National Marine Sanctuaries
National Oceanic and Atmospheric Administration

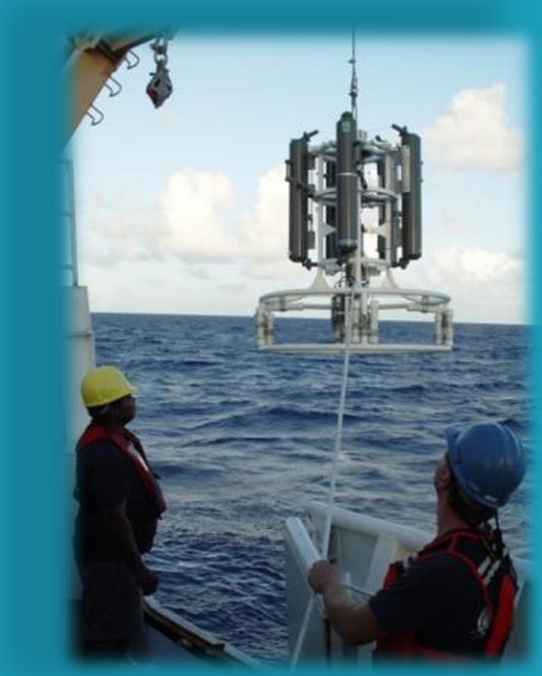
Marine Protected Areas as Sentinel Sites

Ocean Observing Sites for:

Ecosystem Integrity
and
Early Warning

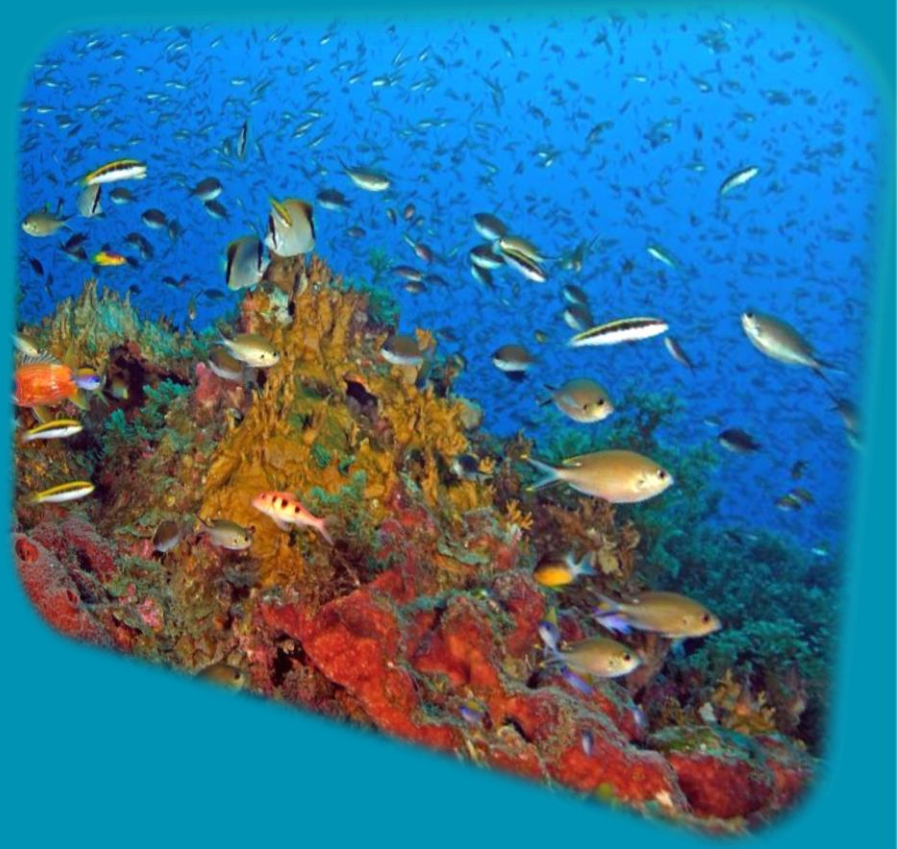
Why MPAs?

- Ecological & economic value
- Representative ecosystems
- Management needs & plans
- Protection & restoration monitoring
- Continuity of investment
- Infrastructure & dedicated staff
- Heavily studied, with baseline data
- Stakeholder need
- Public engagement & partnerships

