Ecological Connectivity: Implications for Adjacency

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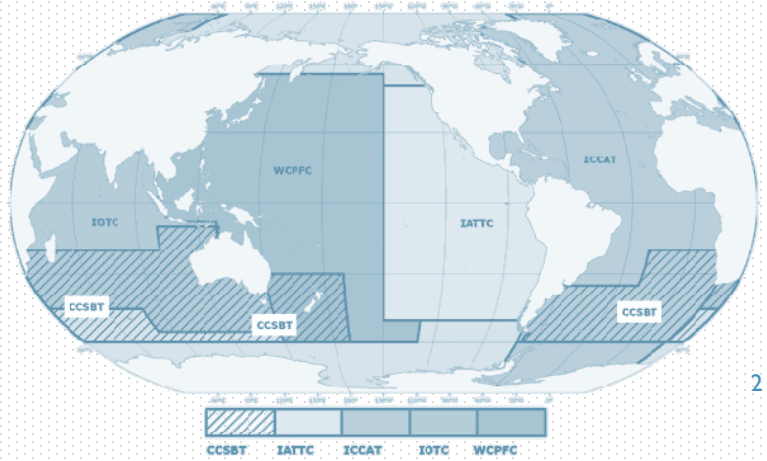
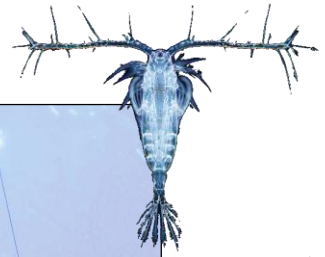
PRESENTATION OUTLINE

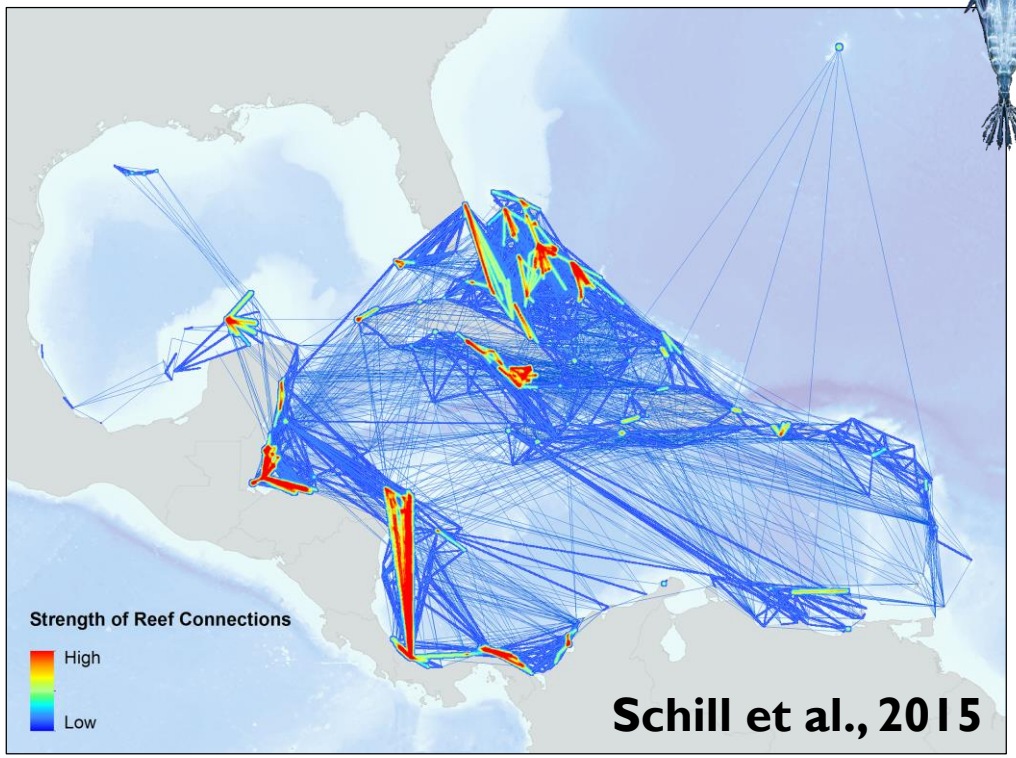
- Explain the two different types of marine ecological connectivity
- Current state of knowledge on migratory & straddling species
- The conservation and management status of some of the world's marine highly migratory and straddling biodiversity
- Examples of straddling and migratory movements



