



The U.S. Marine Biodiversity Observation Network (MBON)

<https://marinebon.org/>

MBON Evolution and Status



Group for Earth Observations (GEO)
(remote sensing)

UN/IOC/Ocean Decade

GEO Biodiversity
Observation Network
(GEOBON)

Global Ocean Observing
System (GOOS including
IOOS)

Essential Biodiversity
Variables (EBVs)

Essential Ocean Variables
(EOVs)

**Marine Biodiversity
Observation Network
(MBON)**

MarineLife2030

Observing Life in the Sea – from
observations to models to products

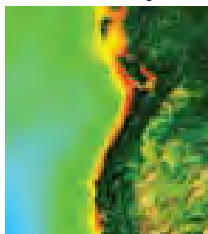
International Programs

Climate Acidification Deoxygenation Human Disturbance

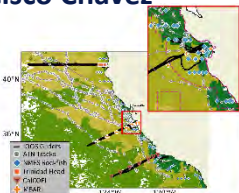
Drivers of Marine Biodiversity Change

Arctic MBON / PI: Katrin Iken
University of Alaska, Fairbanks

Northern California Current MBON
PI: Maria Kavanaugh
Oregon State University



Central California MBON
PI: Francisco Chavez
(MBARI)

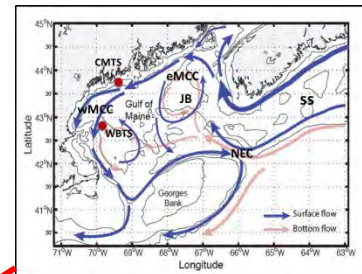


Southern California Bight MBON
PI: Robert Miller
UC Santa Barbara



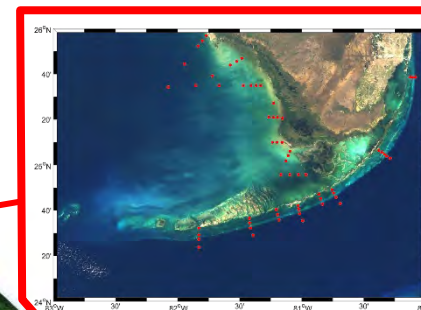
Estuaries MBON
PI: Cassie Glaspie / Louisiana State U.

MBON
Marine Biodiversity
Observation Network

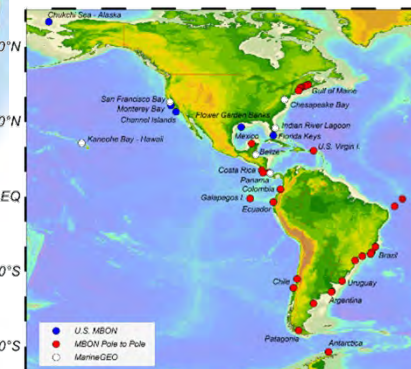


Gulf of Maine MBON
PI: Jeffrey Runge; University of Maine

Coastal New England MBON
PI: Nathan Furey; U. New Hampshire



South Florida MBON
PI: Frank Muller-Karger
University of South Florida



MBON Pole to Pole
in the Americas
PI: Enrique Montes

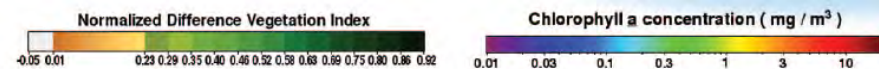


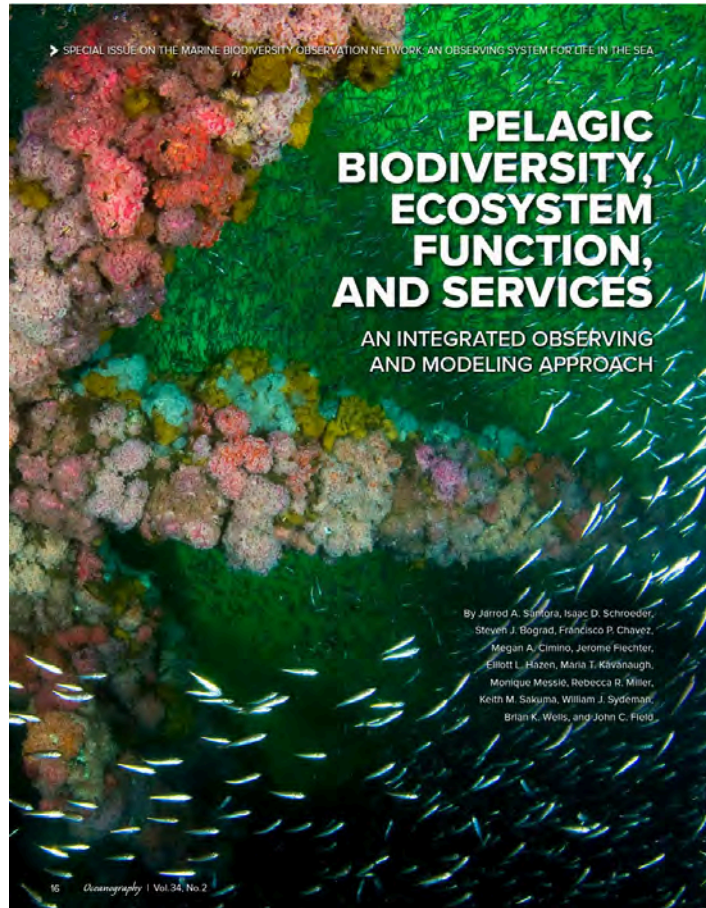
IMAGE COURTESY OF GENE C. FELDMAN AND
NORM KURING, NASA GODDARD SPACE FLIGHT CENTER.