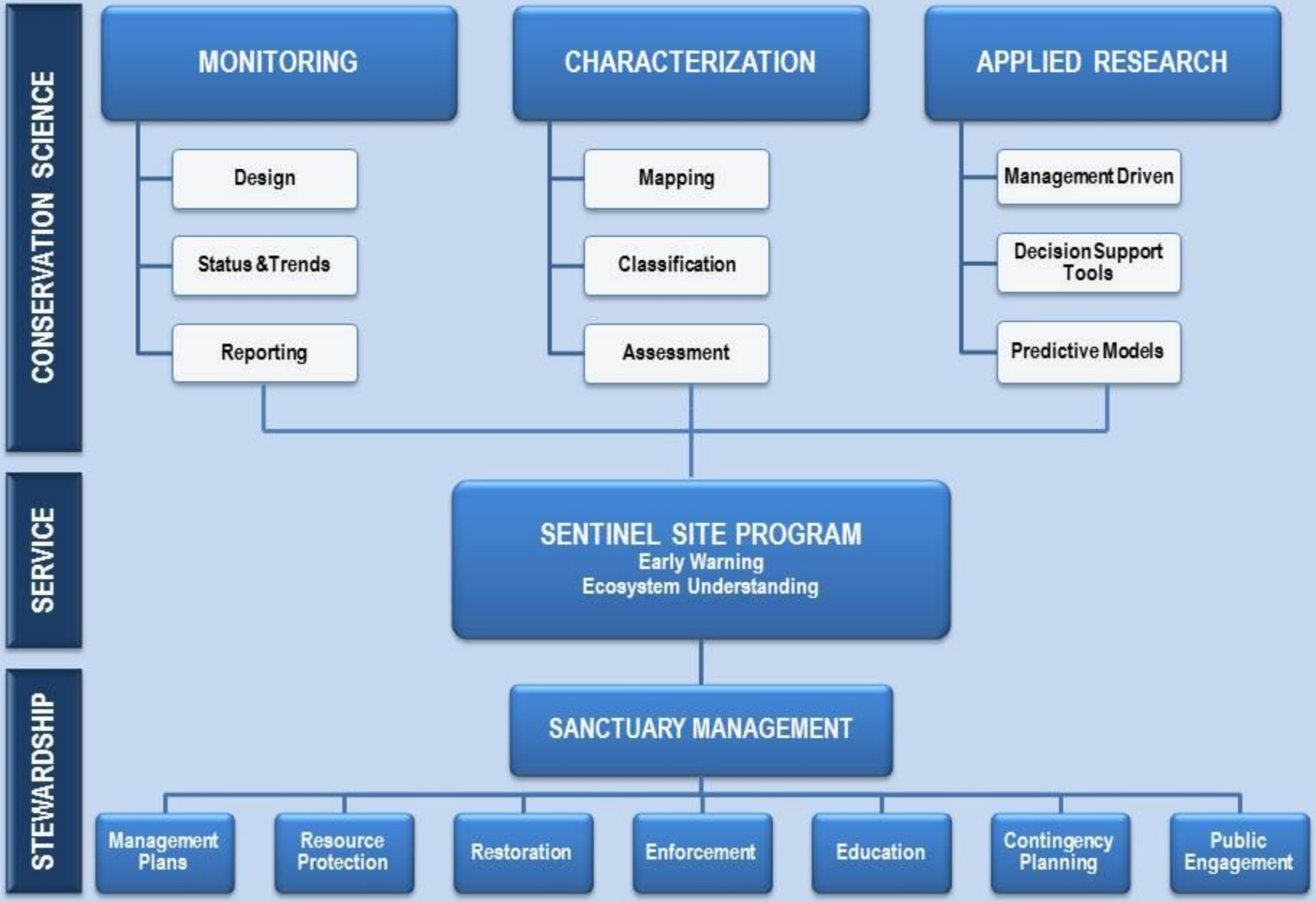


Key Messages

- **Sentinel sites** are intensely studied and monitored areas.
- **Sentinel monitoring** informs management by increasing understanding of ecosystems and by providing early warnings of ecosystem change.
- A **sentinel site program** attracts and supports collaboration and advances conservation science



ONMS and Sentinel Sites

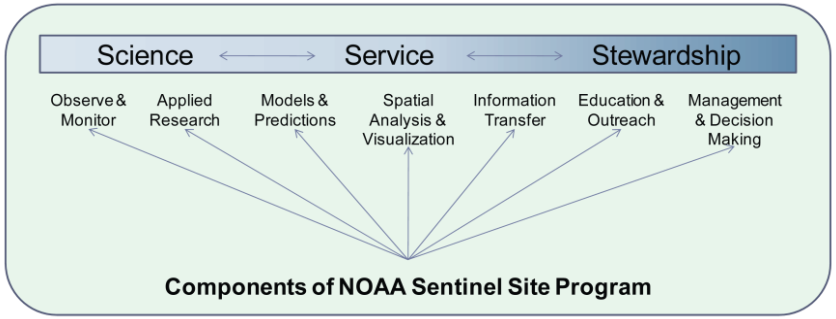

CONSERVATION SCIENCE
SERVICE
STEWARDSHIP
MONITORING
CHARACTERIZATION
APPLIED RESEARCH
Design
Status &Trends
Reporting
Mapping
Classification
Assessment
Management Driven
Decision Support Tools
Predictive Models
SENTINEL SITE PROGRAM
Early Warning
Ecosystem Understanding
SANCTUARY MANAGEMENT
Management Plans
Resource Protection
Restoration
Enforcement
Education
Contingency Planning
Public Engagement

