How are we doing?
Taking the pulse of California's oceans

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MPA Monitoring Enterprise, California Ocean Science Trust

Smart decisions for our oceans

CALIFORNIA OST Ocean Science Trust
Connecting Science to Ocean Management

Our Mission - *"To advance a constructive role for science in decision-making by promoting collaboration and mutual understanding among scientists, citizens, managers, and policymakers working toward sustained, healthy, and productive coastal and ocean ecosystems"*

mpa MONITORING ENTERPRISE

Objective, reliable and timely monitoring information is used in management decisions for improved stewardship of California MPAs

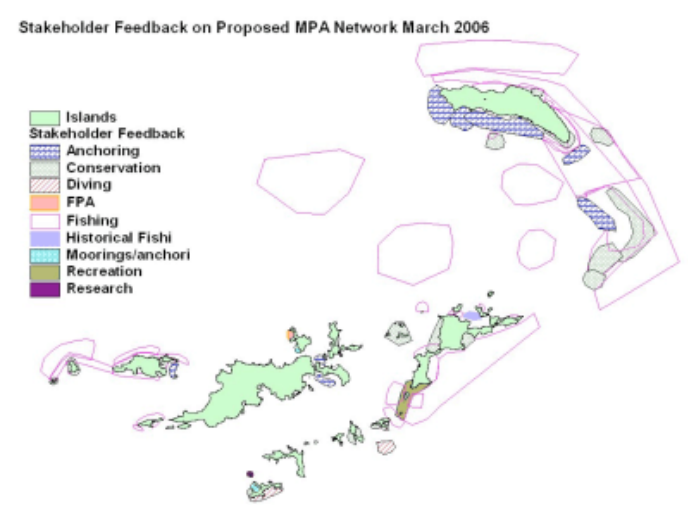
MPAs: The old days

Protect specific species, places, objects…

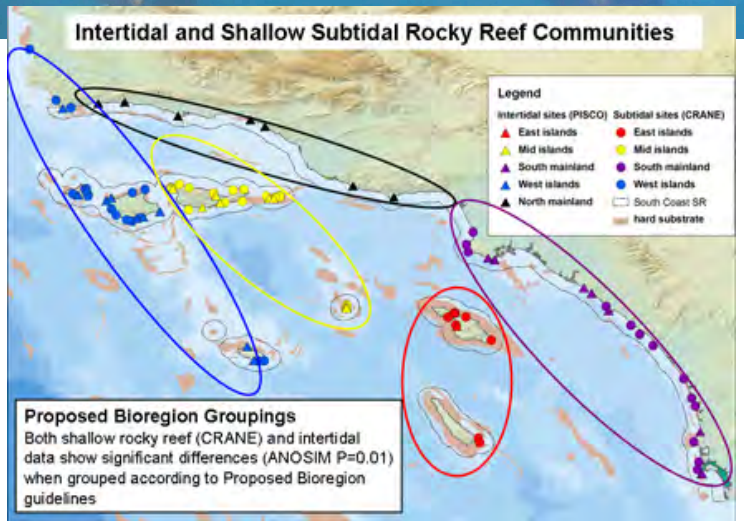
Research showed ecosystem declines…

- Loss of critical habitats
- Functional extinctions
- Loss of predators
- Simplification of food webs
- Trophic cascades
- Loss of resilience?
- …..

…and led evolution of MPA policy



Source: BVI MPA project



Source: PISCO

- Emphasis on protecting biodiversity, habitats, and ecosystems
- Introduction of systems & networks
- Development of new planning principles (representation, replication, connectivity)

But despite this victory…

…MPA monitoring often remains unresponsive to new policy goals

Monitoring has not served management well

MPA Policy and Management Needs:	*MPA Monitoring Delivers:*
Protect ecosystems?	More fish
Confer resilience?	Bigger fish
How many MPAs?	More species

New statewide MPA network in California

1999 Marine Life Protection Act

Designed to protect marine life and habitats, ecosystems, and natural heritage,

as well as improve recreational, educational and study opportunities.