<http://marinebon.org>

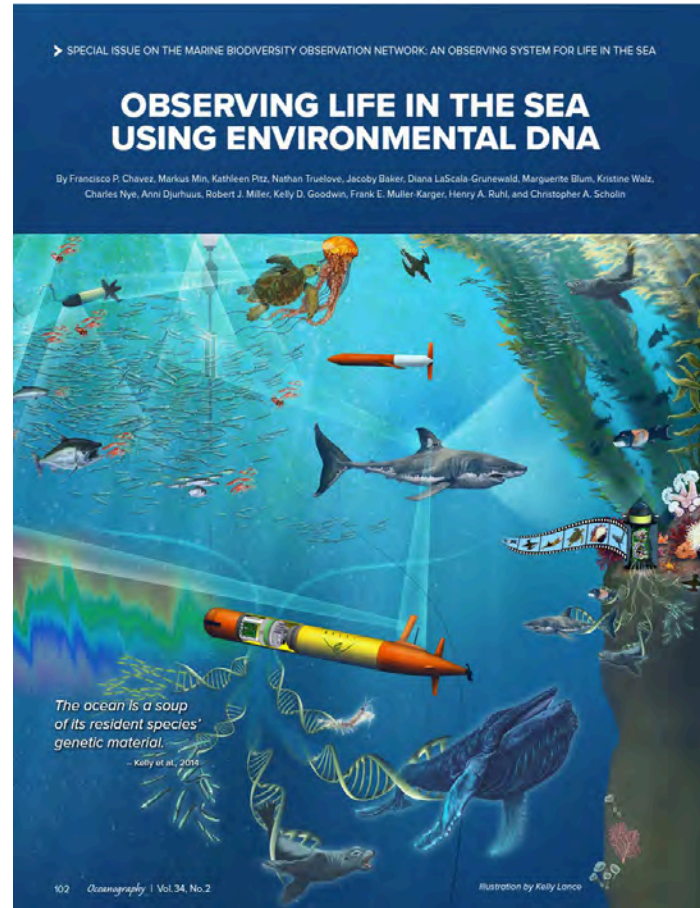
Funded by NASA, NOAA, BOEM, ONR others

Satellite-derived
Chlorophyll distribution

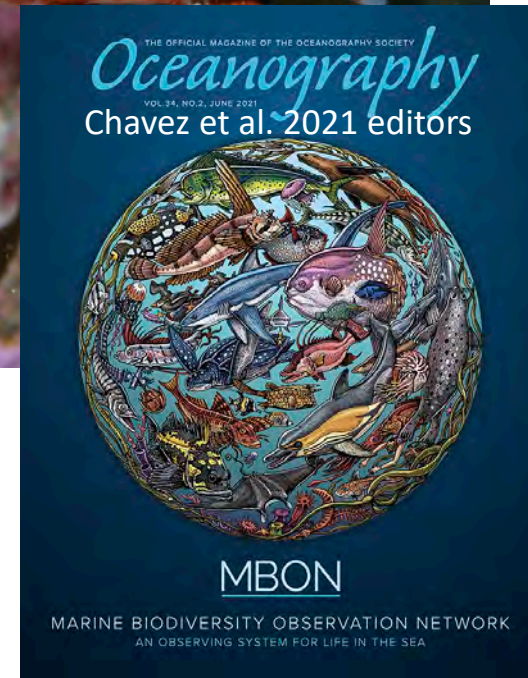
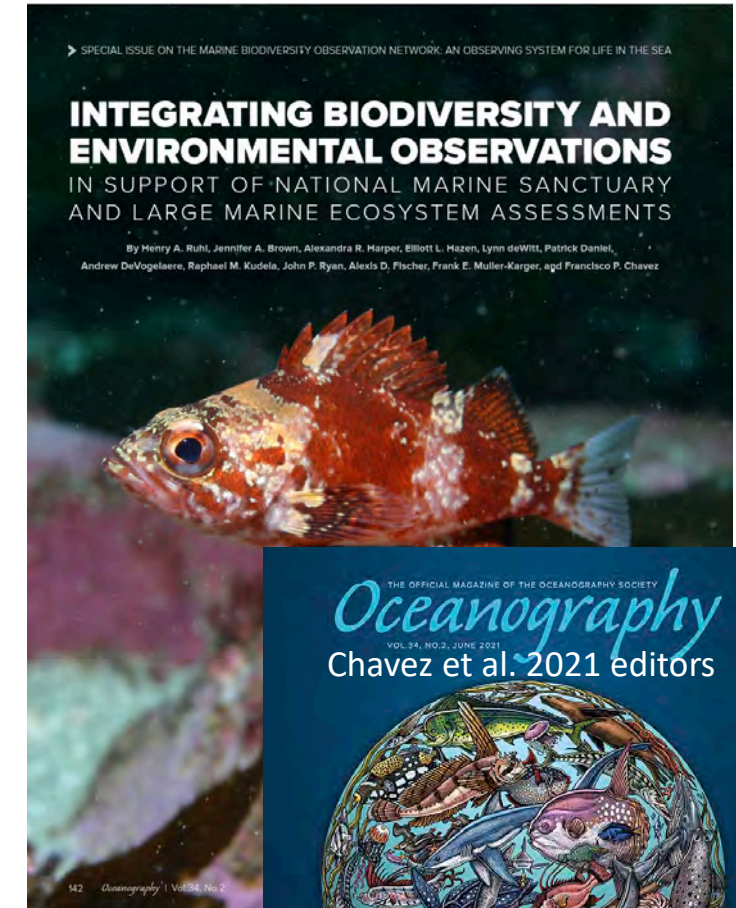
Observations and modeling



