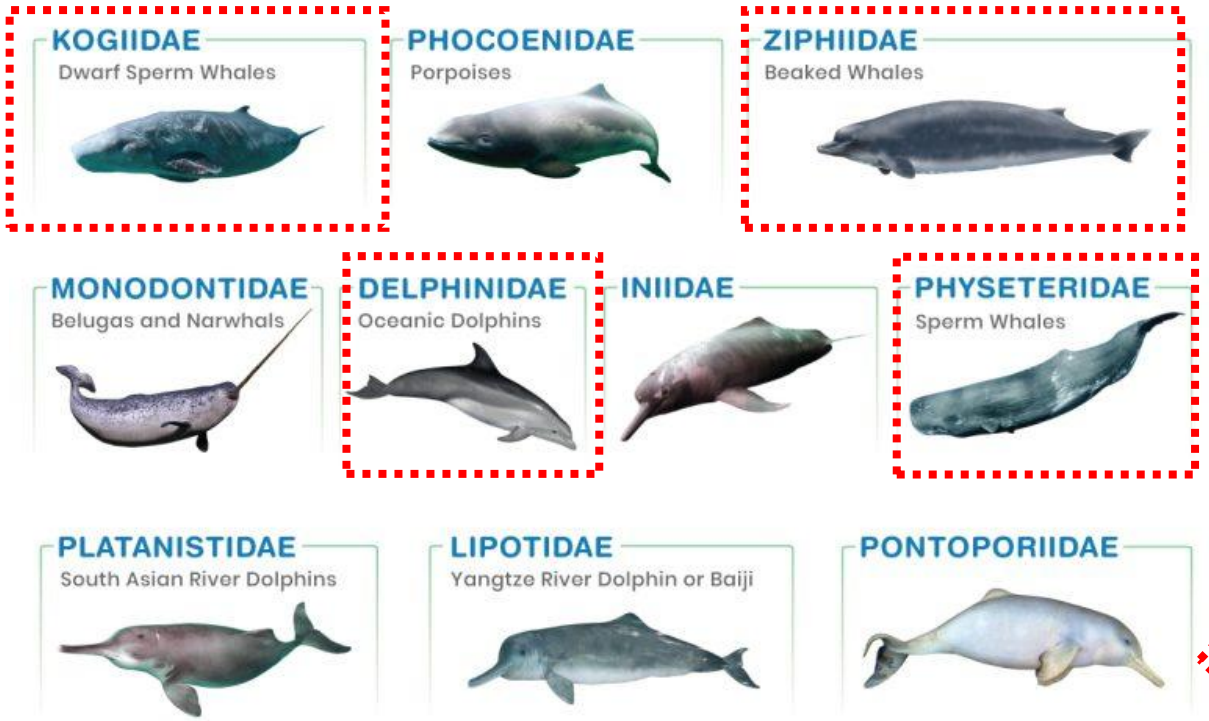
Marine mammals

TOOTHED WHALES
PARVORDER ODONTOCETI

Large cetacean mammals with bony teeth instead of keratinized oral plates. 73 described species are grouped under 10 families

Range: From the ARCTIC to the TROPICAL WATERS

Diet: CEPHALOPODS, BIVALVES, CRUSTACEANS, and FISH



AnimalFact

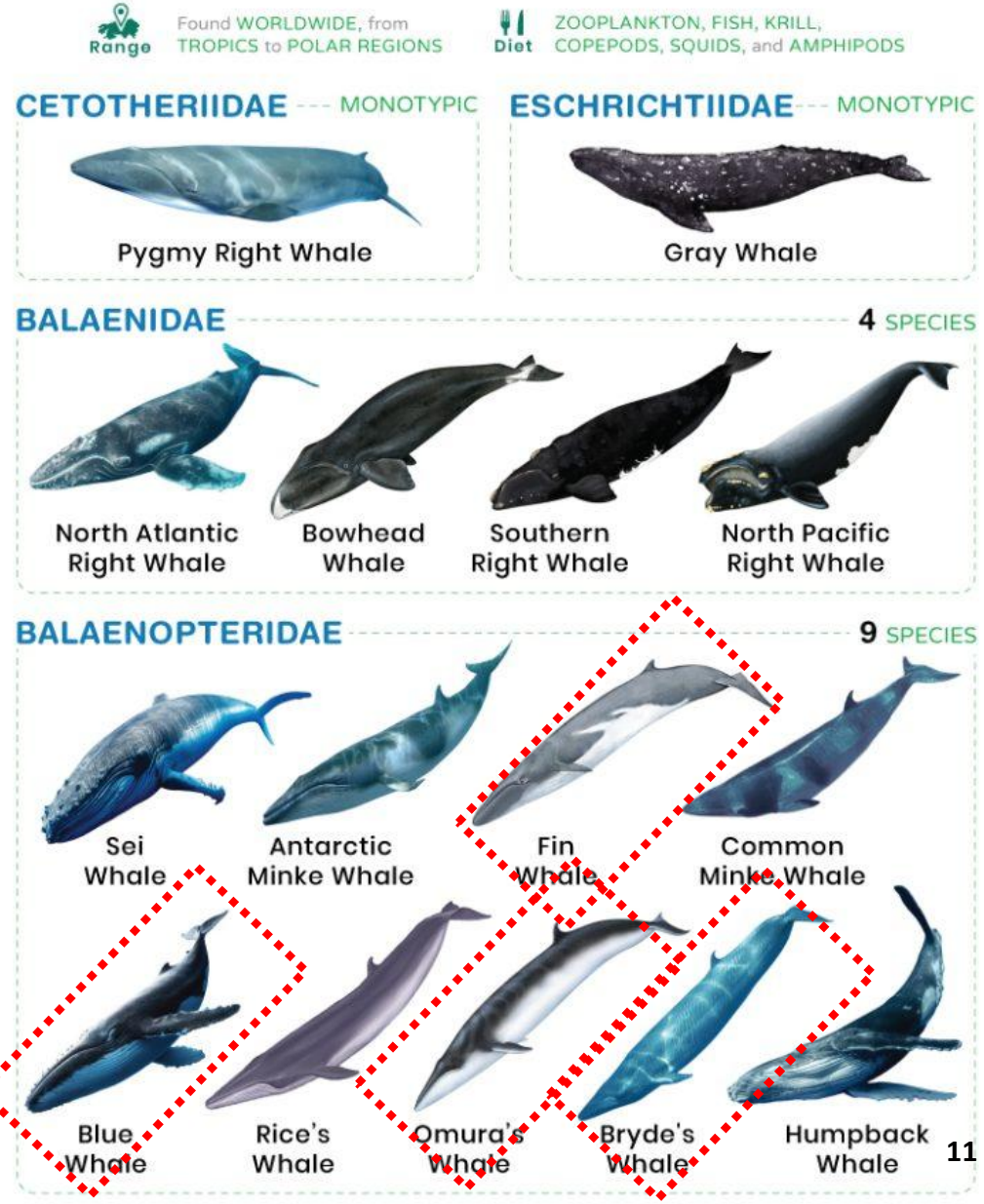
BALEEN WHALES
PARVORDER MYSTICETI

AnimalFact

Large marine mammals with hard, keratinized plates called baleen in place of teeth. Fifteen recognized species are divided into four families

Range: Found WORLDWIDE, from TROPICS to POLAR REGIONS

Diet: ZOOPLANKTON, FISH, KRILL, COPEPODS, SQUIDS, and AMPHIPODS



https://animalfact.com/

Seabirds

- The group of modern avian associated with sea life behavior from shoreline to high seas
- Displayed the unique behavior of deep dive into the school of pelagic fish for high latitude species
- However, most tropical seabirds (like boobies, shearwaters, and terns) **cannot dive more than a few meters**. To survive in the nutrient-poor tropical open ocean, they depend entirely on **subsurface predators**—like Yellowfin Tuna, Skipjack Tuna, and Billfish—to drive schools of baitfish up to the surface.