TWO TYPES OF ECOLOGICAL CONNECTIVITY

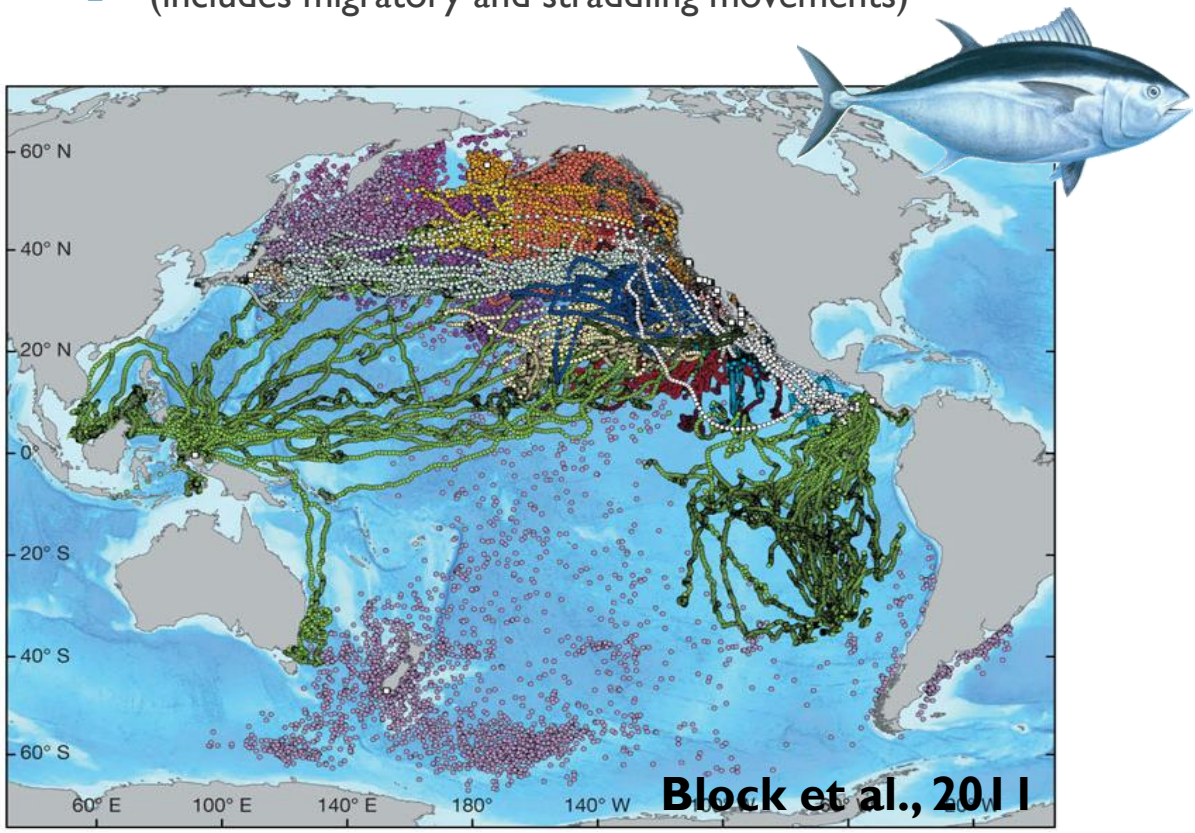
- Planktonic (passive) connectivity: Driven by oceanography (ocean currents)