Developing new technologies



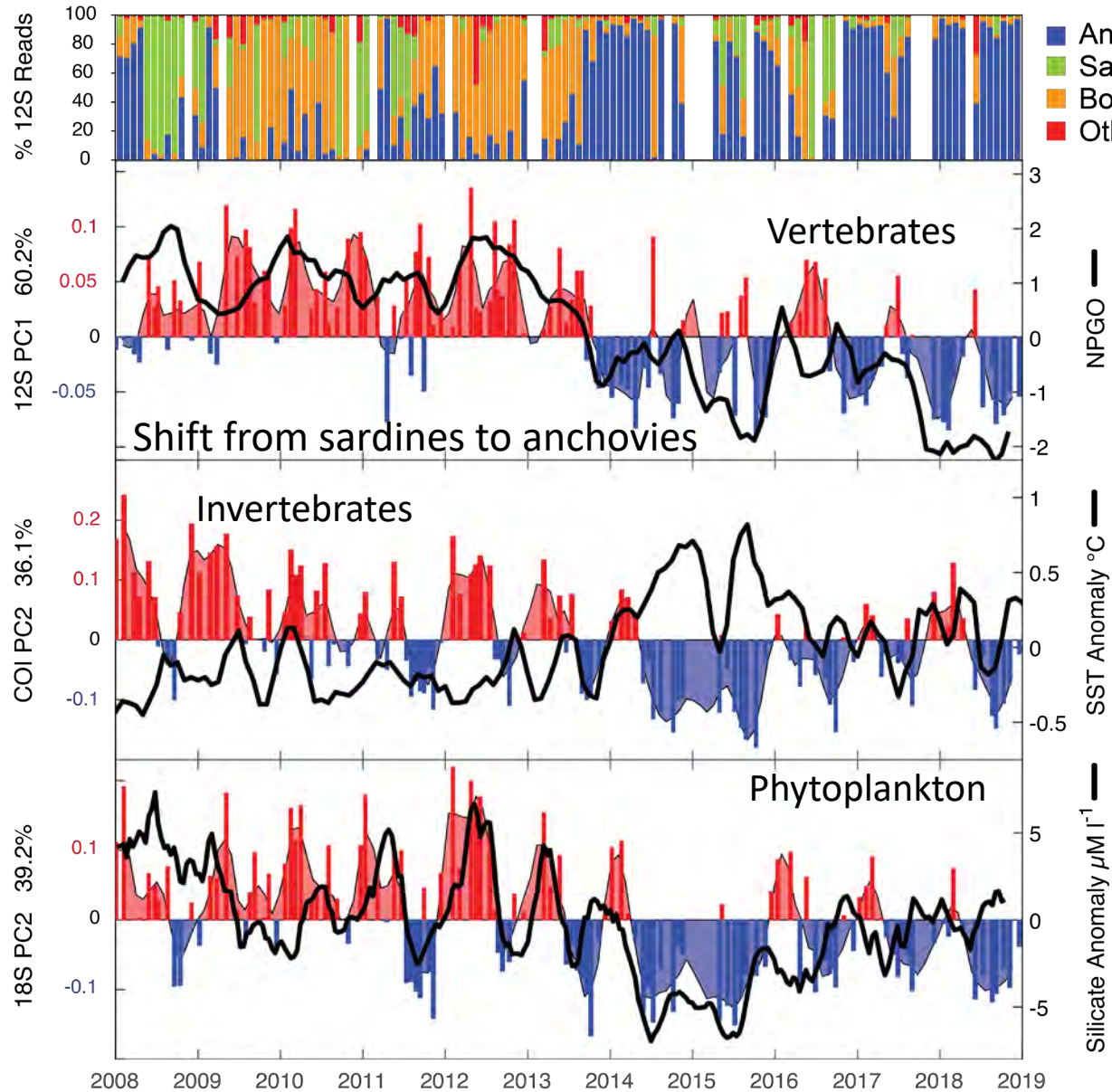
Delivering information



How and why is marine biodiversity changing

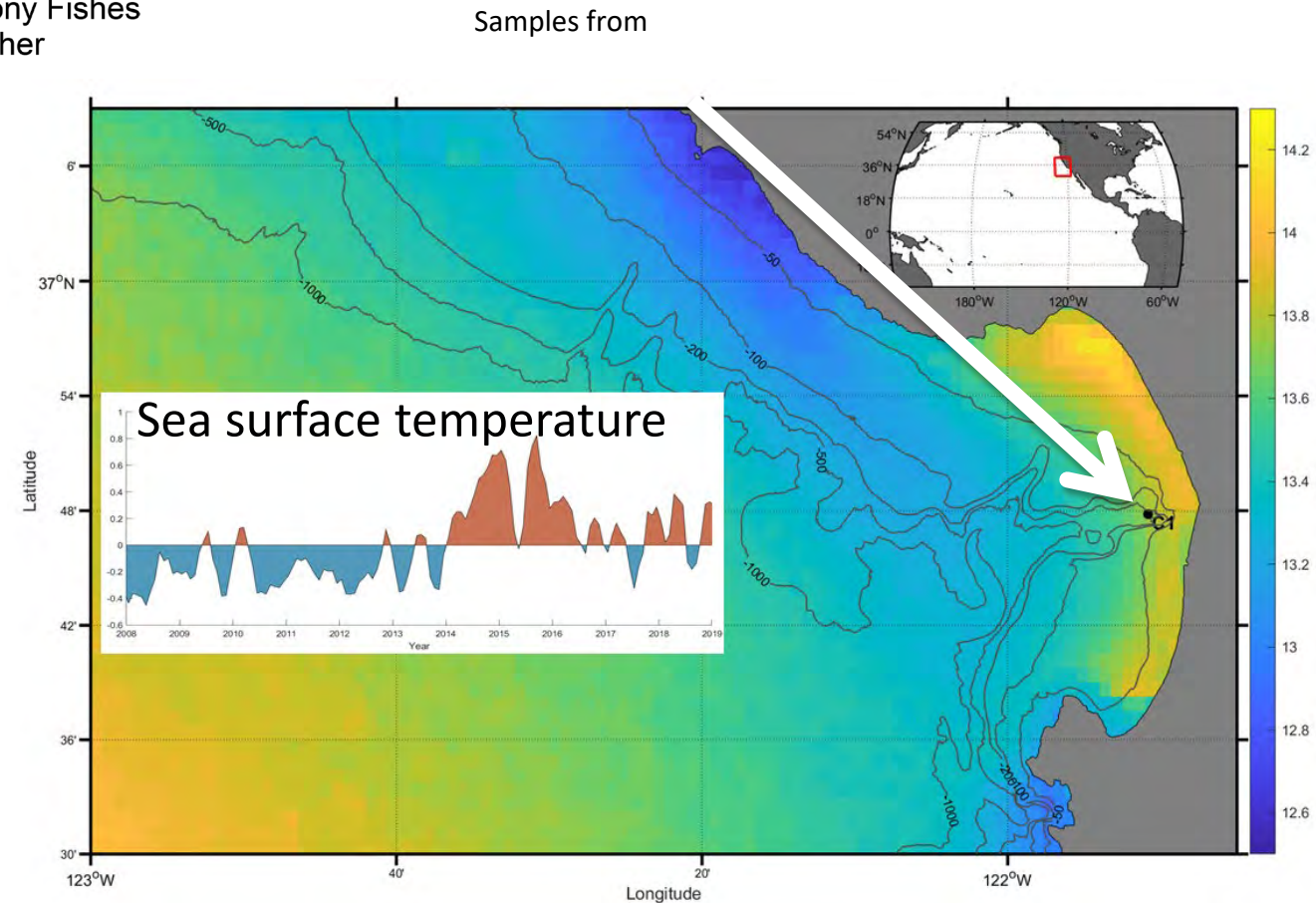
- eDNA: environmental DNA (Francisco Chavez)
- BioTrack (Neil Hammerschlag, Megan McKinzie/ATN)
- BioSound (Neil Hammerschlag)
- Remote sensing/seascapes (Dan Otis, Eurico D'Sa, Maria Kavanaugh)
- Ecosystem function (Katrin Iken, Nathan Furey)
- DMAC: Data Management and Cyberinfrastructure (Matt Biddle)
- Indicators (Ben Best)
- Stakeholder engagement (Chris Simoniello & Jorge Brenner/GCOOS, Jen Dorton/SECOORA)