Seabirds

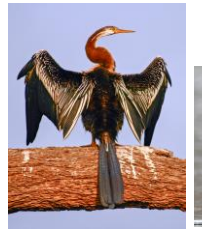
- CHARADRIIFORMES
  - Alcidae (Auks)
  - Stercorariidae (Skuas)
  - **LARIDAE (Gulls, Terns, Skimmers)**
- PROCELLARIIFORMES (Albatrosses & Petrels, tubenose group)
  - **PROCELLARIDAE (tubenose)**
- SPHENISCIFORMES (Penguins, flightless swimmers)
- PELECANIFORMES (Pelicans, Herons, Ibises)
  - **FREGATIDAE (Frigatebirds)**
  - SULIFORMES (Gannets, Cormorants, Boobies)
    - Anhingidae (Darters)
    - Phalacrocoracidae (Cormorants)
    - **SULIDAE (Boobies & Gannets)**







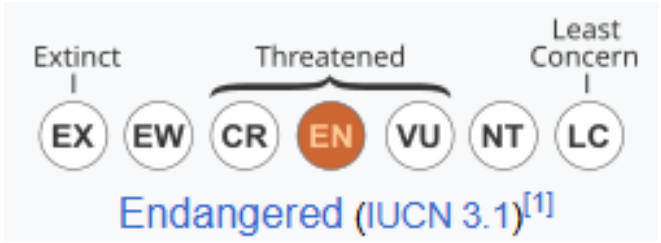




Seabirds

- PROCELLARIIFORMES
  Procellariidae

Barau's Petrel
(*Pterodroma baraui*)
Distribution: Indian Ocean to West Australia

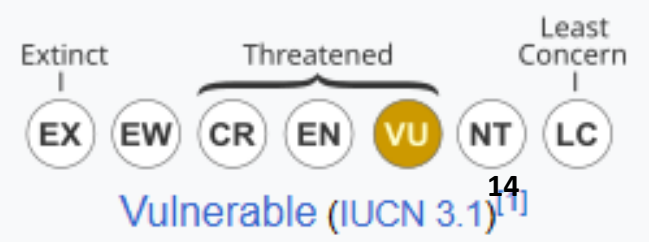


- SULIFORMES
  Sulidae

Abbott's Boobies
(*Papasula abbotti*)
Distribution: Christmas Island, Indonesia, and Northwest Australia

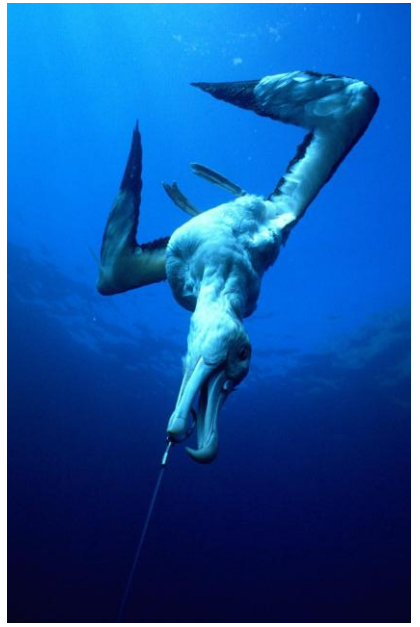
- SULIFORMES
  Fregatidae

Christmas Frigatebird
(*Fregata andrewsi*)
Distribution: Christmas Island, Indian Ocean, and Southeast Asia



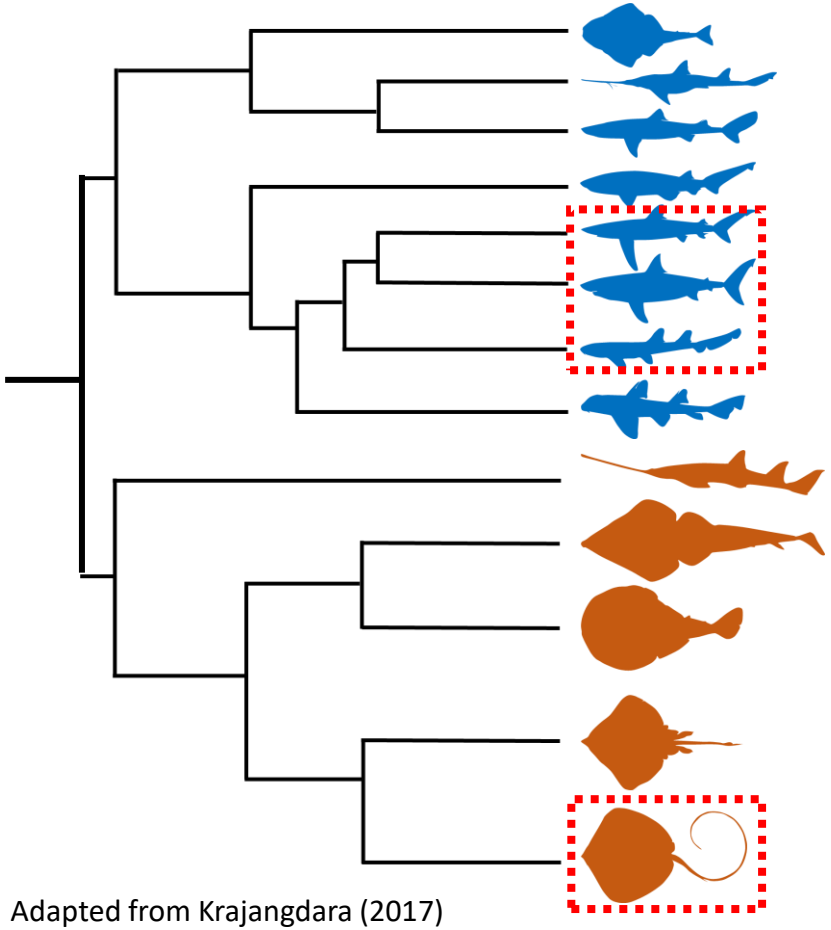
Seabirds

- Threat
  - Industrial Overfishing of Tuna (High Seas) -> Fewer Subsurface Predators driving baitfish up
  - **The High Seas Threat:** Commercial overfishing of large tunas on the high seas directly causes tropical seabirds to starve because it destroys their primary method of finding food.

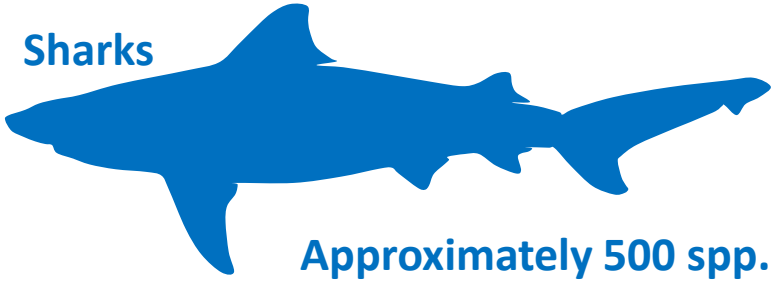


Elasmobranchs

- 400 million years of evolution
- 1,200 spp. worldwide (Krajangdara, 2017)

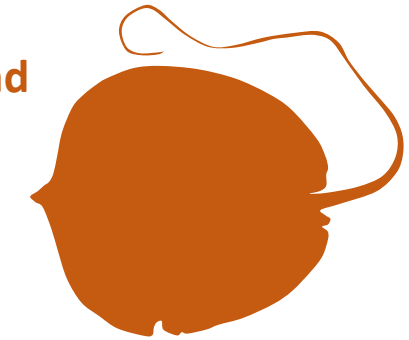


Adapted from Krajangdara (2017)



Sharks

Approximately 500 spp.
(Ebert et al., 2013)