Schill et al., 2015

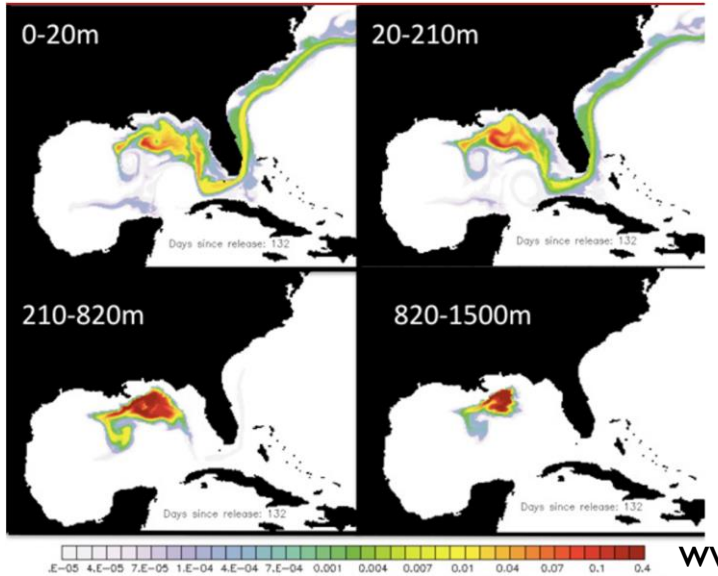
- Nektonic (active) connectivity: driven by locomotion
  - (includes migratory and straddling movements)



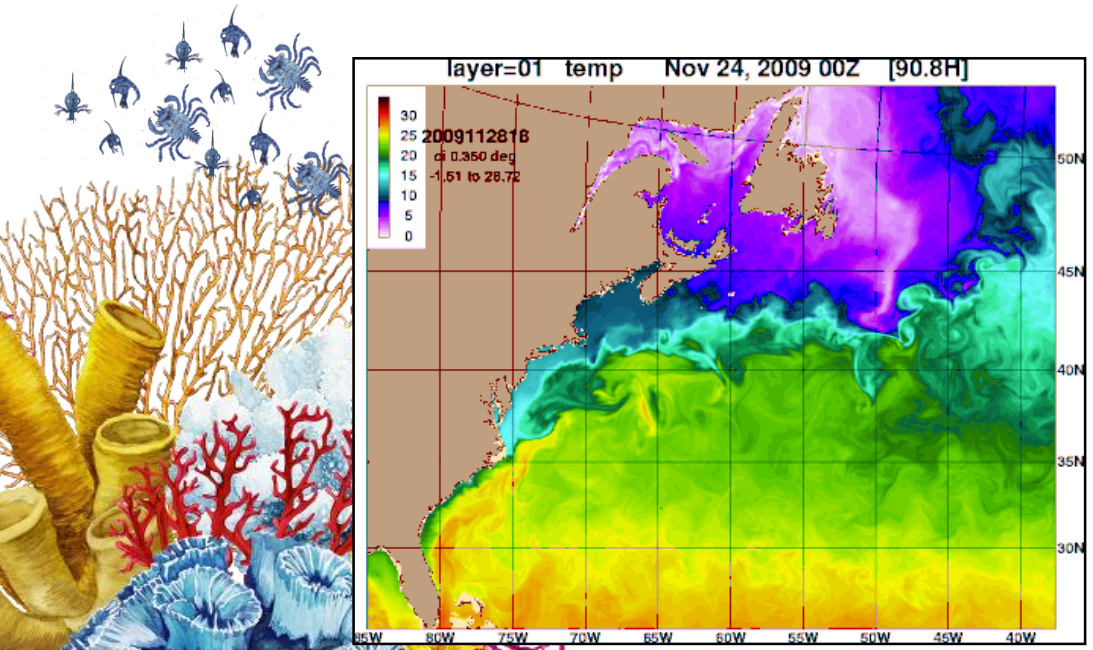
Block et al., 2011

OCEANOGRAPHIC CONNECTIVITY

- Ocean currents can be thought of as major highways which **transport** and **redistribute** nutrients, heat and organisms – as well as pollutants - in the thee spatial dimensions of the ocean and across jurisdictional boundaries.
- These long-distance connections are important as they periodically **provide recruits** from distant stocks and populations.