Marine regime shift



Identified using eDNA

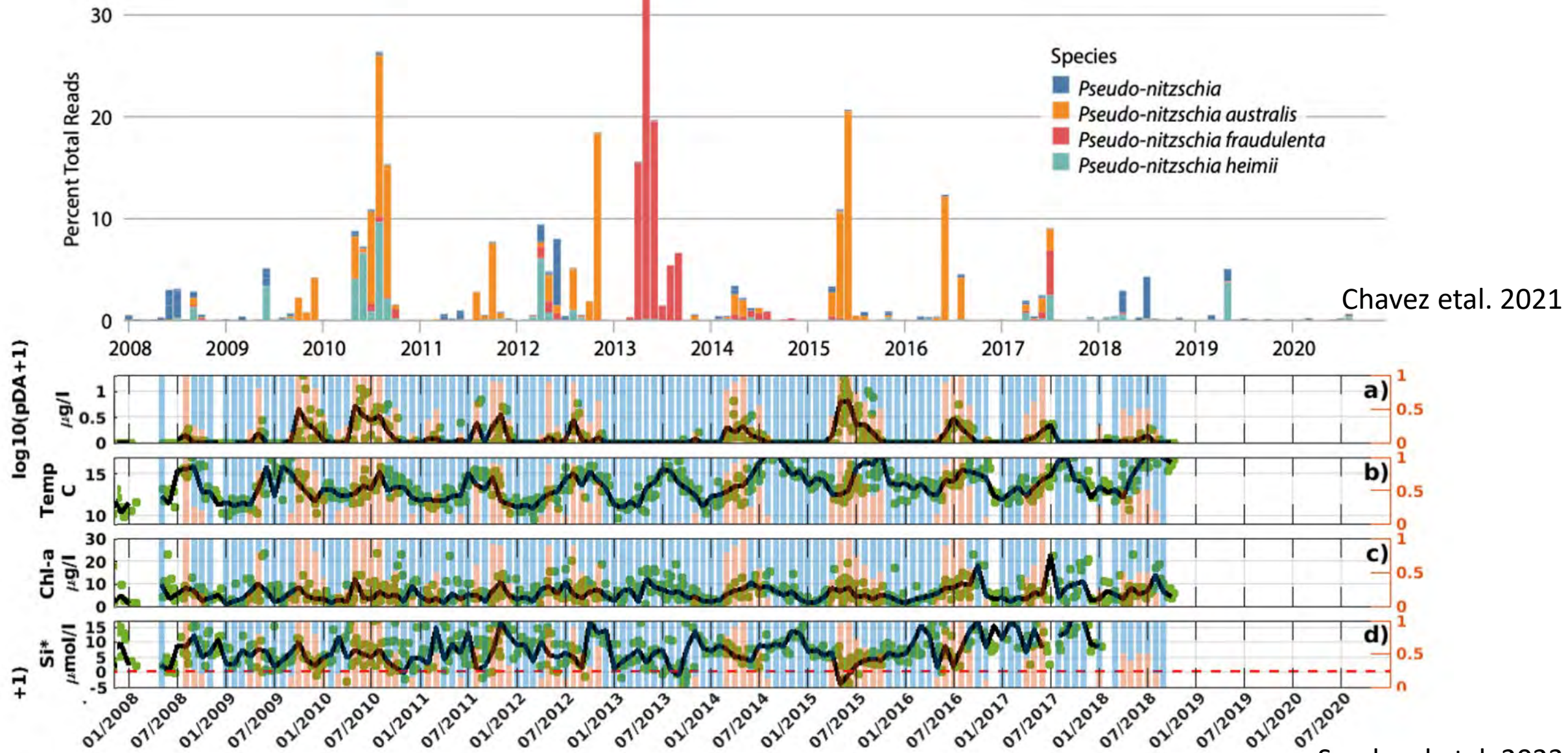
Changes over time from eDNA



2008-2018 time series

Pitz and Chavez in preparation

Time series of Harmful Algal Blooms (HABs) from eDNA



Sandoval et al. 2023



GOAL:

Integrate marine life observations with GOOS and other networks, advance interoperability and data access, plan for marine ecological forecasting - examples