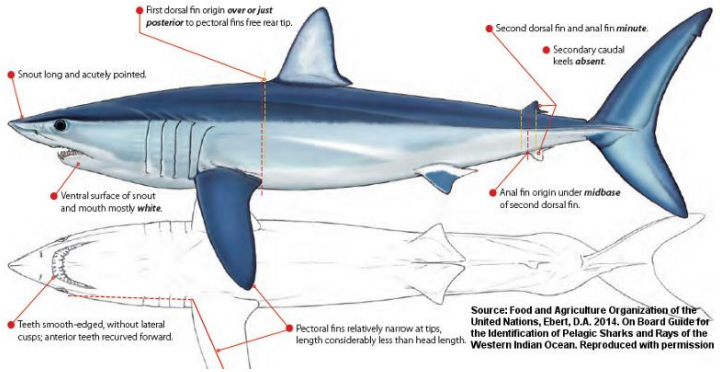


Rays and skates

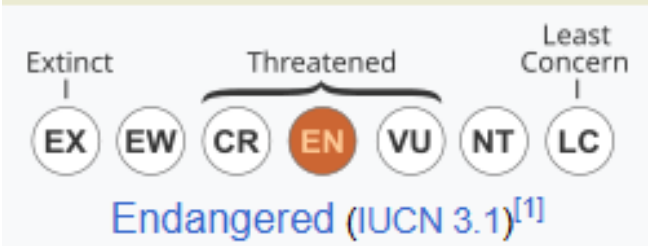
Approximately 600 spp.
(Last et al., 2016)

Elasmobranchs

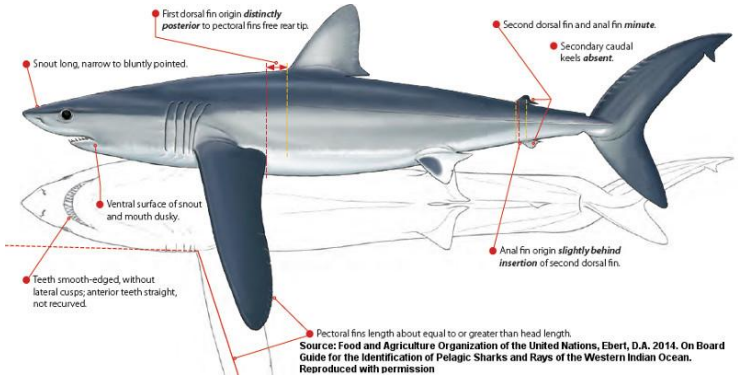
- LAMNIFORMES
  Lamnidae



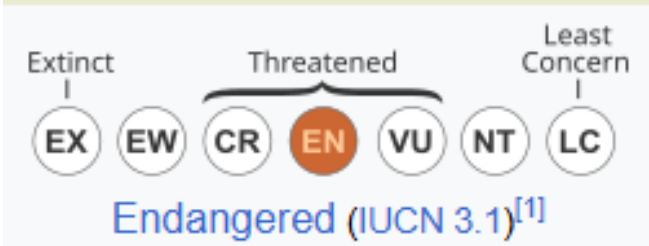
Shortfin Marko
(*Isurus oxyrinchus*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean



- LAMNIFORMES
  Lamnidae

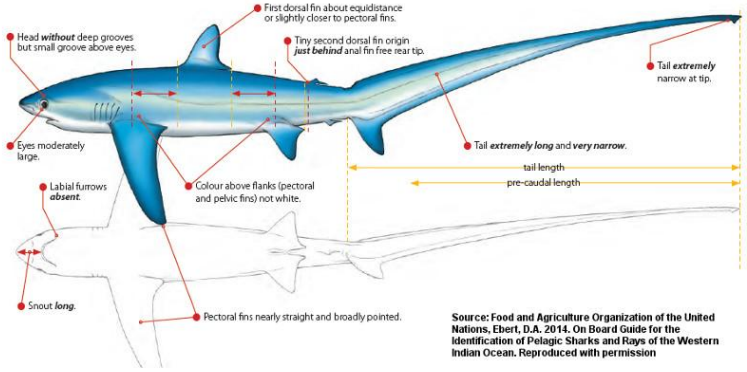


Longtfin Marko
(*Isurus paucus*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean

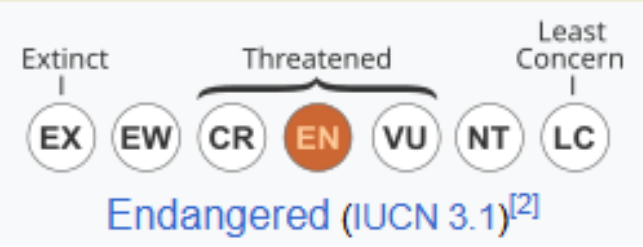


Elasmobranchs

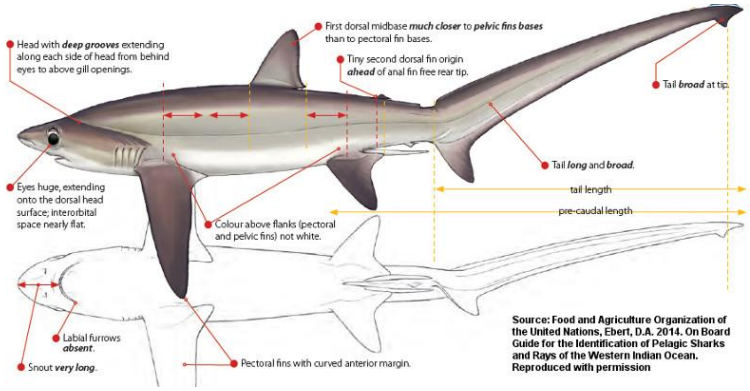
- LAMNIFORMES
  Alopiidae



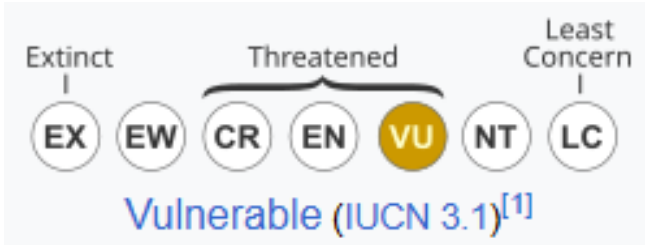
Pelagic Thresher
(*Alopias pelagicus*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean



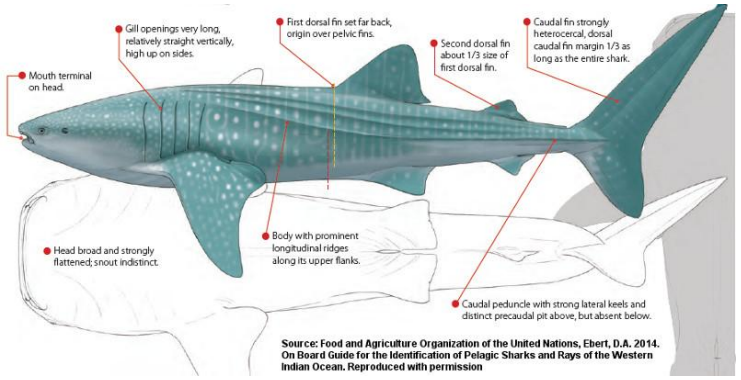
- LAMNIFORMES
  Alopiidae



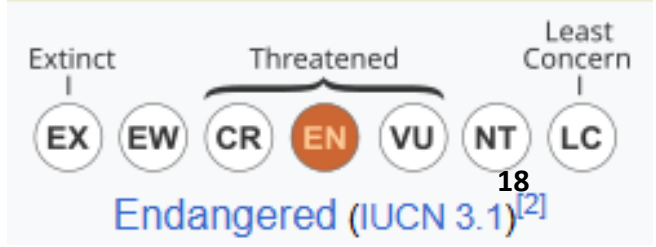
Bigeye Thresher
(*Alopias superciliosus*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean



- ORECTOLOBIFORMES
  Rhincodontidae



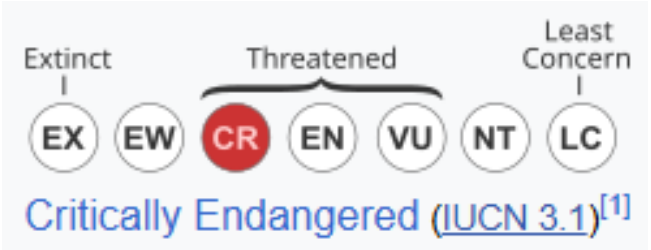
Whale Shark
(*Rhincodon typus*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean



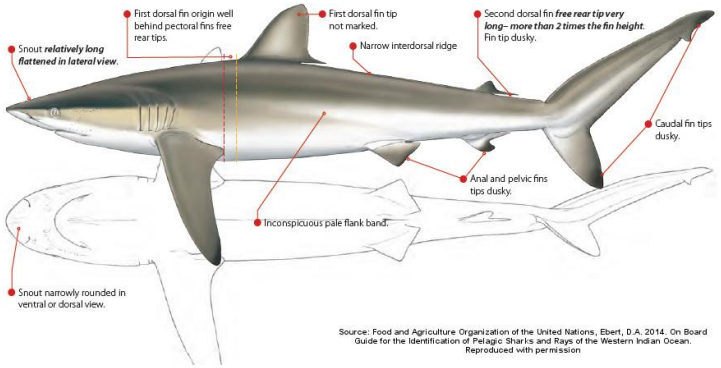
Elasmobranchs

- CARCHARHINIFORMES
  Sphyrnidae

Scalloped Hammerhead
(*Sphyrna lewini*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean

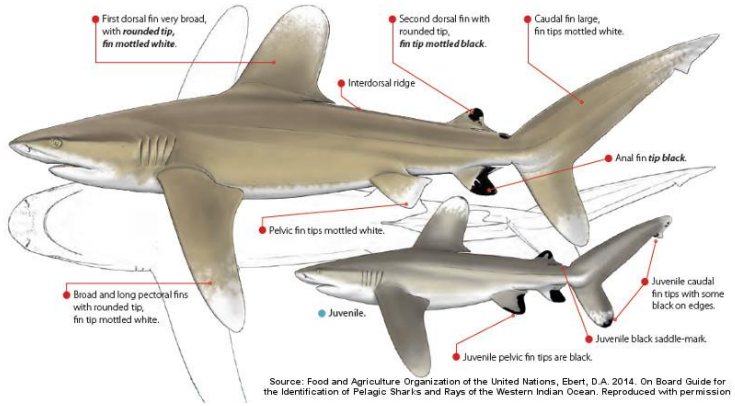


- CARCHARHINIFORMES
  Carcharhinidae

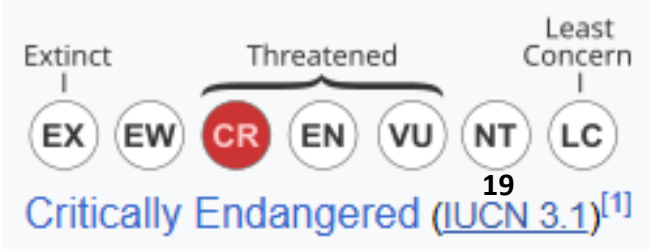


Silky Shark
(*Carcharhinus falciformis*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean

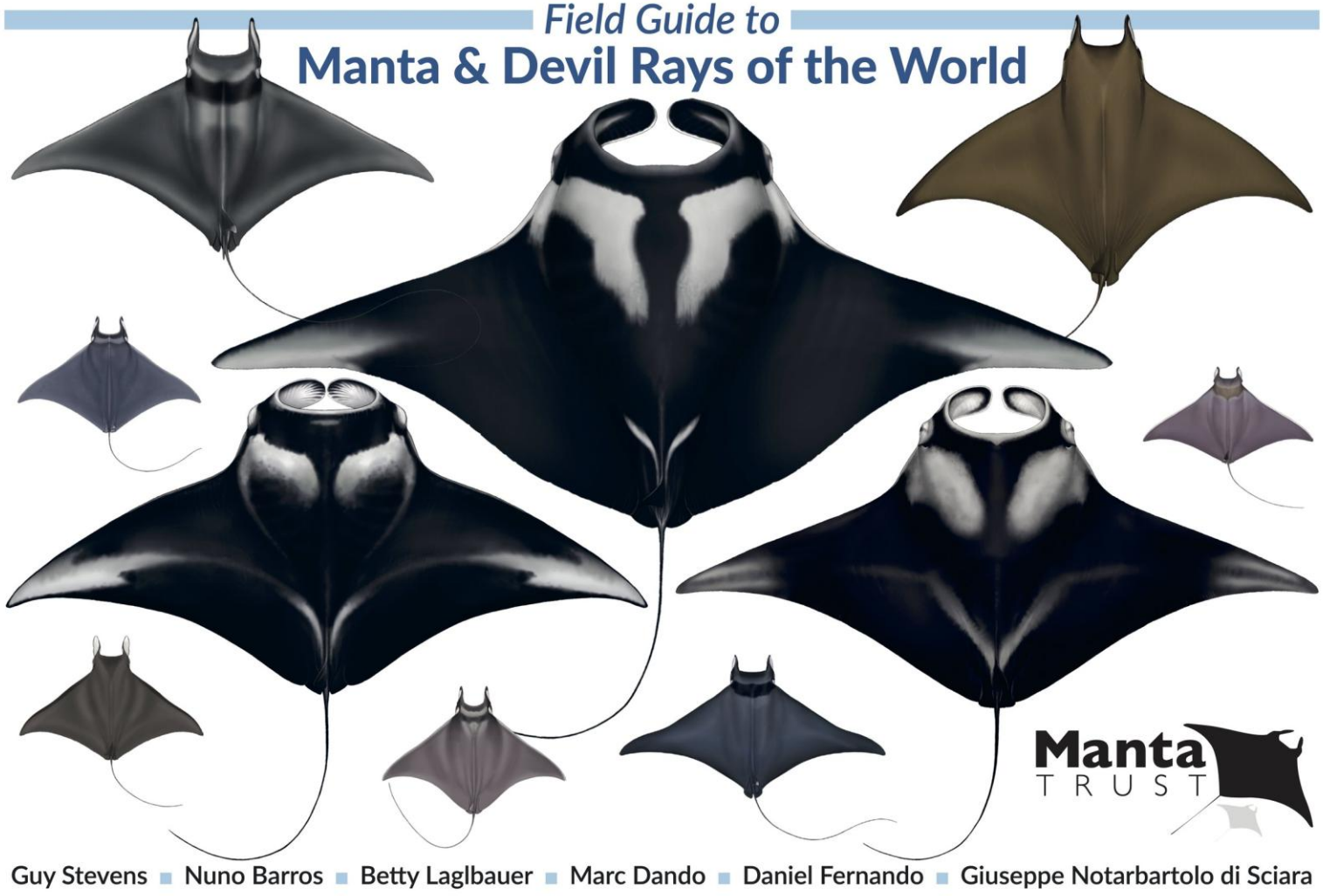
- CARCHARHINIFORMES
  Carcharhinidae



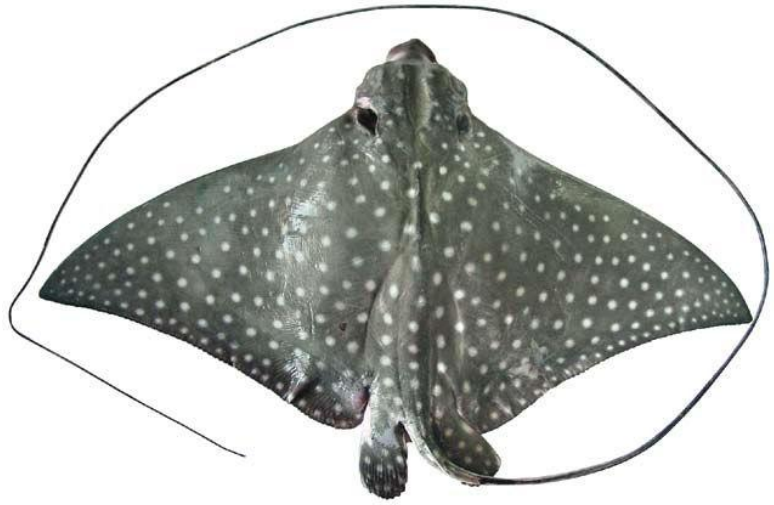
Oceanic Whitetip
(*Carcharhinus longimanus*)
Distribution: through the tropical Pacific, Atlantic, and Indian Ocean