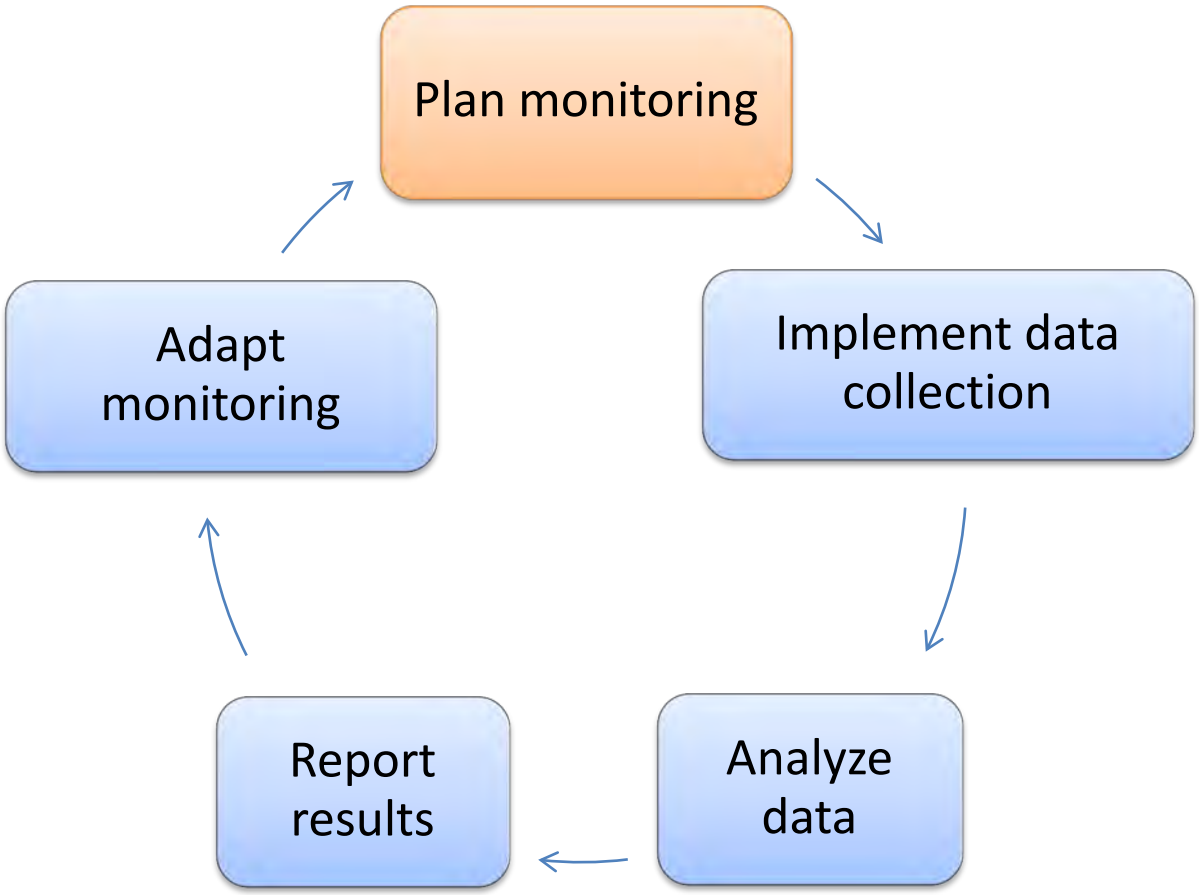
The policy context for monitoring

"Are the MPAs working?"

Under the MLPA, monitoring should:

- Evaluate the MPA network's performance relative to MLPA goals
- Facilitate adaptive management
- Improve understanding of marine systems