Drivers of Sentinel Sites

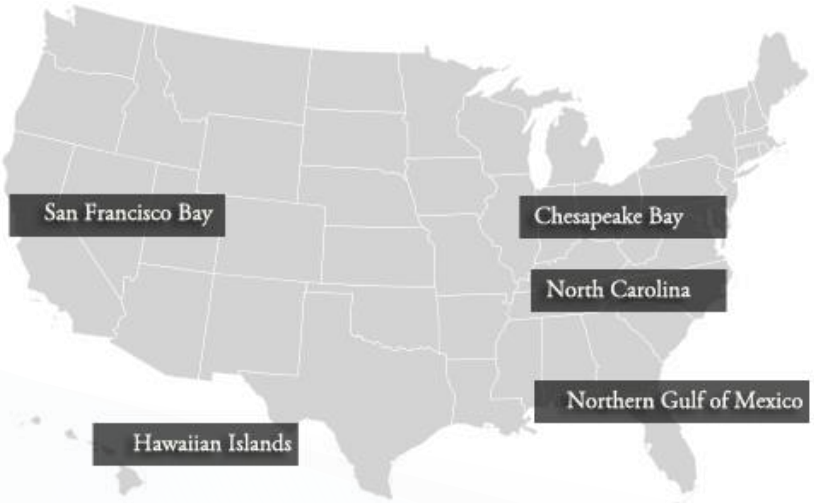
- Do more with less by working together
- Improvements to SWiM SOR
- NOS/Climate SLC initiative
- National Ocean Policy IP milestones
- Next Generation Strategic Plan
- NOAA Five-Year R&D Plan
- Annual Guidance Memoranda

NOAA Sentinel Site Program

- Est. Dec. 2011
- **Place-based, issue-driven** approach
  - Current Issue: sea level change & coastal inundation
- 5 cooperatives



Vision: The NOAA Sentinel Site Program brings to life NOAA's science, service, and stewardship continuum by leveraging existing resources and integrating parallel efforts to promote resilient coastal communities and ecosystems in the face of change.



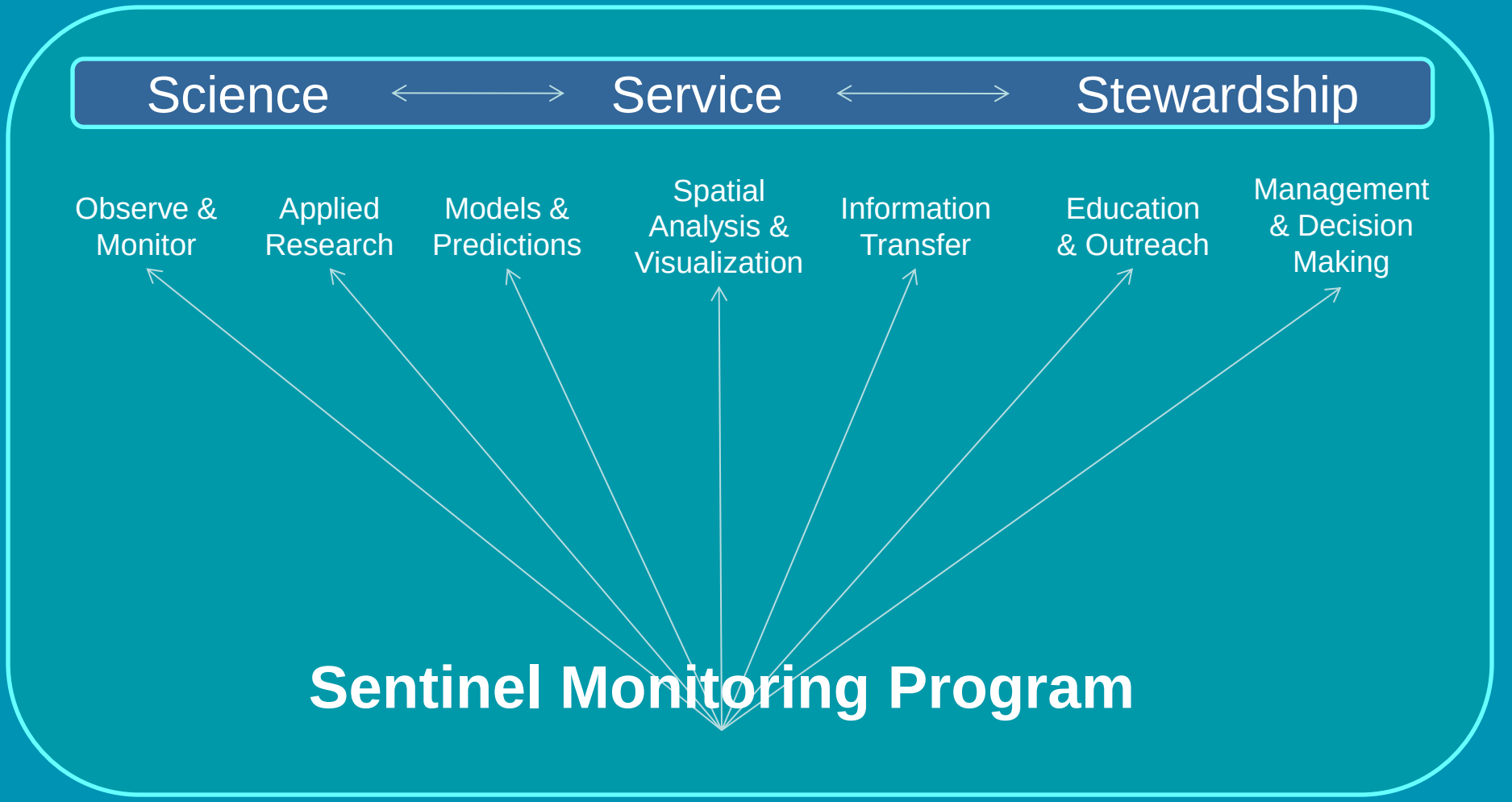
Who is Involved?