www.ucar.edu



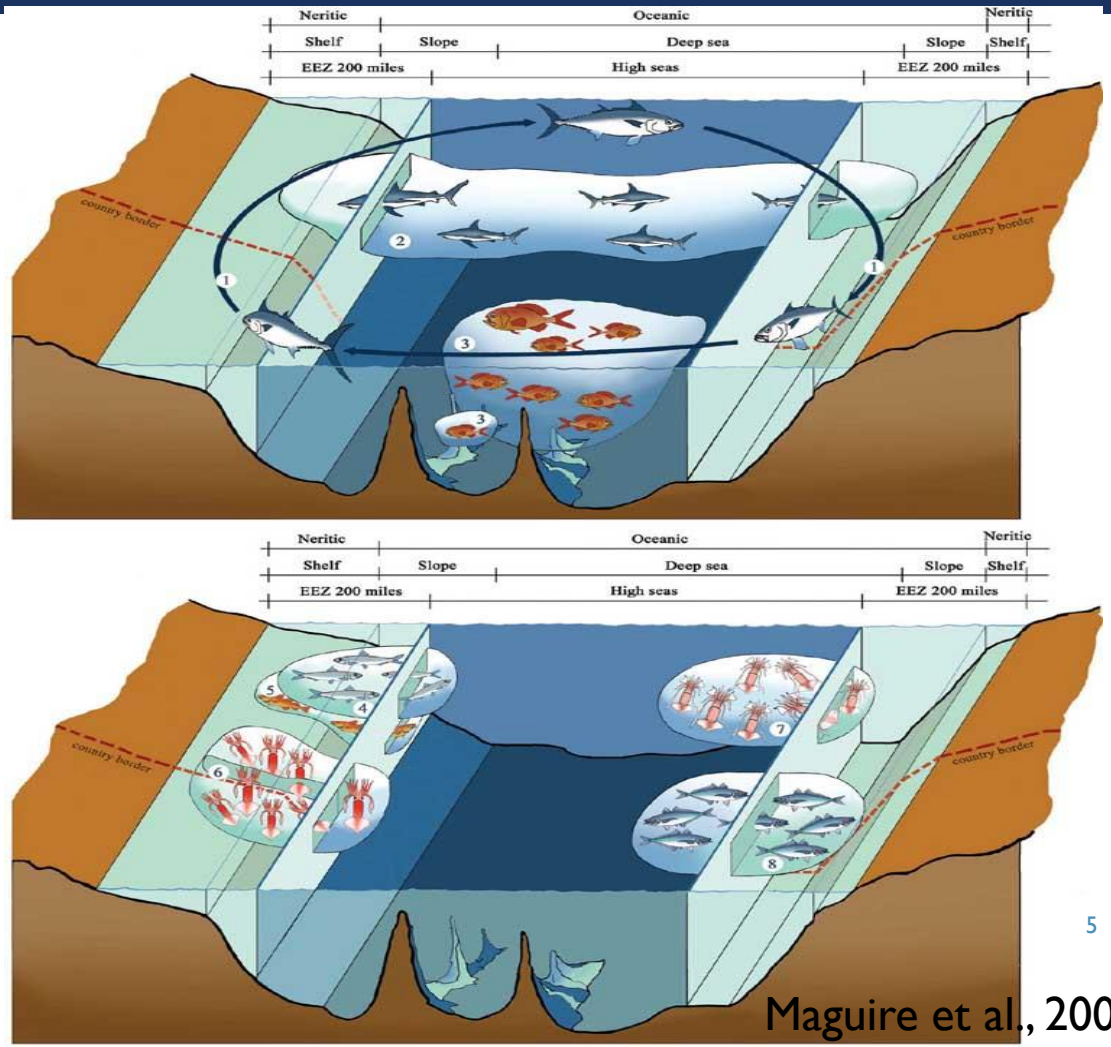
- **Long-distance interdependence** of marine ecosystems within these regions.
- These analyses demonstrate the importance of direct adjacency between near shore (EEZ) areas and offshore (ABNJ)

TYPES OF NEKTONIC CONNECTIVITY

- Highly migratory species:
  - The legal definition must evolve to encompass the ecological definition (Annex I)
- Straddling:
  - UNCLOS does not use the term "**straddling stocks**"
  - Article 63, clause 2 refers to: "*the same stock or stocks of associated species[which] occur both within the exclusive economic zone and in an area beyond and adjacent to the zone*",

- Coastal States and States fishing in the High Seas shall:

"*take into account the **biological unity of the stocks** and the relationships between the distribution of the stocks, the fisheries and the geographical particularities of the region concerned, including the extent to which the stocks occur and are fished in areas under national jurisdiction*" [Article 7.2(d)]

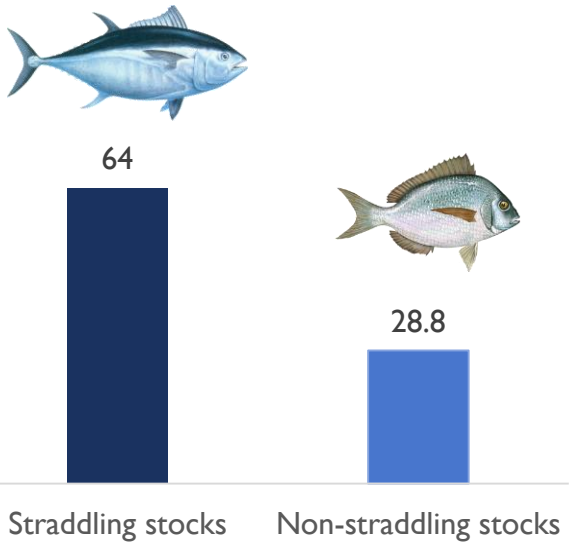


Maguire et al., 2006

MIGRATORY & STRADDLING SPECIES

- The management and conservation of straddling and highly migratory species is a complex challenge:
  - Large and dynamic **spatiotemporal distributions**: complicated to study
  - Many have **vulnerable life history** strategies: growth rate | age of maturity
  - Complexities of coordination among **multiple parties** across jurisdictional boundaries.

- In 2011, the FAO estimated that straddling stocks were overfished or experiencing overfishing at a rate twice that of stocks within national jurisdictions.



1. Albacore tuna: *Thunnus alalunga*.
2. Bluefin tuna: *Thunnus thynnus*.
3. Bigeye tuna: *Thunnus obesus*.
4. Skipjack tuna: *Katsuwonus pelamis*.
5. Yellowfin tuna: *Thunnus albacares*.
6. Blackfin tuna: *Thunnus atlanticus*.
7. Little tuna: *Euthynnus alletteratus*; *Euthynnus affinis*.
8. Southern bluefin tuna: *Thunnus maccoyii*.
9. Frigate mackerel: *Auxis thazard*; *Auxis rochei*.
10. Pomfrets: Family *Bramidae*.
11. Marlins: *Tetrapturus angustirostris*; *Tetrapturus belone*; *Tetrapturus pfluegeri*; *Tetrapturus albidus*; *Tetrapturus audax*; *Tetrapturus georgei*; *Makaira mazara*; *Makaira indica*; *Makaira nigricans*.
12. Sail-fishes: *Istiophorus platypterus*; *Istiophorus albicans*.
13. Swordfish: *Xiphias gladius*.
14. Sauries: *Scomberesox saurus*; *Cololabis saira*; *Cololabis adocetus*; *Scomberesox saurus scombroides*.
15. Dolphin: *Coryphaena hippurus*; *Coryphaena equiselis*.
16. Oceanic sharks: *Hexanchus griseus*; *Cetorhinus maximus*; Family *Alopiidae*; *Rhincodon typus*; Family *Carcharhinidae*; Family *Sphyrnidae*; Family *Isurida*.
17. Cetaceans: Family *Physeteridae*; Family *Balaenopteridae*; Family *Balaenidae*; Family *Eschrichtiidae*; Family *Monodontidae*; Family *Ziphiidae*; Family *Delphinidae*.