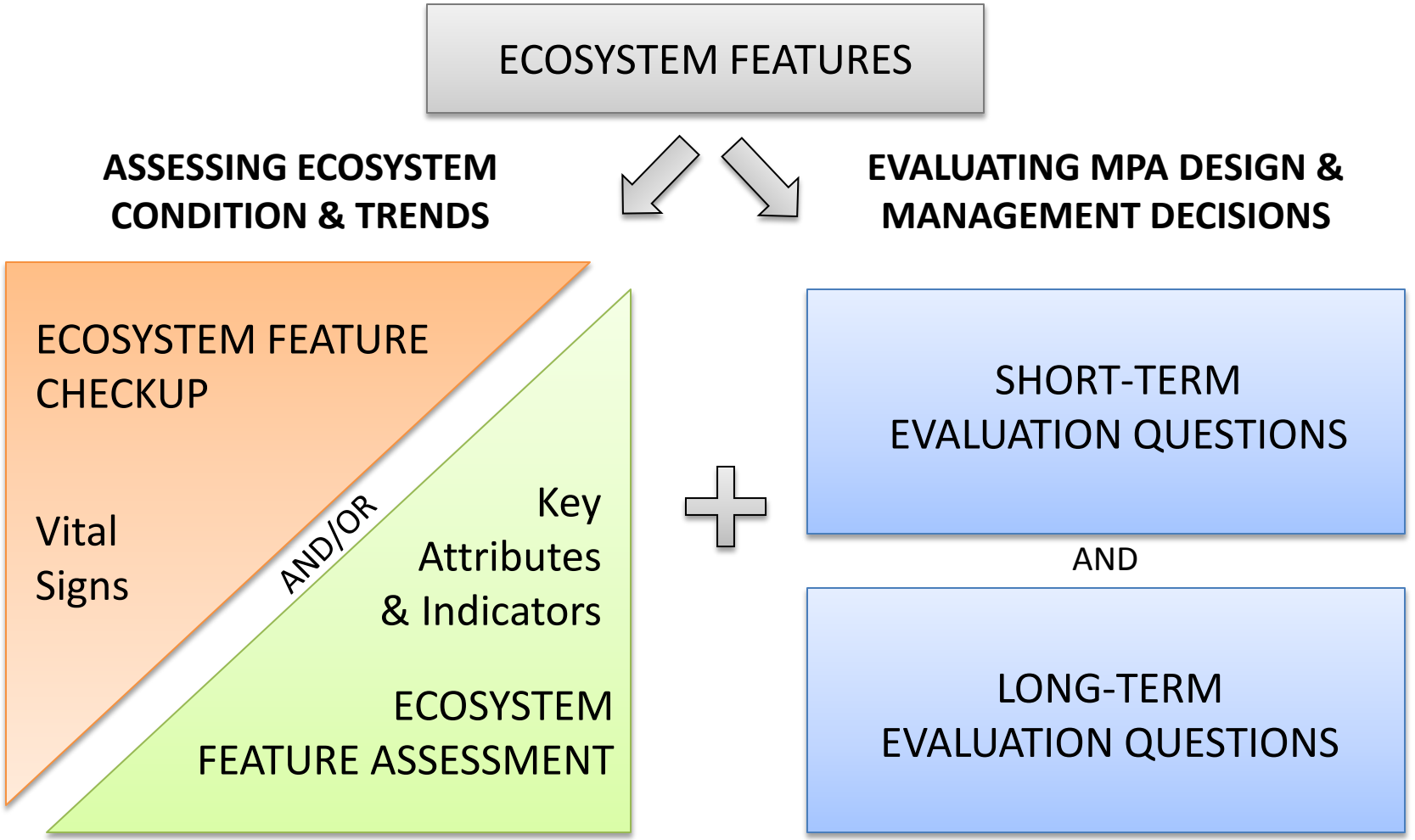
Making monitoring adaptive



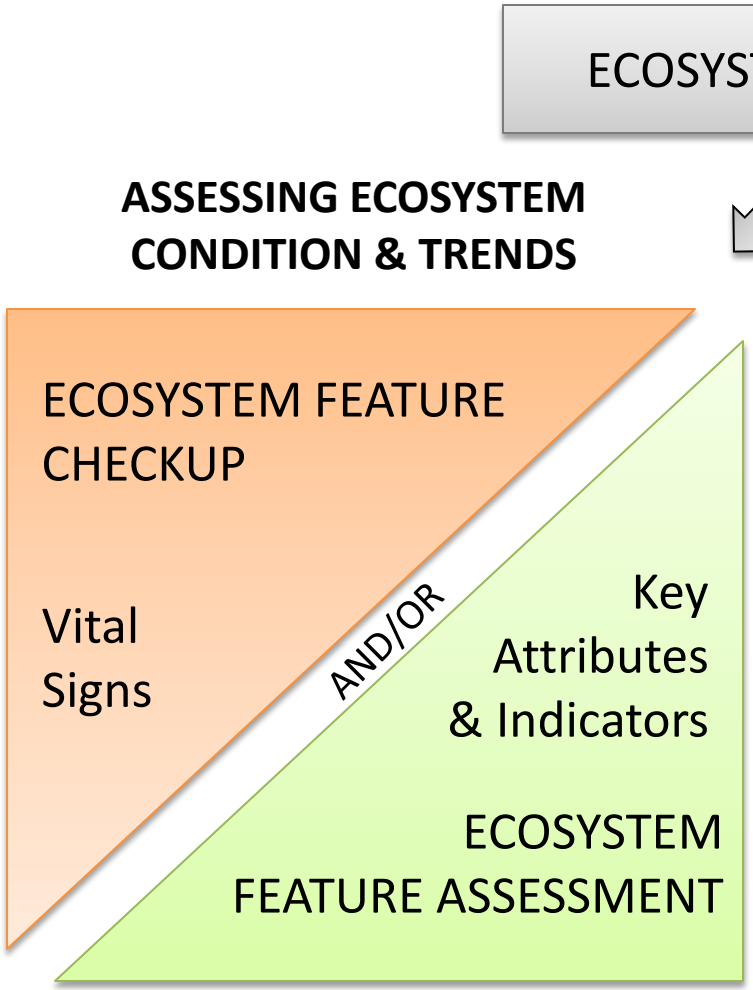
A consultative process

- Focusing on management needs
- Reflecting stakeholder priorities
- Applying the best-available science