- DAA appointees from each LO
- ONMS & NERRS
- NOS (NGS, CO-OPS, CSC, NCCOS)
- other Federal partners
- academic institutions
- NGOs
- state & local governments
- …

Under the NOAA Umbrella

- Clear, consistent messaging/branding
  - (NOS – NERRS, ONMS, CO-OPS towers, NCCOS spp./habitats)
- Shared terminology
- Integration of NOAA efforts
- ONMS & NERRS as MPA sites
- Issue-based growth

Fully-Functioning Sentinel Program



Selection Criteria

Scientific Rationale & Ecological Significance

- High likelihood of detecting change
- Key physical and biological attributes representative of the larger ecosystem
- High ecological value (often biological hotspots, or with key species related to ecosystem function)

Practicality & Leveraging

- Documented stakeholder need with interested and engaged management community
- Existing monitoring/observing infrastructure, data availability, and support for continuity
- Existing capabilities for data analysis, synthesis, and translation
- Existing research activities or capacities that support the goals, objectives and priorities

Responsiveness to Management Issues

- Ability of ecosystem to adapt to change and maintain or enhance services provided
- Utility of information to reduce vulnerabilities of ecosystems and communities
- Ability to document changes in local populations and economies
- Utility of lessons learned to other areas with comparable governance and issues

Ecosystem Integrity

- A condition that enables ecosystems to support and maintain a community of organisms that works together and adapts to changing conditions in ways that are determined by the ecosystem's natural evolutionary history

Early Warning

- Indicators of impending change within ecosystems that may allow for effective control or mitigation through management action

Sentinel Monitoring

- Observations that help us understand and track ecosystems and their integrity, and provide early warnings of change. A fully functioning sentinel monitoring program includes a continuum of activities that include observing, applied research, modeling and predictions, data analysis and visualization, information sharing, support for management decisions, and education and outreach

Sentinel Stations

- Discrete measurement locations that provide information that can be used to understand the ecological status and trends in biological and physical variables of interest.

