

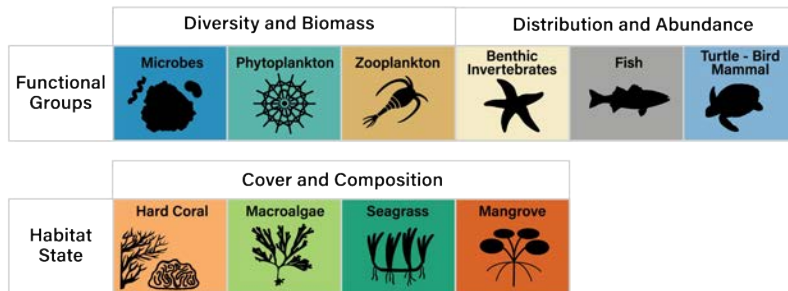
# IOOS Marine Life Program Update

Gabrielle Canonico, NOAA, US IOOS  
IOOS Advisory Committee, Dec 2022

# Marine Life Program: Vision and Definition

Vision: IOOS provides access to marine life observations, data and information products for management, forecasting and decision-making towards resilience and stability of living marine resources and human communities in the face of change.

- “Marine life obs” are direct measures of species, including biogenic habitat providers
- Integrate with physics, chemistry, nutrients, bgc etc for context/projections of marine life change



# Key Questions

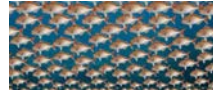
What natural **changes** are occurring?  
What coastal and offshore activities are planned?  
What are the **impacts** on marine life?  
What data are needed for **models** and projections?  
What information products are needed to inform **decisions**?



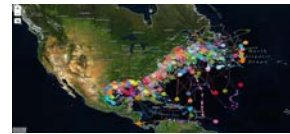
Aggregations, hotspots



Diversity



Abundance



Movement, stressor response

**MBON**  
Marine Biodiversity  
Observation Network



# Stakeholder Requirements

- NOS/Place-based management
  - Sanctuaries and Monuments
  - National Estuarine Research Reserves
- NMFS:Ecosystem-based management
  - Stock assessment and bycatch
  - Essential Fish Habitat and Protected Species
  - Integrated Ecosystem Assessment



Source: NOAA/ONMS

- OSTP/OAR/NOS: Climate impacts and adaptation
  - Conservation; America the Beautiful Initiative
  - Climate Program Office - modeling in Sanctuaries, joint effort with MBON
  - AOML - eDNA methods for Sanctuaries, IEA; eDNA sample processing; integrating approaches to evaluate restoration effectiveness
- BOEM/DOE: Renewable energy

# Current State

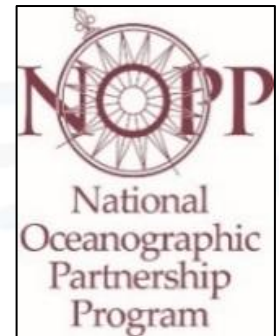
- Strong interagency engagement
- US Marine Biodiversity Observation Network (<https://marinebon.org/>)
- US Animal Telemetry Network (<https://ioos.noaa.gov/project/atn/>)
- Sanctuary Sound Monitoring Program (<https://sanctsound.ioos.us/>)
- SanctuaryWatch (<https://sanctuarywatch.ioos.us/>)
- Advancing biological data standards; data access
  - Documenting data flows and the international data standards to align with; <https://ioos.github.io/mbon-docs/index.html>
  - Biological data mobilization workshops ([https://ioos.github.io/bio\\_mobilization\\_workshop/](https://ioos.github.io/bio_mobilization_workshop/))
- IOOS RAs Regional Products
- Global activities

# SOST-level coordination

- IOOC 'Biology: Integrating Core to Essential Variables' Task Team reports published
  - <https://www.iooc.us/task-teams/bio-ice/>
  - Reconcile IOOS and GOOS variables; Identify and improve pathways for data flow for marine mammals and corals observations from RA and Federal sources into IOOS and global data portals
- SOST Biodiversity IWG
  - Co-chairs NOAA/US IOOS, NASA, BOEM
  - Established eDNA Task Team → drafting National eDNA strategy

# NOPP Marine Life Partnership

- FY14-18 (NOAA, NASA, BOEM, NSF-Polar, Shell Oil)
- FY19-21 (NOAA, NASA, BOEM, ONR)
- **FY22-26** (NOAA, NASA, ONR; BOEM pending)
  - California Current (CeNCOOS)
  - New Hampshire and southern Maine/Casco Bay (NERACOOS)
  - Louisiana Deltaic Estuaries (GCOOS)
  - Arctic (AOOS)
  - Southeast (SECOORA, GCOOS)
  - <https://ioos.noaa.gov/news/new-marine-life-projects/>
- Averaging \$3M per year
- USGS/OBIS in-kind data support 2014 - present