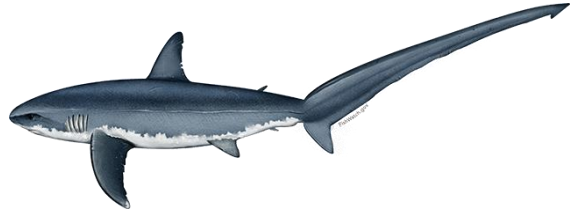
35 spp. of bony fish
67 spp. of shark
75 spp. Of marine mammal

HIGHLY MIGRATORY SPECIES UNDER UNCLOS: ANNEX I

Sea turtles

Lascelles et al., 2014

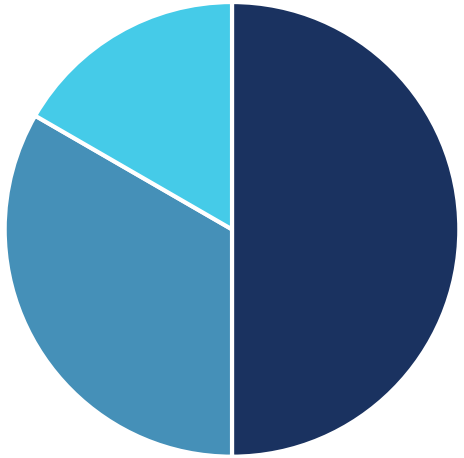
Seabirds

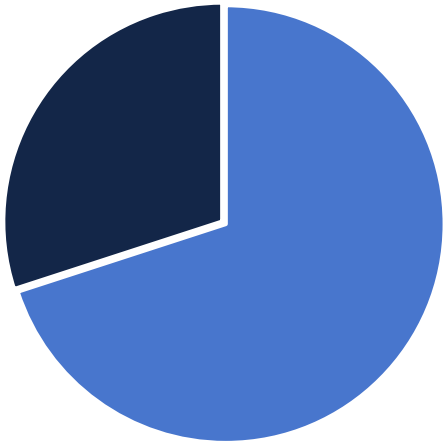