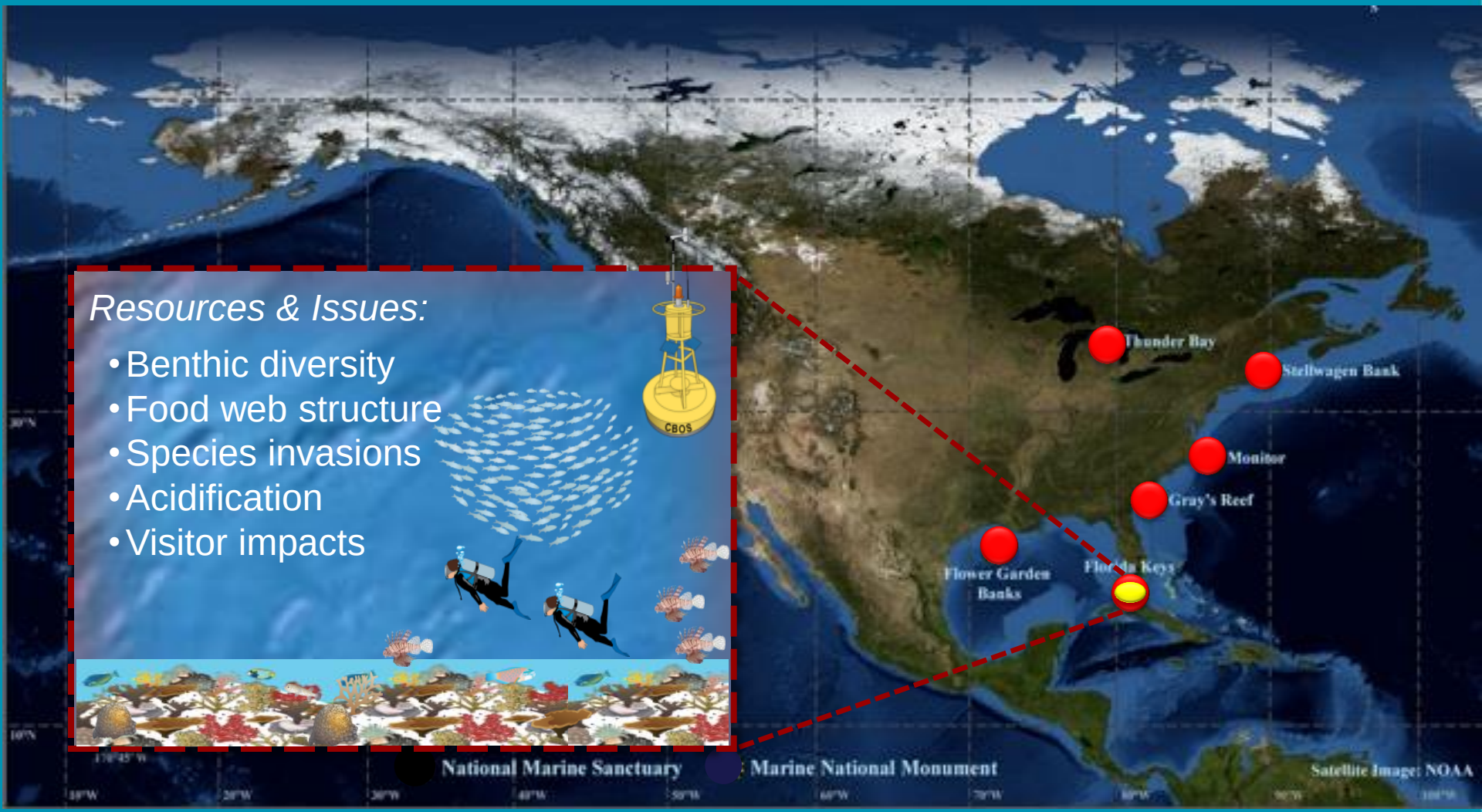
Sentinel Sites

- Areas in coastal and marine environments that have the operational capacity for intensive study and sustained observations to detect and understand changes in the ecosystems they represent

Sentinel Network

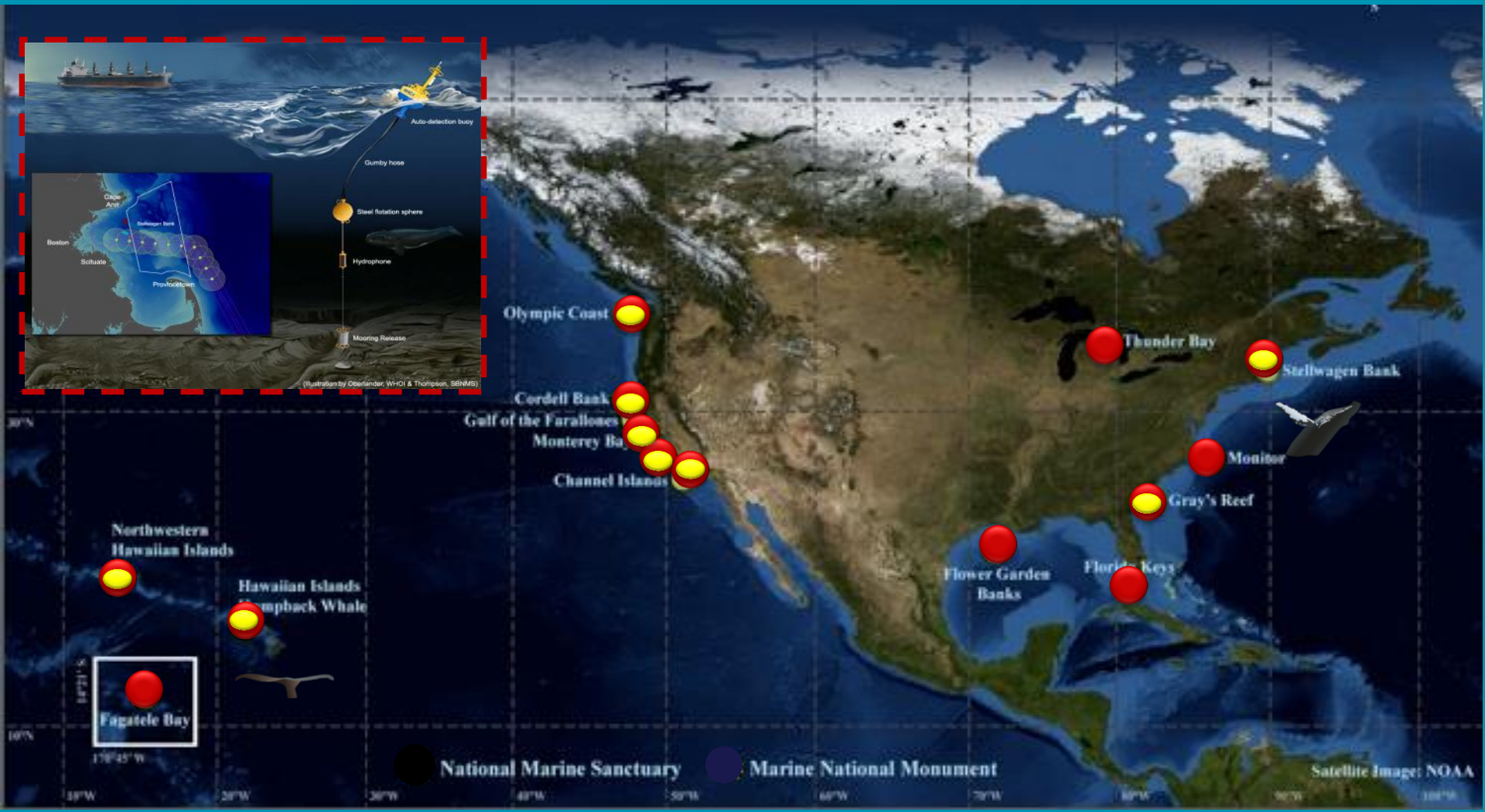
- Groups of sentinel stations and sentinel sites whose integrated information and data streams provide a broad understanding of ecosystem conditions at specific temporal and spatial scales that are relevant to science and management priorities