MPA Monitoring Framework



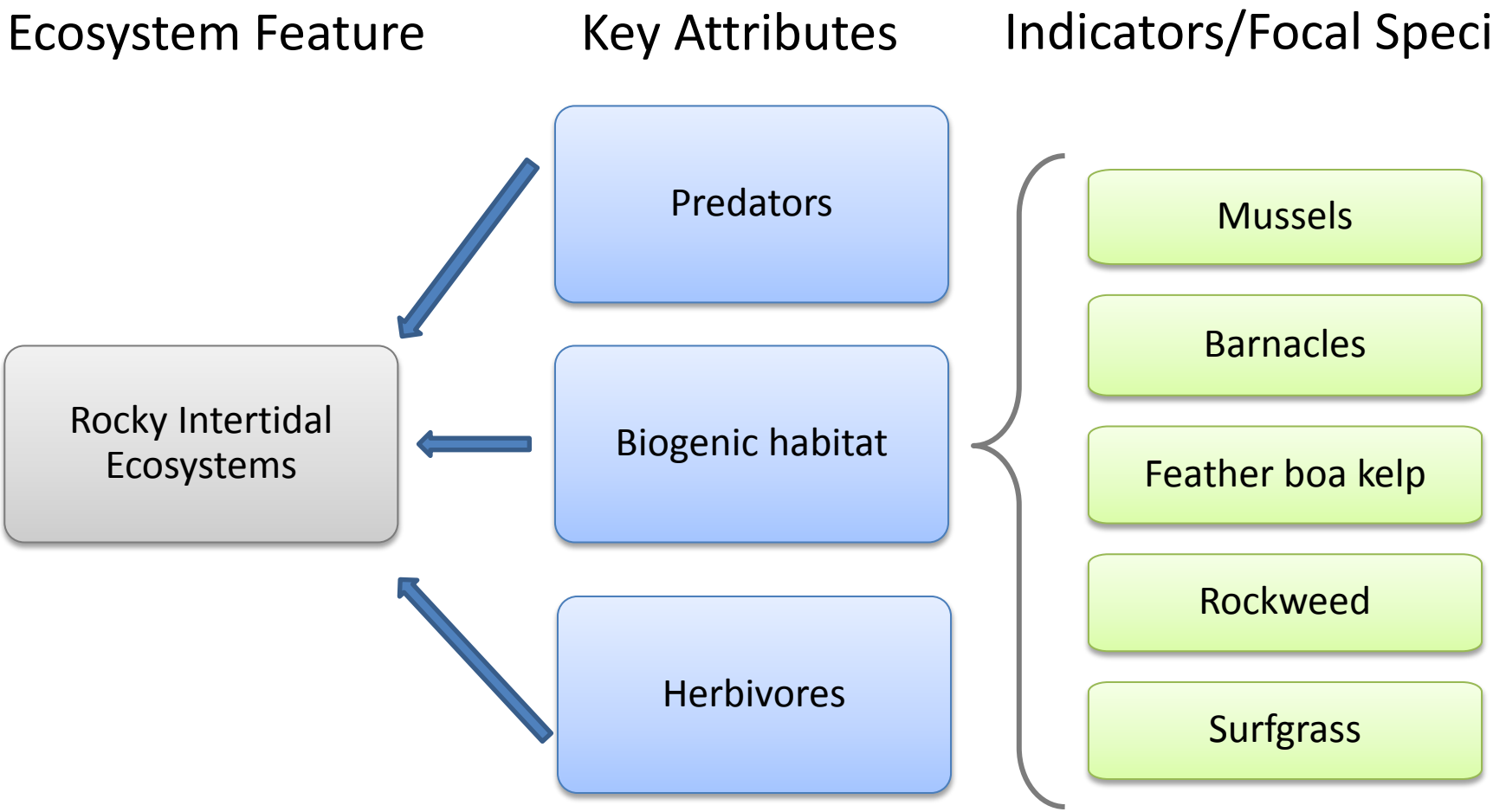
Taking the pulse of ocean ecosystems



- Checkups: designed to facilitate involvement of community and citizen-science groups
- Assessments: more technically demanding, take advantage of partnerships with academic and agency scientists

'How is the system doing?'

Selecting informative metrics



Evaluating network design decisions

ECOSYSTEM FEATURES

EVALUATING MPA DESIGN & MANAGEMENT DECISIONS

- Levels of protection – allowed uses
- Placement
- Size & shape
- Spacing
- Habitat representation