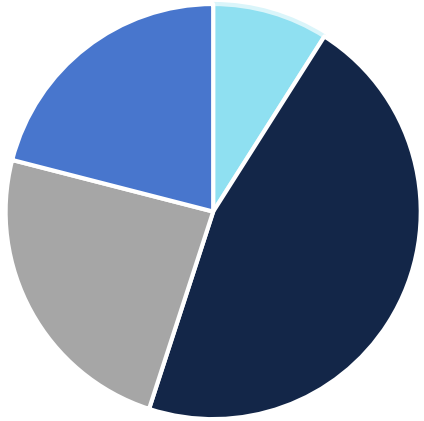
Fowler 2014

Shark

Marine fish





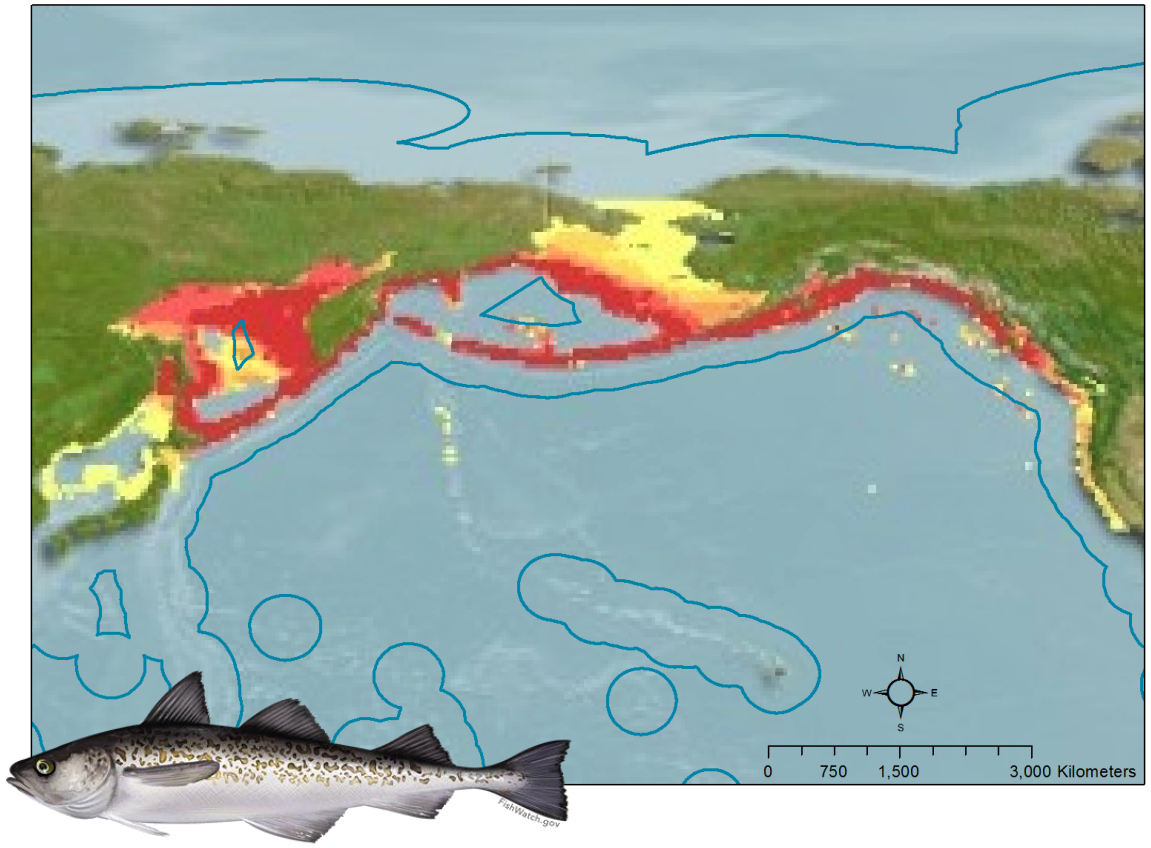


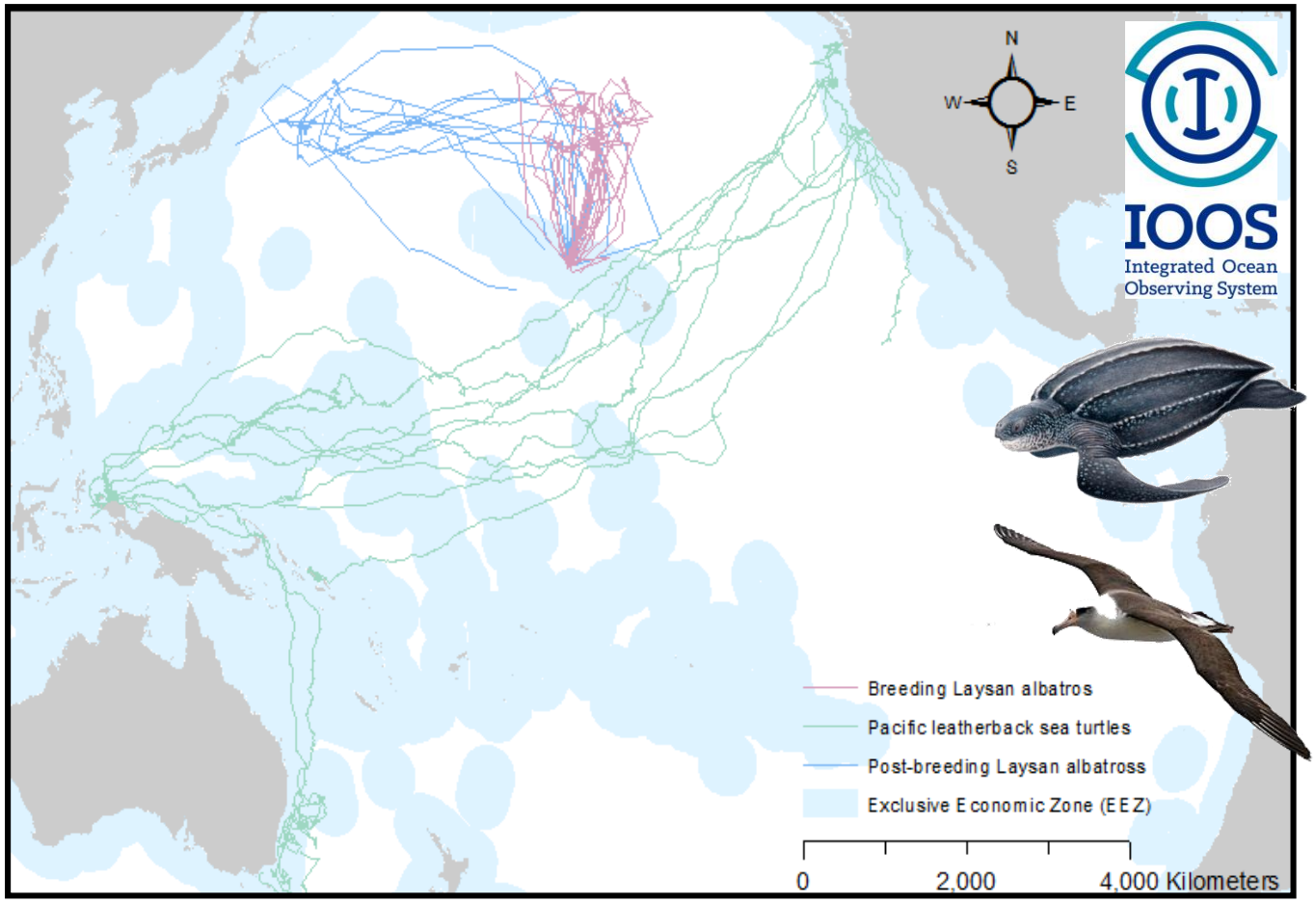
Maguire et al., 2006

226 species (or species group)
129 species/stocks that straddle