Sentinel Site



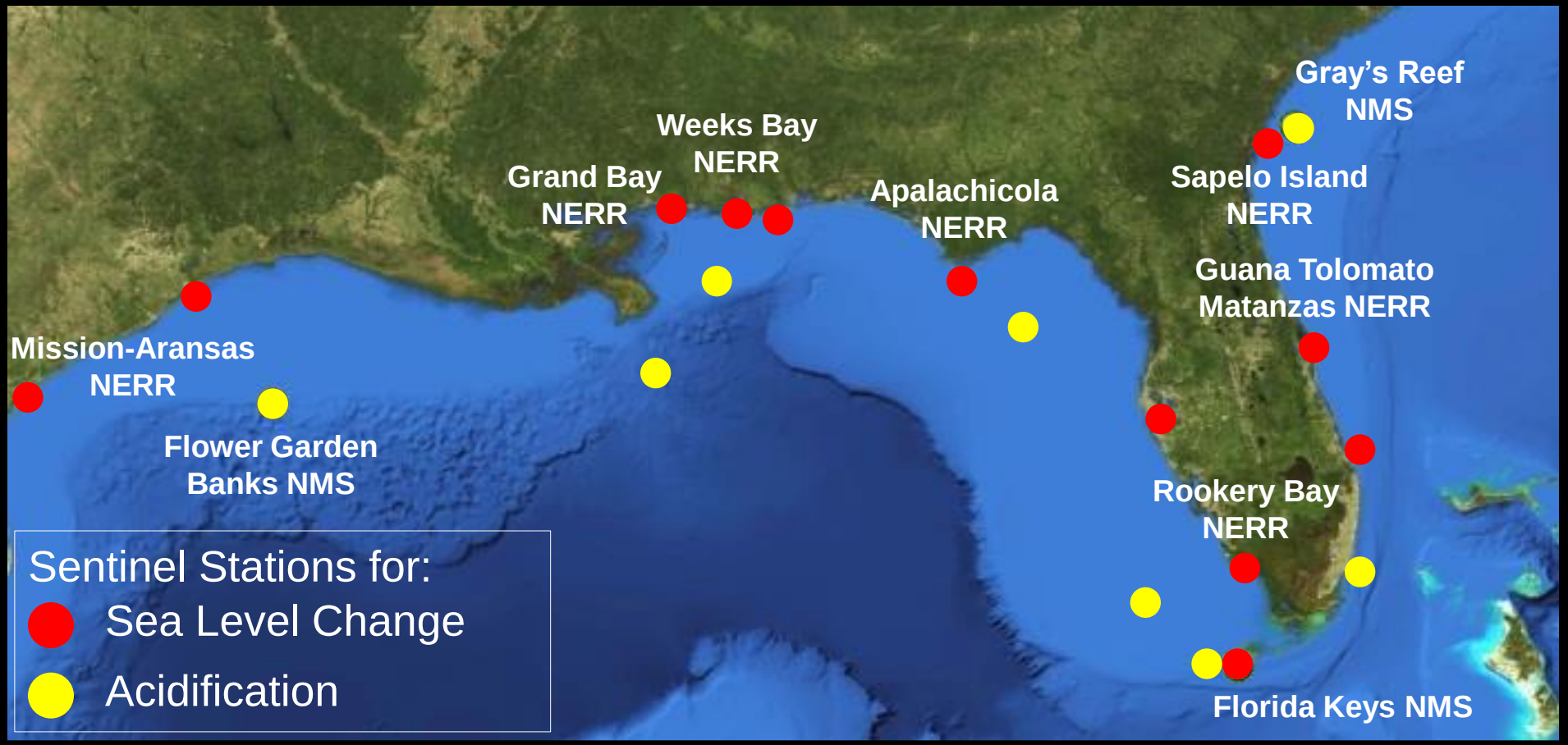
Sentinel Network:
Invasive Species -- Lionfish