SHORT-TERM EVALUATION QUESTIONS

AND

LONG-TERM EVALUATION QUESTIONS

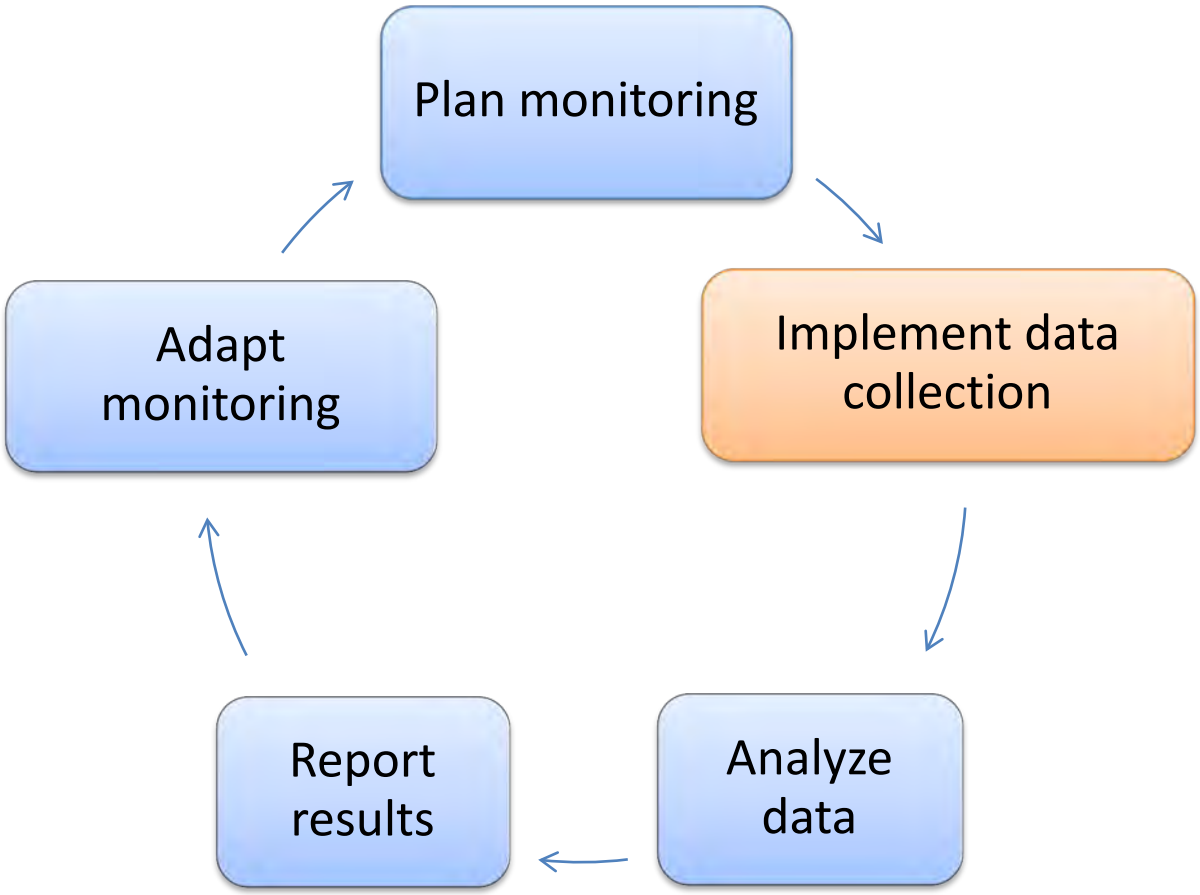
'How are MPAs affecting the system?'

Reflecting management priorities

What are the rates of rockfish bycatch with salmon trolling and do rates vary with water depth?

Are there impacts (e.g., trampling) of increased visitation on rocky intertidal ecosystems in MPAs?

An adaptive monitoring cycle



The first steps are critical

- What is baseline monitoring?
  - To establish a benchmark of ecological conditions against which future changes can be measured
  - To assess initial changes (2-3 years) following MPA implementation
- Baseline Programs implemented in each MLPA region
  - Approximately $4m available per region from the California Ocean Protection Council
  - Programs are a collaboration of OPC, California Sea Grant, California Department of Fish and Wildlife and OST

Implementing monitoring

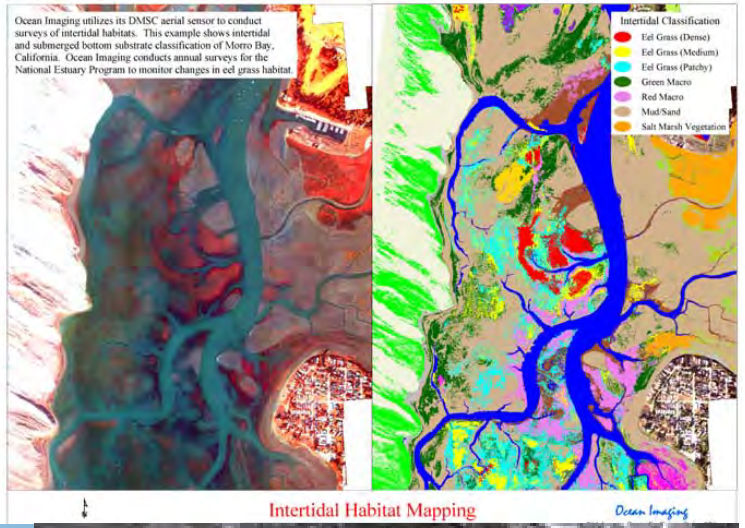
South Coast Baseline Program:

- 10 projects selected for funding
- Includes academic, citizen-science & collaborative fisheries programs
- Encompasses many ecosystems: rocky shores, kelp forests, beaches, deep reefs etc
- Ecology & socioeconomics