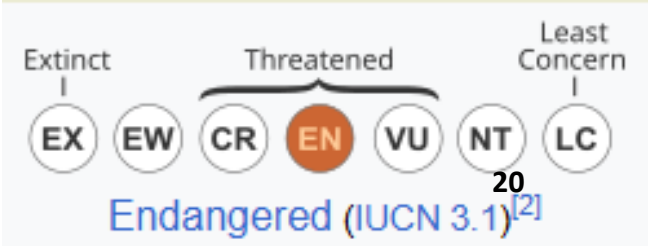
Elasmobranchs



- MYLIOBATIFORMES
  Aetobatidae

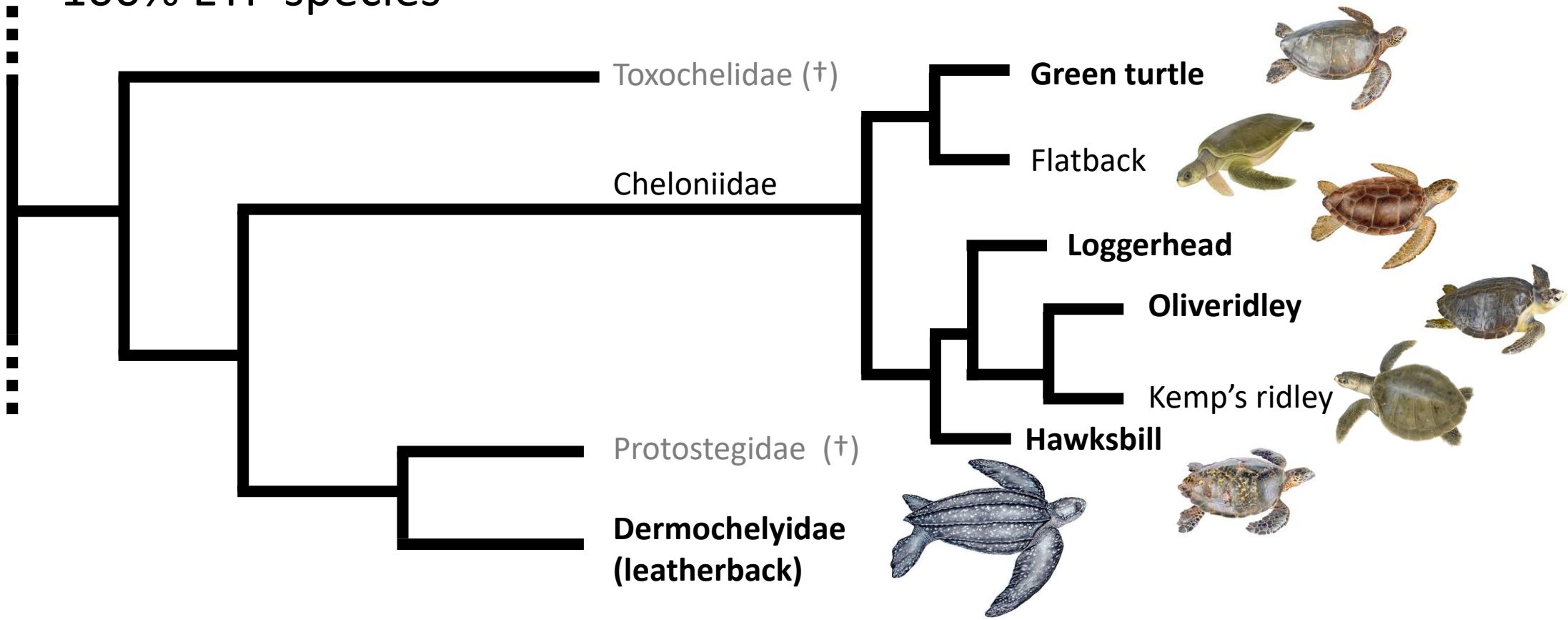


Ocellated Eagle Ray
(*Aetobatus ocellatus*)
Distribution: rarely found in high seas of Pacific, Atlantic, and Indian Ocean



Marine reptile

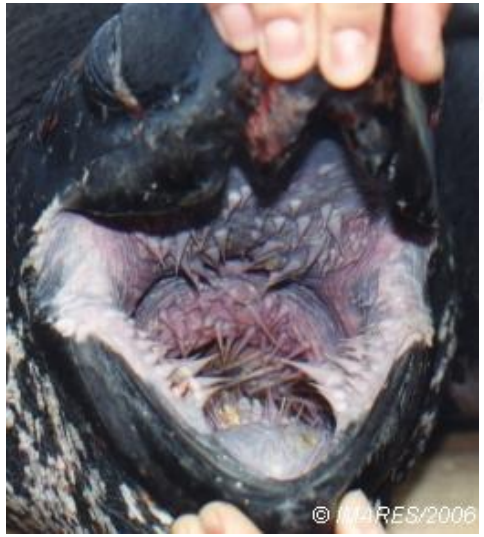
- Only one group was found using high seas as a migratory route: sea turtles
- 100% ETP species

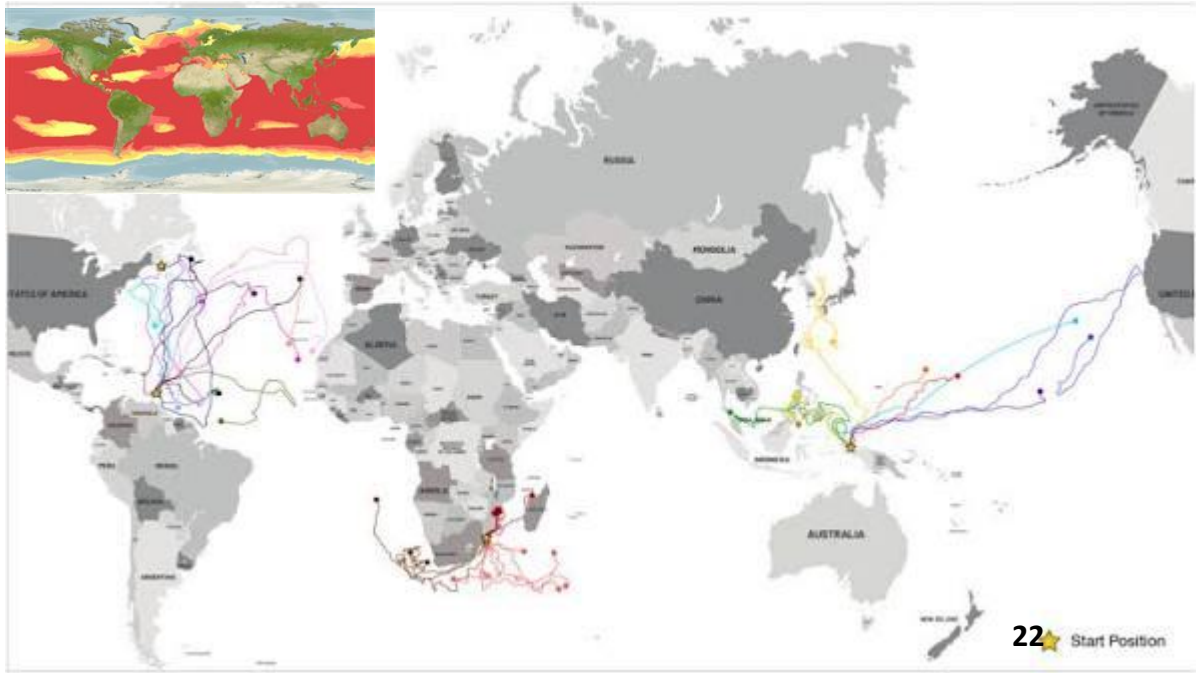


https://www.reptilesofecuador.com/cheloniidae.html

Marine reptile

- Leatherback turtle (*Dermochelys coriacea*)
- No scutes; only skin covers a shell
- Largest sea turtle, 150- 160 cm shell length, weight 350-450 kg.