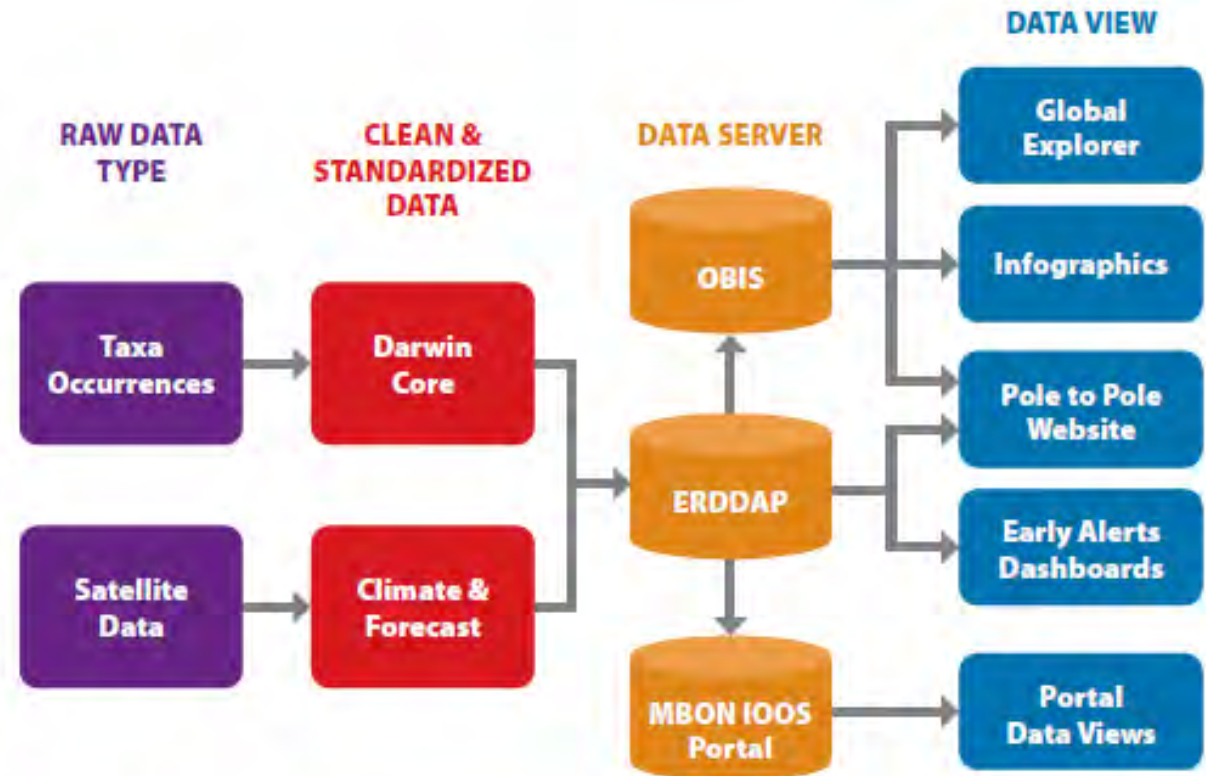
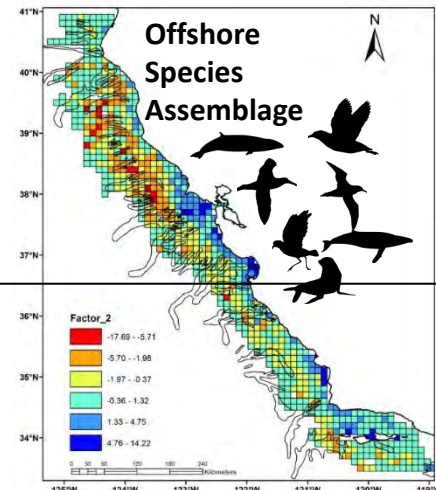
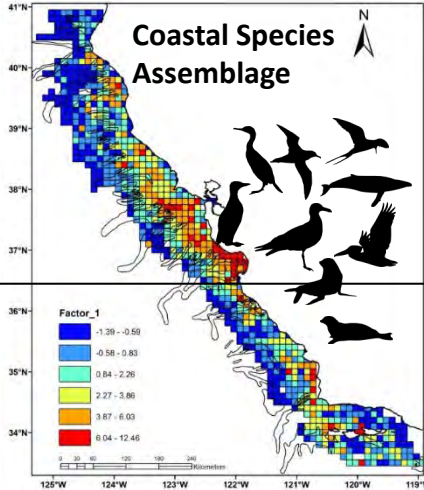
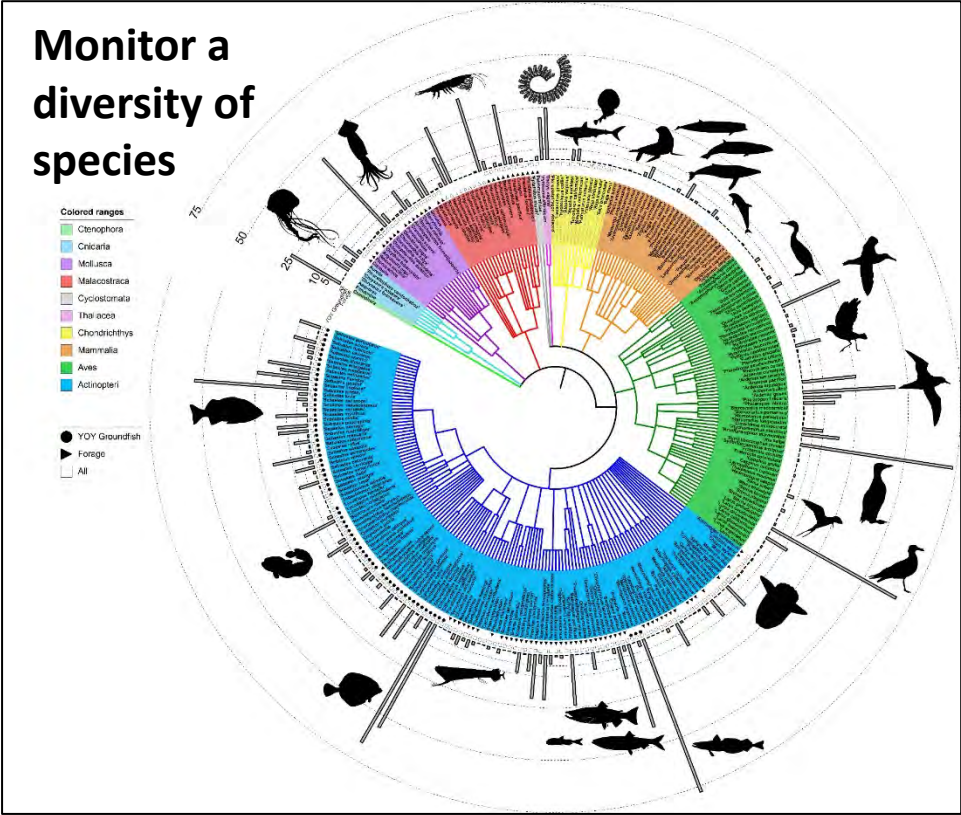