National Sentinel Network:
Whale Strike

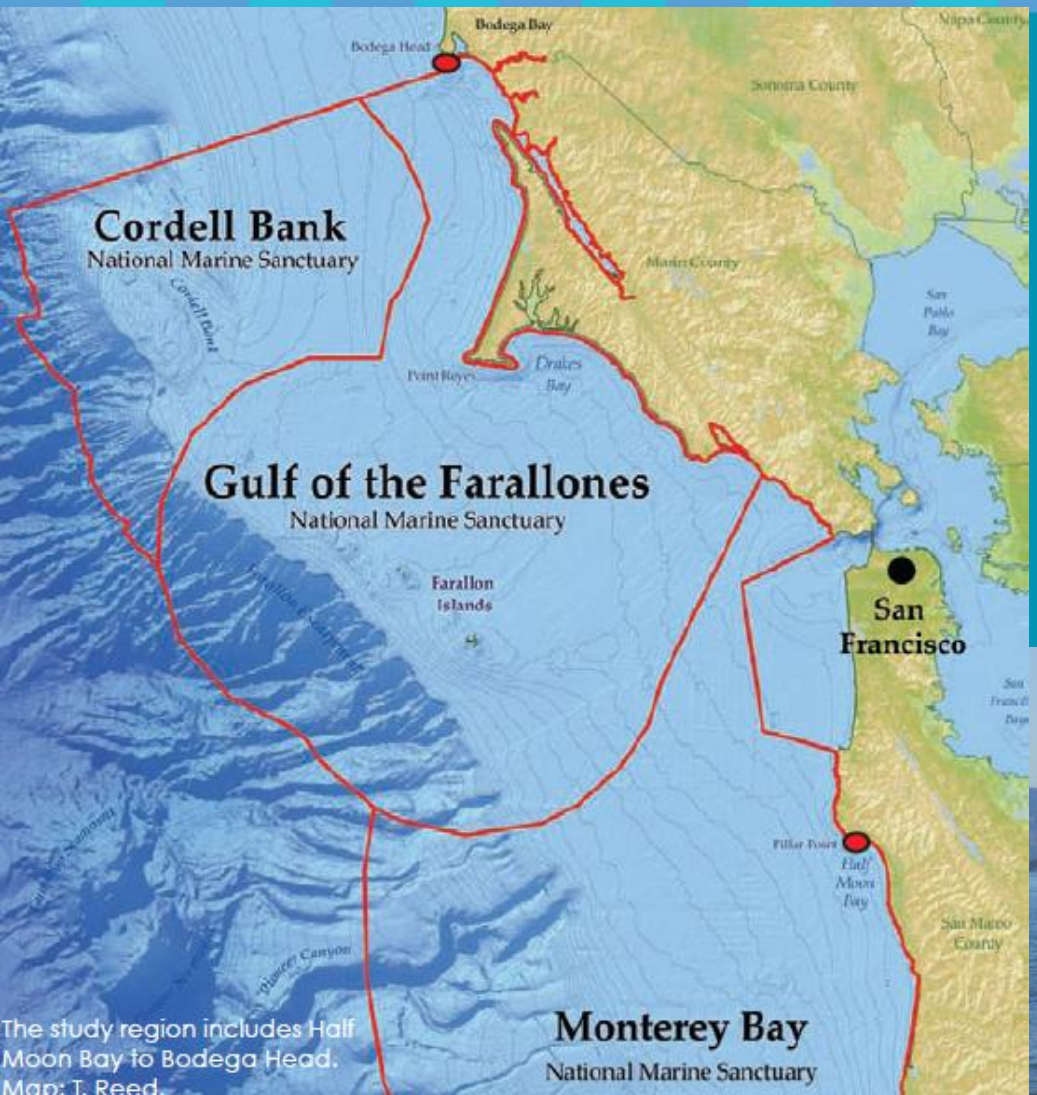


National ONMS Program:
Biodiversity Observing Network

Sanctuaries and Reserves in Sentinel Networks

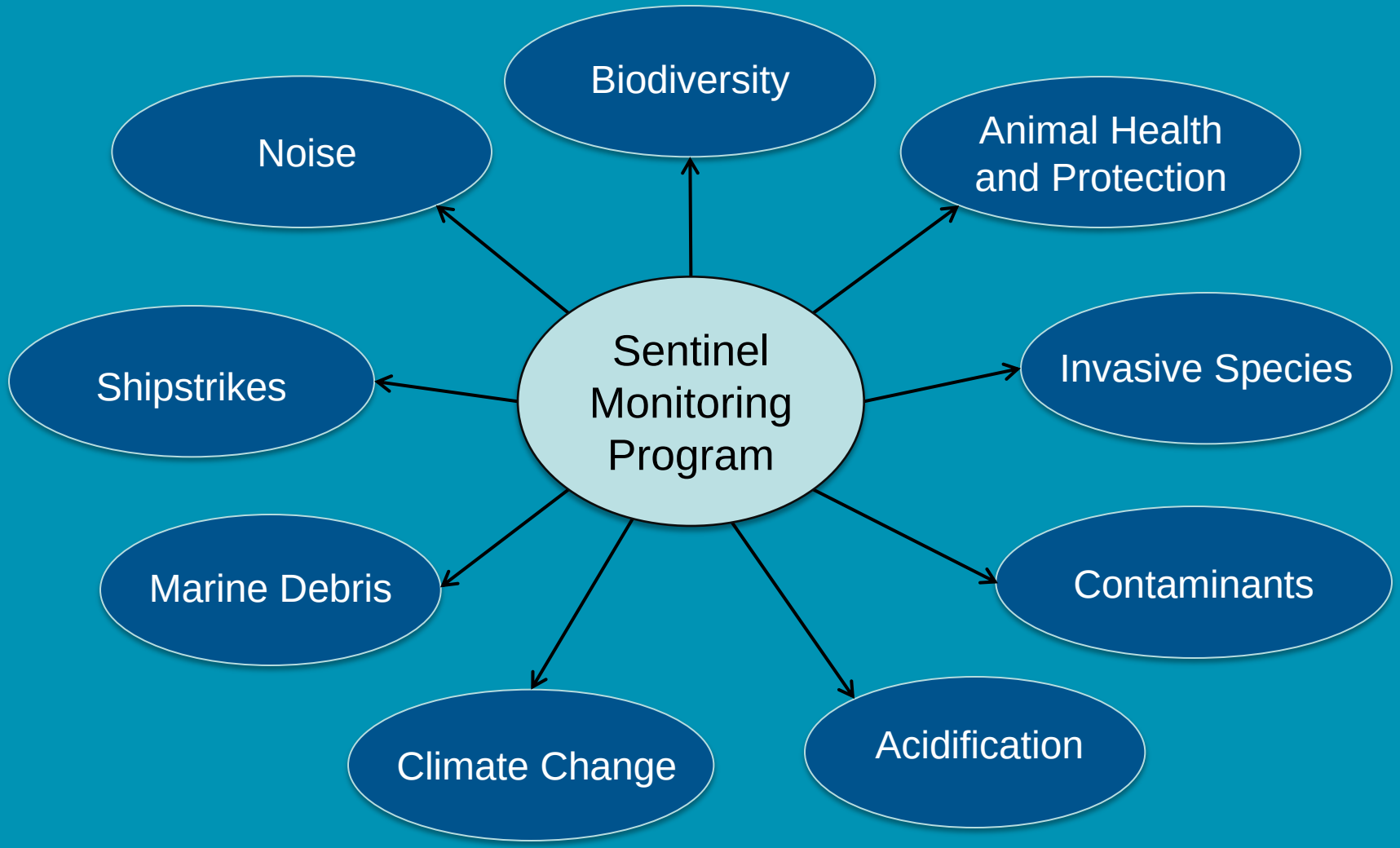


Our Coasts - Our Future



Planning for sea level rise and storm hazards along the Bay Area's outer coast

ONMS Sentinel Monitoring Program
Priority Issues



Implementation

Initial

- Web Design/Content
- Marketing to Partners

Growth

- Filling gaps
- Partner investment

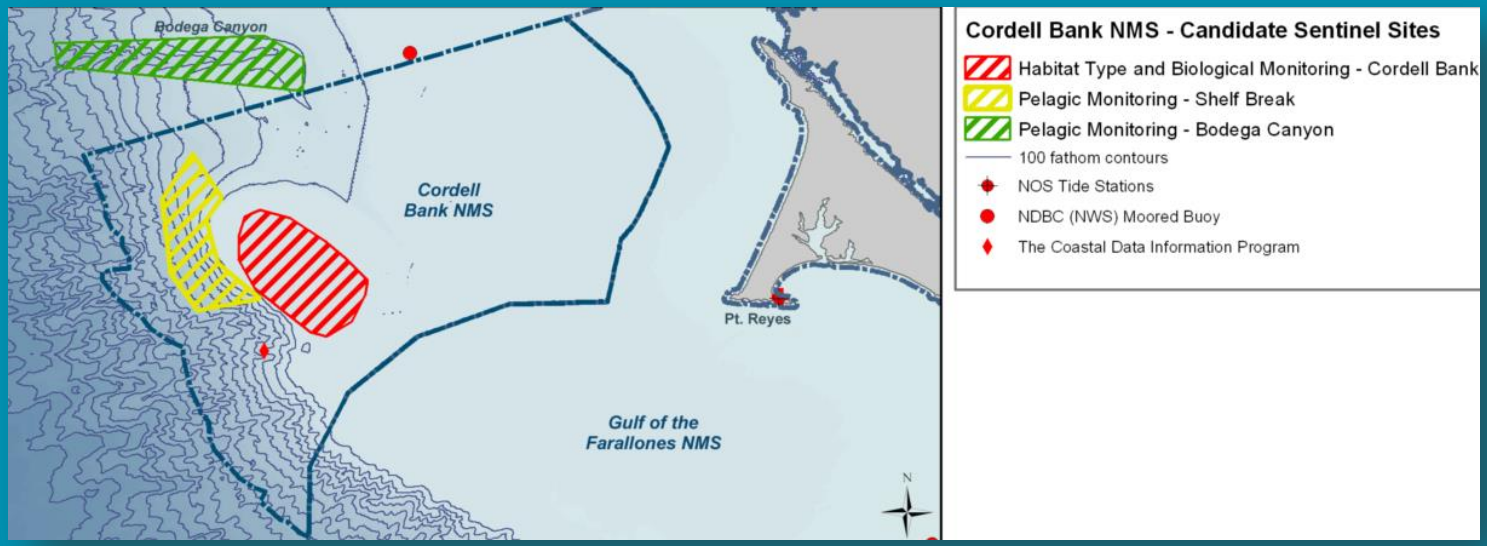
Sentinel Website

Initial

- Monitoring inventory
- Maps of priority observing locations
- Existing capabilities/assets
- Site information & selected results
- Partnering on SLC, OA, Invasives

Future

- Interactive maps
- Links to data
- Outputs for condition reporting
- Integrating other sentinel programs
- Interactivity for training & education



Existing Capacity

- SIMoN
- MBNMS Sanctuary Ecologically Significant Areas (SESA)
- West Coast - Beach Watch & LiMPETS
- SBNMS Whale Alert
- FGLTMP
- GRNMS Research Area
- CRCP – NCRMP