Setting a benchmark of ocean health


Credit: PISCO


Scuba surveys of fish in a kelp forest.
Credit: R. Schwemmer/NOAA



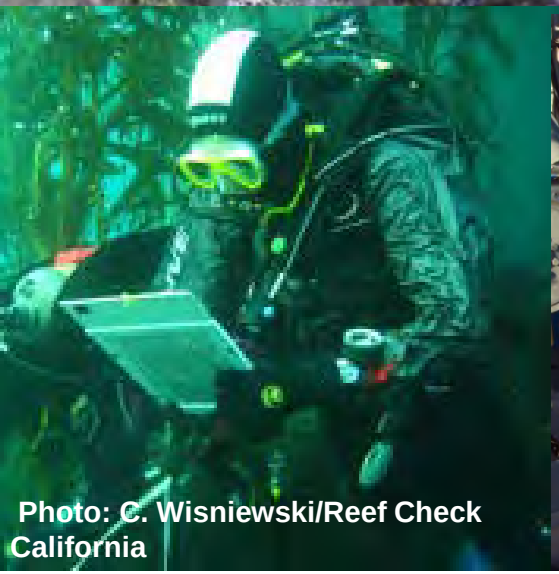
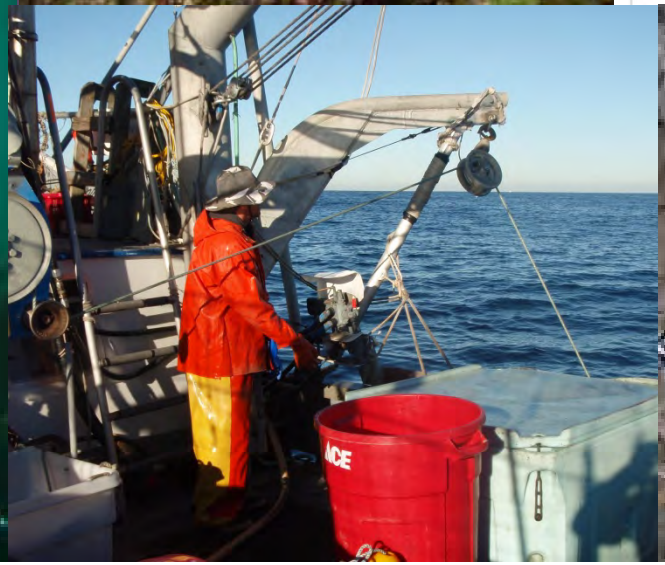
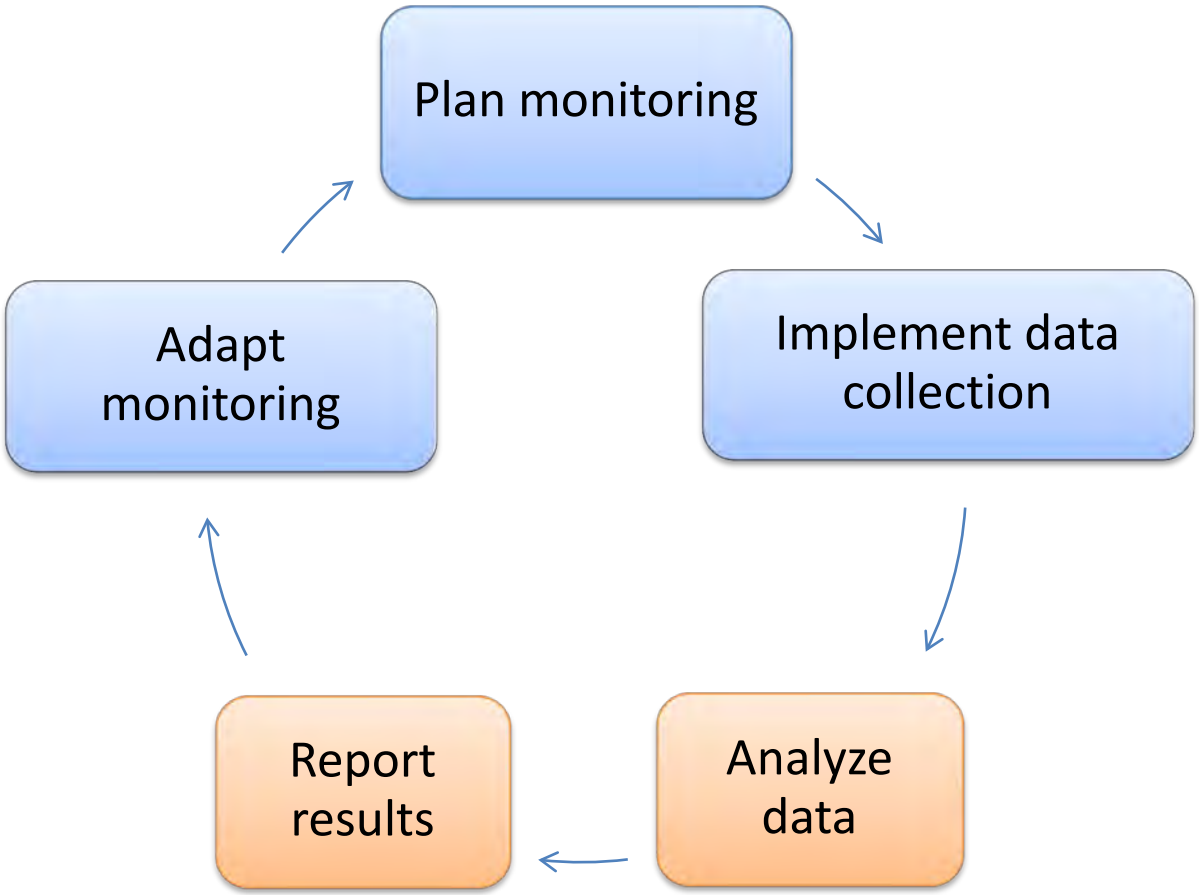