FIGURE 2. Starting from the left of the diagram above, raw data of different types are cleaned, standardized, hosted, and made into data products for end users. On the right are data-driven products designed to address specific user stories from MBON end users. The Global Explorer was developed to display a global map of biodiversity status indicators for each regional Exclusive Economic Zone. The Climate and Forecast standard (<https://cfconventions.org/>) is most often used with physical oceanographic data and the Network Common Data Form (NetCDF) format. OBIS = Ocean Biodiversity Information System. IOOS = Integrated Ocean Observing System.

Monitor a diversity of species

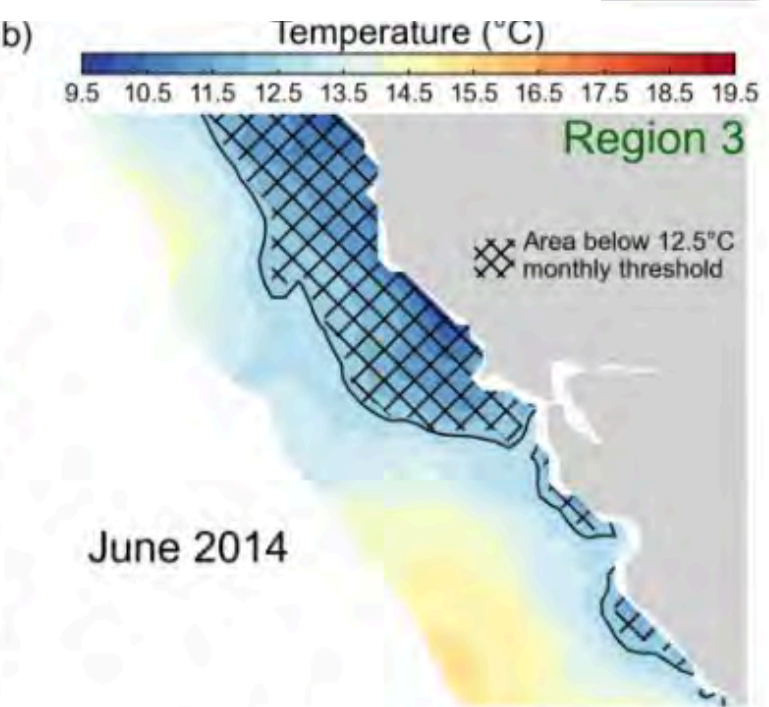
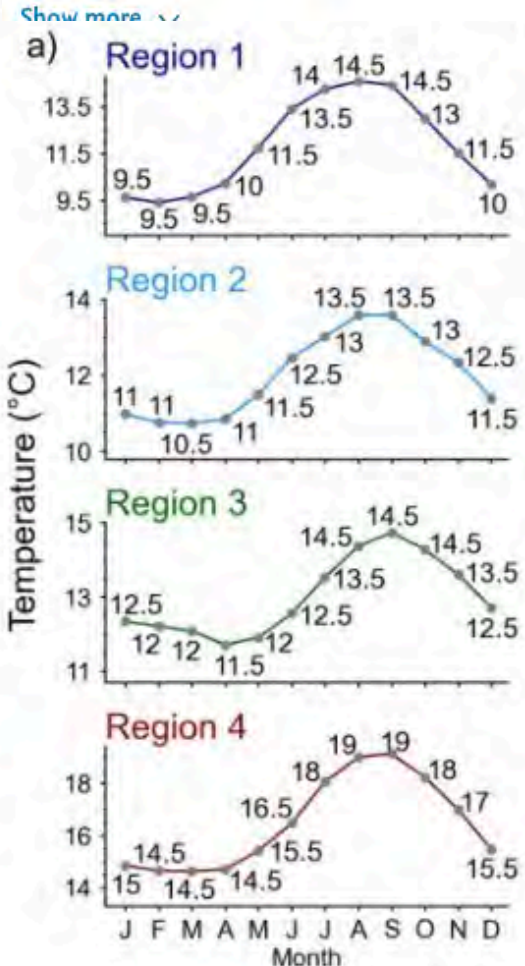


Santora et al. 2021a

Habitat compression indices for monitoring ocean conditions and ecosystem impacts within coastal upwelling systems