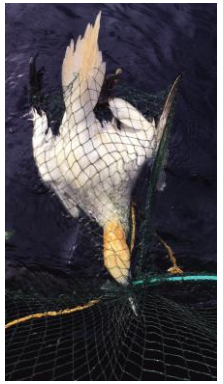


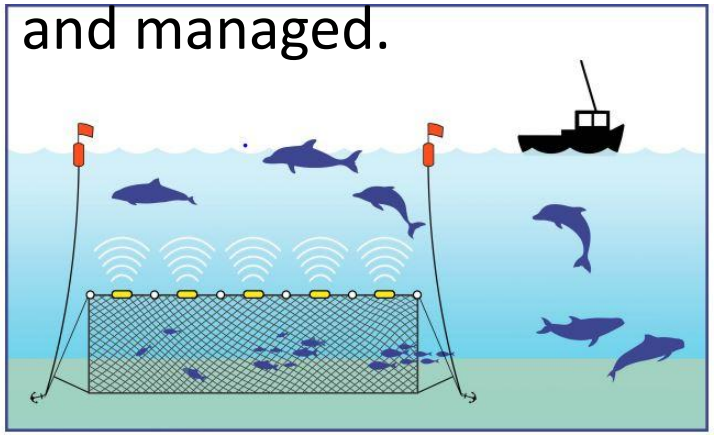


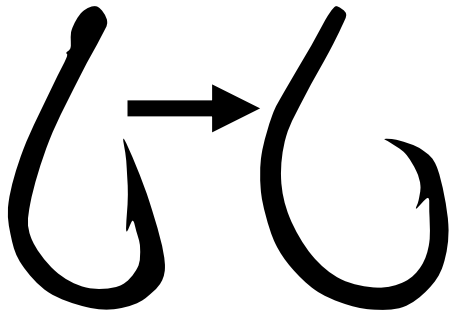
Management measures and way forwards

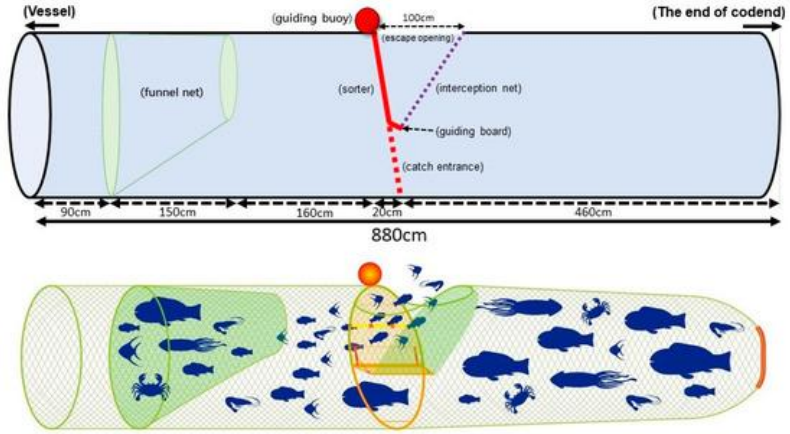
Bycatch reduction

- The gear improvement by enlarging the mesh size or attaching special equipment to reduce bycatch.
- The utilization of the “pinger” to reduce cetacean bycatch entangling with the net.
- The distribution area of species listed as endangered, threatened, and protected (ETP) species is identified and managed.





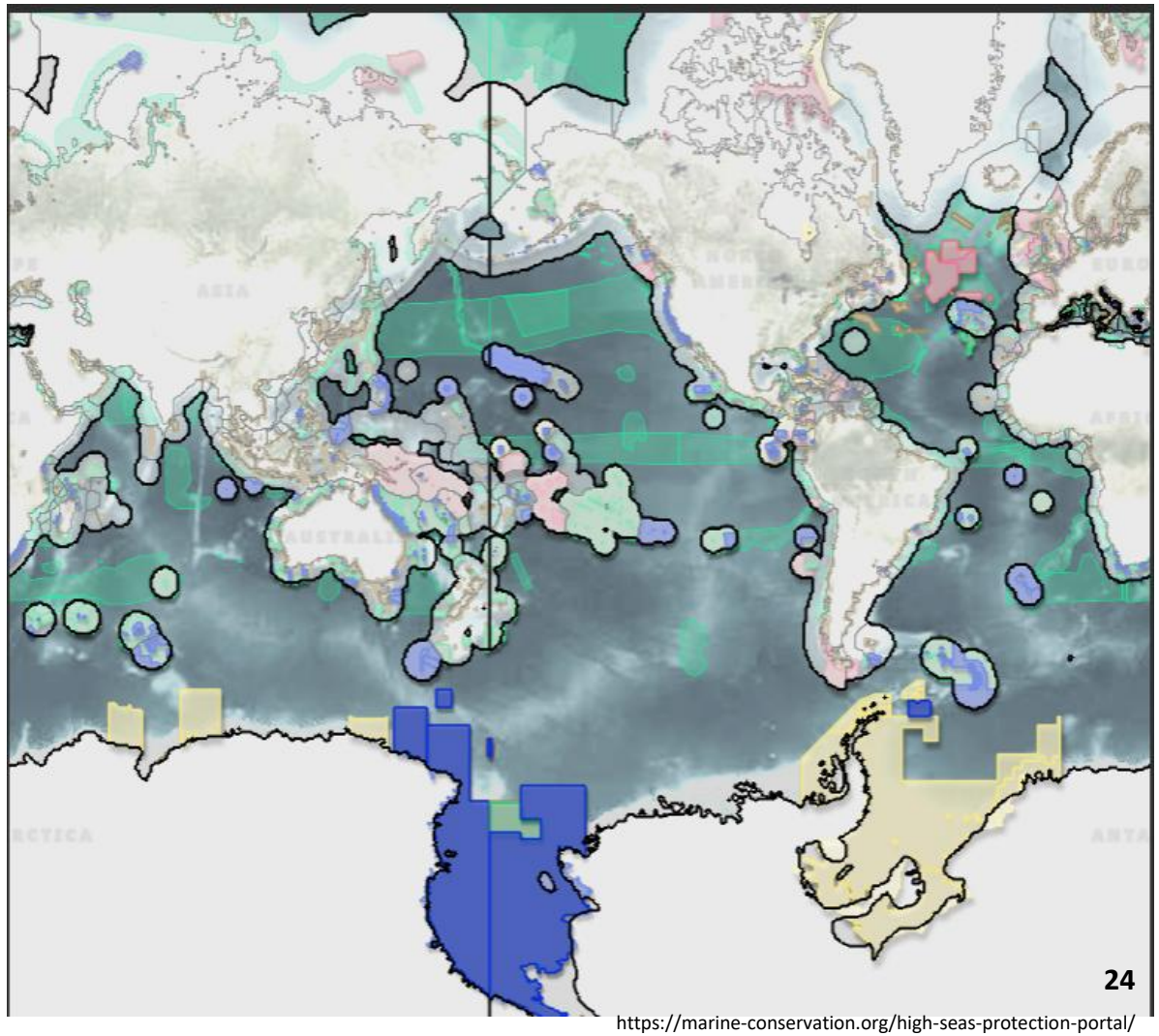




Management measures and way forwards

Marine Protected Areas (MPAs)

- These high seas MPAs are protected ocean zones in international waters beyond any single country's national jurisdiction.
- Currently, less than 1.5% of these international waters are protected, but the landmark UN BBNJ (Biodiversity Beyond National Jurisdiction).
- Treaty provides a new global framework to scale up high seas sanctuaries.