# U.S. MBON and ATN



**MBON**  
Marine Biodiversity  
Observation Network



**IOOS**  
Integrated Ocean  
Observing System



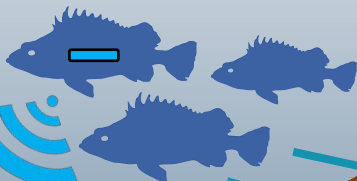
Argos



eDNA



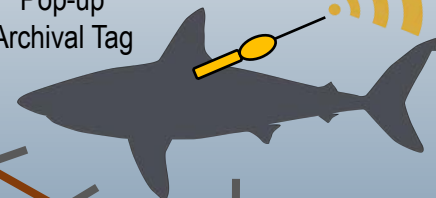
Acoustic  
Tag



Satellite  
Tag



Pop-up  
Archival Tag



Acoustic  
Receiver



**Fisheries**

**Ocean  
Observation**

**Climate Adaptation**

**Conservation**

## Stock assessment

- Stock identification and mixing
- Estimation of fishing and natural mortality rates
- Informing optimum yield

## Bycatch

- Estimating post-release mortality
- Informing spatial management
- Characterizing shark and marine mammal depredation

## Essential Fish Habitat

- Habitat use and residency
- Seasonal migrations

## Ocean Profiling

- Animal-borne sensors for temperature and/or salinity profiles
- Data pipelines to oceanographic and meteorological databases
- Integration with traditional oceanographic data buoys or gliders

## Storm Prediction

- Complementing traditional ocean observing platforms and data sources
- Measuring mixed layer depth and heat content
- Improving hurricane forecasts

## Shifting Distributions

- Modeling the effects of climate variability and change on marine life movements
- Affects on fishery resources and fishing community resiliency
- Adapting to human-wildlife conflict including beach safety

## Offshore Renewable Energy

- Assessing impacts of offshore energy development activities
- Marine life movements before, during, and after construction

## Protected Species

- Informing status reviews and authorizations under the Endangered Species Act and Marine Mammal Protection Act
- Designating critical habitat

## Sanctuaries and Marine Protected Areas

- Characterizing use of protected areas
- Seasonal and inter-annual trends
- Enforcement

## Ecosystem-based Management

- Monitoring biodiversity in a changing ocean





# Information for Place-Based Management

- Collaborating on:
  - Products that provide more frequent updates on Sanctuary condition
  - Data for IEA indicators
- IOOS niche: data access; fill data gaps; build web portals for data and products ([SanctSound](#), [SanctuaryWatch](#))
- Additional opportunities:
  - SanctuaryWatch products of interest to many new sites
  - Expand sound monitoring, acoustic telemetry
  - Establish ecosystem moorings at key locations
  - Integrate use and visitation observations to support NOAA's New Blue Economy

# Other Emerging Opportunities

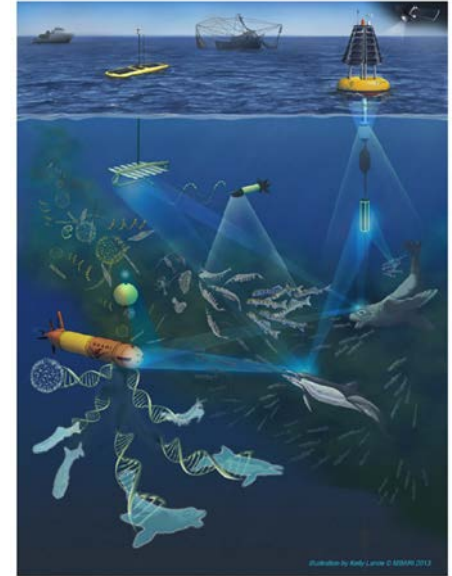
- Renewable energy
  - Technology and infrastructure in place; data being collected
  - IOOS niche: coordination/delivery of data and products via RAs to NOAA, BOEM, DOE, states, etc.; ensure open access
- Climate projections and modeling
  - Models available but data limitations (eg species data)
  - IOOS niche: provide obs and curated data for models; develop and deliver models, data products to stakeholders
- Conservation, America the Beautiful
  - Requires annually updated authoritative geospatial source for marine life data and biodiversity metrics
  - IOOS niche: Facilitate access to data from multiple sources for map layers

# FY22 Infrastructure Funds for Data

- Towards an IOOS Marine Life Data Network
- Vision: MBON, ATN, RA and other marine life data are visible in a centralized data platform
- IIJA funds will continue: development of ATN DAC and MBON Portal, marine life data ingest, and improved functionality to share, aggregate, display and access data
- Effort is required to understand community needs for a more reliable access to marine life information (for decisions, modeling, etc)

# Advancing new technologies

- Sound monitoring
- Animal movement
- Satellite/in situ integration
- 'Omics, eDNA methods and applications
- Imagery (Imaging Flow Cytobots, video)
- AI and machine learning for taxonomic ID
- Cyberinfrastructure
- IOOS niche: technology deployments, transition to operations, data standards and interoperability, generating data products with users



Source: MBARI

\*\*These activities can be effectively prioritized if we engage with users before we invest and expand these efforts

# Input needed

1. How to quickly and effectively grow IOOS capacity for delivering marine life products and services to meet increasing demand?
2. How can emerging technologies and solutions better support marine life observing and knowledge delivery based on specific user questions and product format needs?
3. How can we establish IOOS as a resource for marine life data standardization and delivery and ensure these efforts are designed with users and curated to meet their needs?
4. How can we build recognition of IOOS capability to ensure more direct engagement as a resource for stakeholders that have marine life information needs?

# Backup Slides