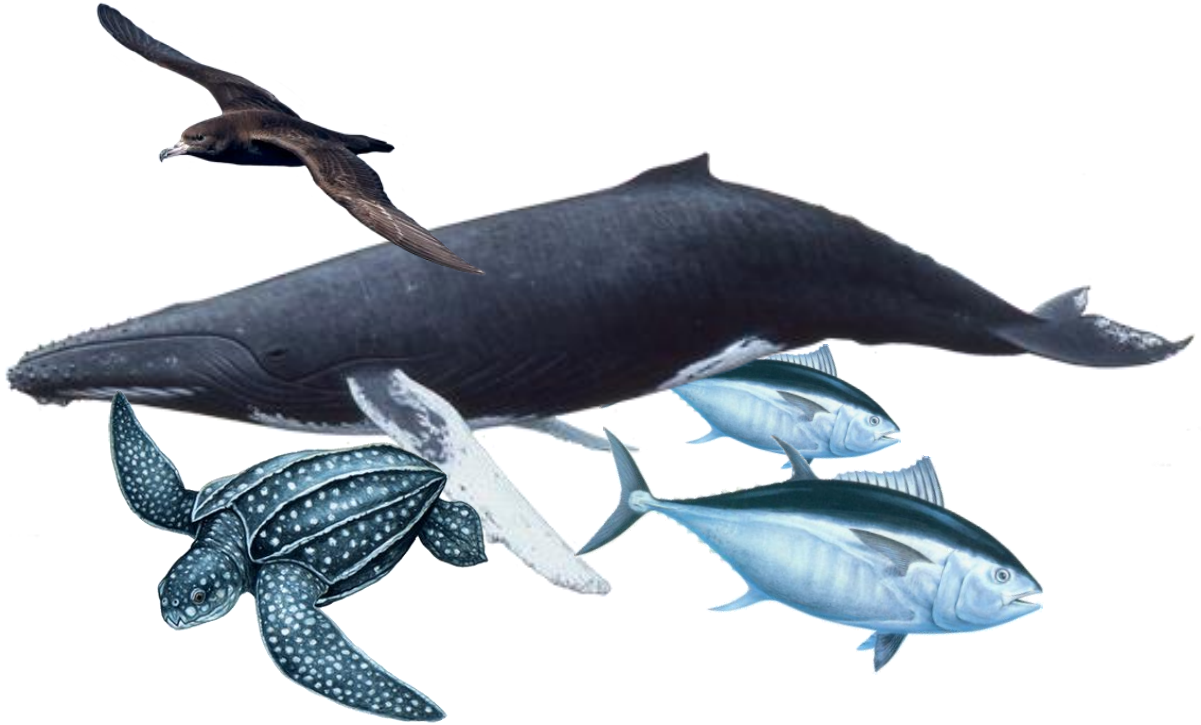
APPLYING THE PRINCIPLE OF ADJACENCY

Adapted from http://www.gbif.org/





THAN YOU FOR YOUR ATTENTION QUESTIONS?



"When everything is connected to everything else, for better or worse, everything matters."

— **Bruce Mau**