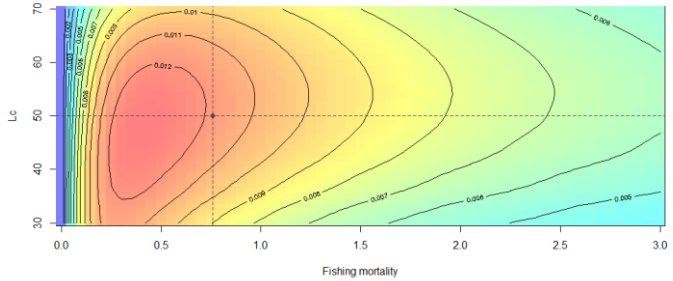


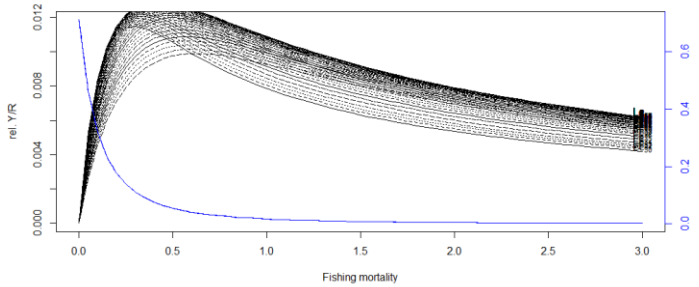
https://marine-conservation.org/high-seas-protection-portal/

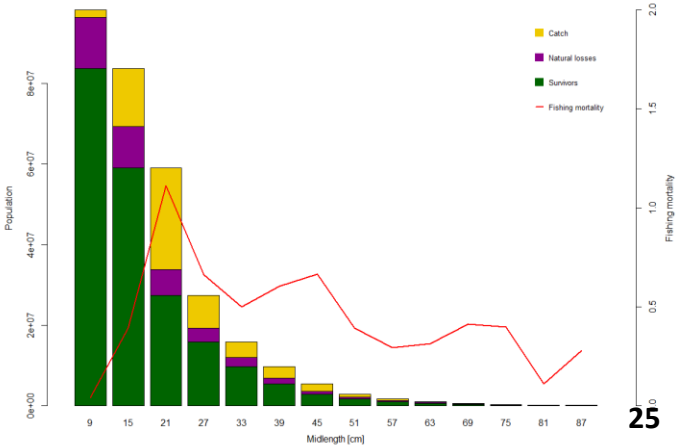
Management measures and way forwards

Population Dynamics and Stock Assessment

- Continue the data collection
- Utilize the data by providing the annual or regular stock status
- Collect the environmental parameters
- Up date the status and find the relationship with the changing of environmental factors
- Length-based SA, LBSPR, CART, etc.







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- https://pdf.sciencedirectassets.com/271824/1-s2.0-S0308597X23X00141/1-s2.0-S0308597X24001155/

In Southeast Asian conservation and fisheries management, **ETP species** refer to **Endangered, Threatened, and Protected** aquatic and marine wildlife frequently impacted or caught as bycatch. Key regional species include: [1]

Marine Mammals

- **Irrawaddy dolphin** (*Orcaella brevirostris*)
- **Dugong** (*Dugong dugon*)
- **Finless porpoise** (*Neophocaena phocaenoides*)
- **Sperm whale** (*Physeter macrocephalus*) [1, 2]

Marine Turtles

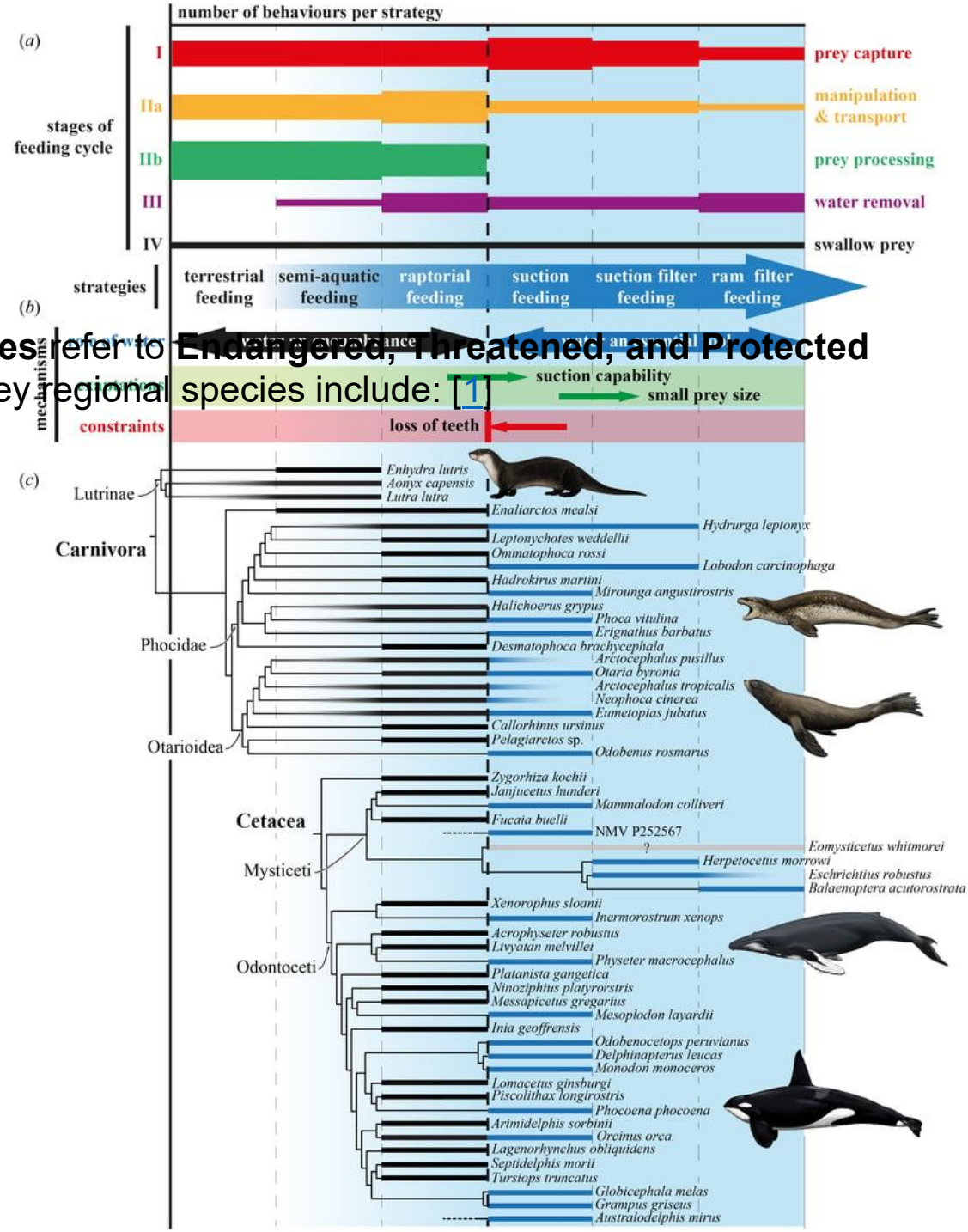
- **Green sea turtle** (*Chelonia mydas*)
- **Hawksbill turtle** (*Eretmochelys imbricata*)
- **Leatherback turtle** (*Dermochelys coriacea*) [1, 2, 3]

