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

- Improve information access
- Strengthen and create partnerships
- Plan for improvements
- Interpret science to the public
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

Science  Service  Stewardship

Observe & Monitor  Applied Research  Models & Predictions  Spatial Analysis & Visualization  Information Transfer  Education & Outreach  Management & Decision Making

Sentinel Monitoring 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.
Resources & Issues:
• Benthic diversity
• Food web structure
• Species invasions
• Acidification
• Visitor impacts
Sentinel Network: Invasive Species -- Lionfish
National Sentinel Network: Whale Strike
National ONMS Program: Biodiversity Observing Network
Sanctuaries and Reserves in Sentinel Networks

Sentinel Stations for:
- Sea Level Change
- Acidification
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

- Biodiversity
- Animal Health and Protection
- Invasive Species
- Contaminants
- Acidification
- Climate Change
- Marine Debris
- Shipstrikes
- Noise
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