Ecological Indicators, November 2022

Isaac D. Schroeder^{a, b}, Jarrod A. Santora^{c, d, e, f}, Nate Mantua^e, John C. Field^{b, e}, Brian K. Wells^e, Elliott L. Hazen^{a, b}, Michael Jacox^{a, b}, Steven J. Bograd^{a, b}

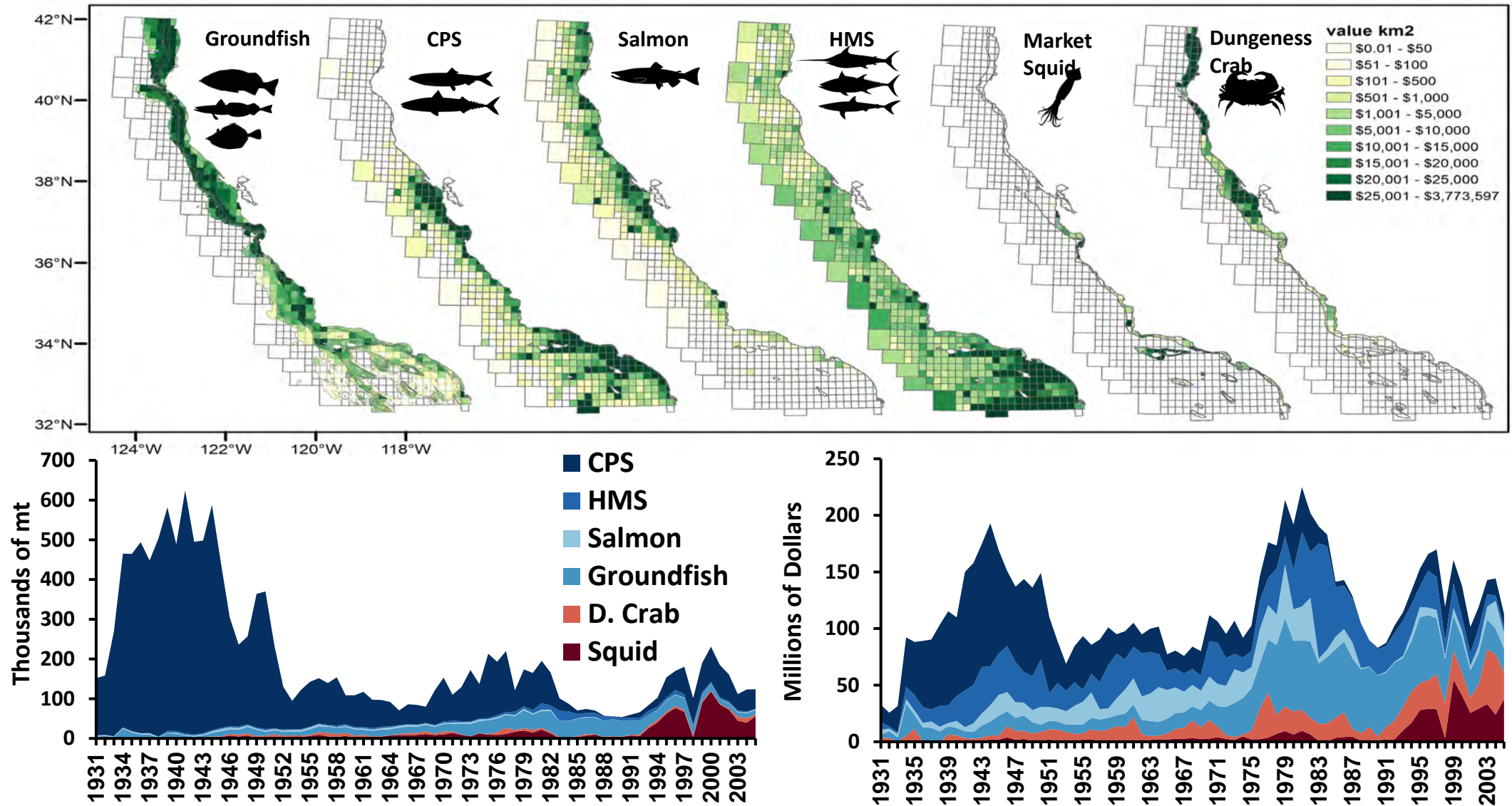


Area below threshold = 29177 km²
Total area = 89418 km²
 $HCI = \frac{29177 \text{ km}^2}{89418 \text{ km}^2} = 0.33$

Forage concentrated near shore when habitat compressed, increased whale entanglements

Biodiversity monitoring informs Ecosystem Services

The Blue Economy



Managers of these fisheries utilize MBON information

Recommendations

Position and resource IOOS/MBON to advance:

- Marine life observations, forecasting and indicator development
- Adoption of biodiversity observing and data standards and best practices across agencies and sectors
- Integration and sharing of biodiversity data (via linkages to ATN, SeaBASS, NCEI, OBIS, GBIF, and other databases for omics, taxonomy, acoustics, imaging, etc.)
- Co-design development of products and applications with relevance to users
- International collaborations with GOOS, GEOBON, G7 and the UN Ocean Decade



MBON
Marine Biodiversity
Observation Network

Thank you