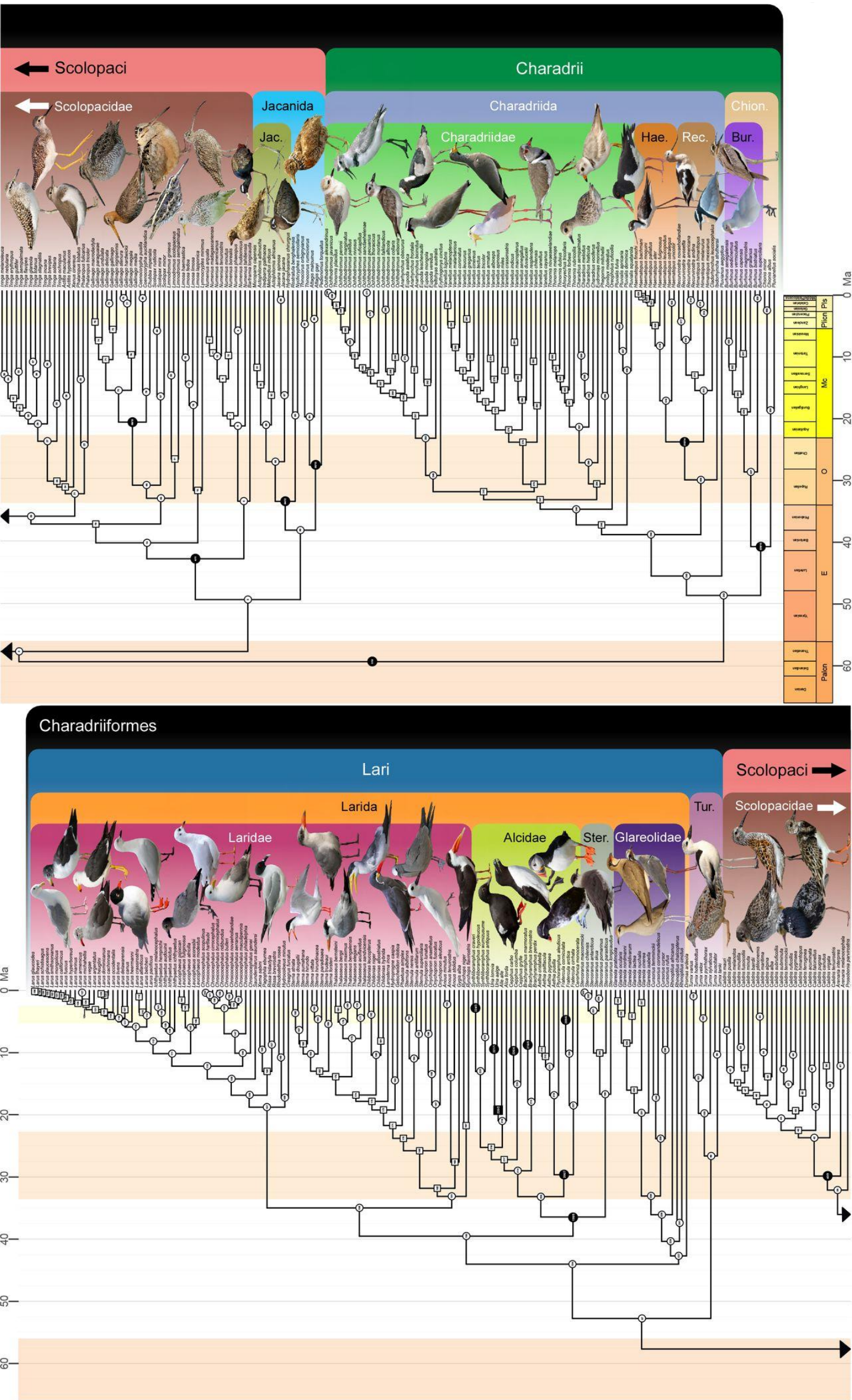
Sharks and Rays

- **Scalloped hammerhead** (*Sphyrna lewini*)
- **Whale shark** (*Rhincodon typus*)
- **Broadnose wedgefish** (*Rhynchobatus djiddensis*)
- **Thresher sharks** (*Alopias spp.*) [1, 2, 3]

Syngnathids and Invertebrates

- **Seahorses** (*Hippocampus spp.*) [1]




Scolopaci
Charadrii
Scolopacidae
Jacanida
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Hae.
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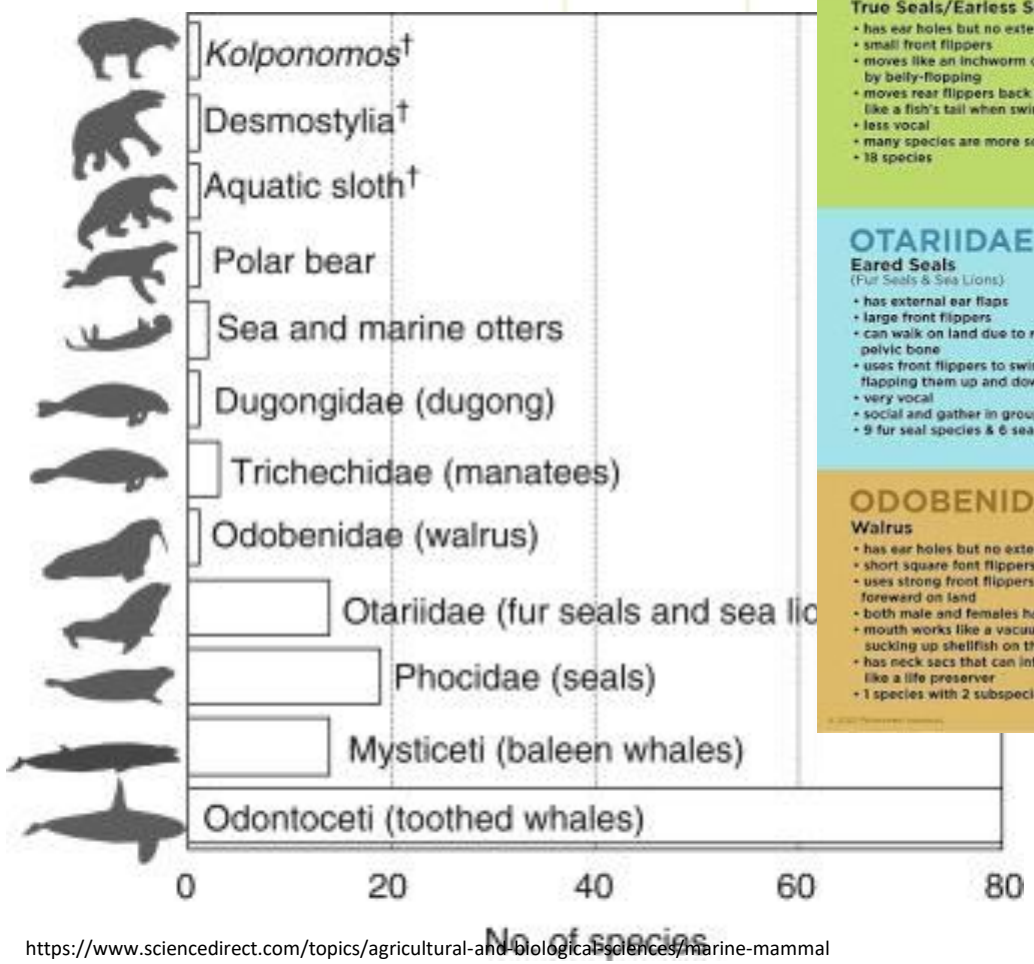
Tur.
Scolopacidae
Laridae
Alcidae
Ster.
Glareolidae

Family tree and evolutionary history of



https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/marine-mammal

https://marinemammalscience.org/science-and-publications/species-information/attachment/taxonomy-sumich-2/