Photo: C. Wisniewski/Reef Check California

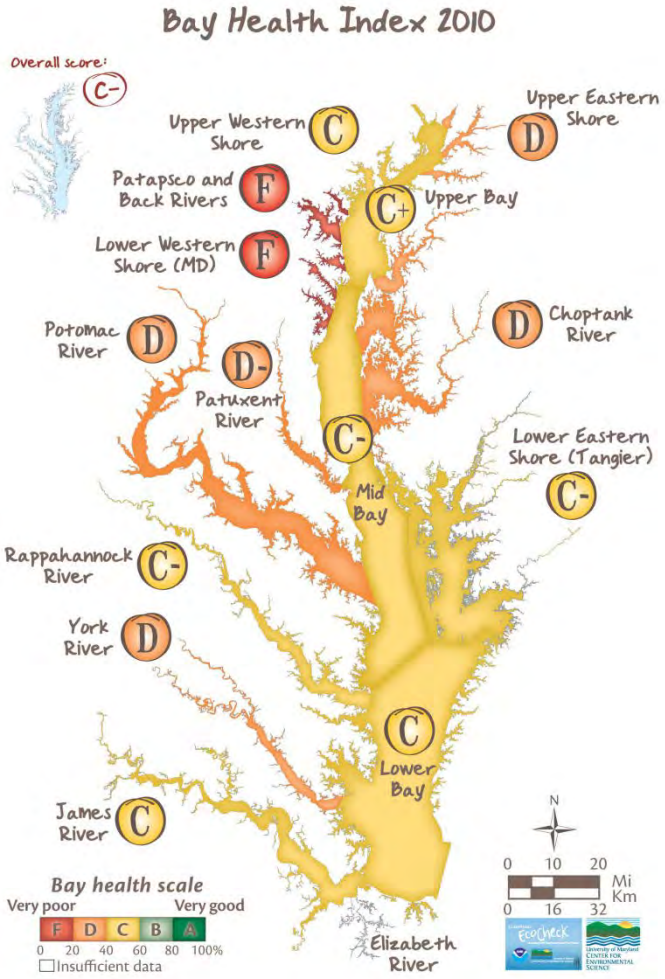



Credit: S. Lyday/Beach Watch

An adaptive monitoring cycle



Giving ecosystems a ‘grade’



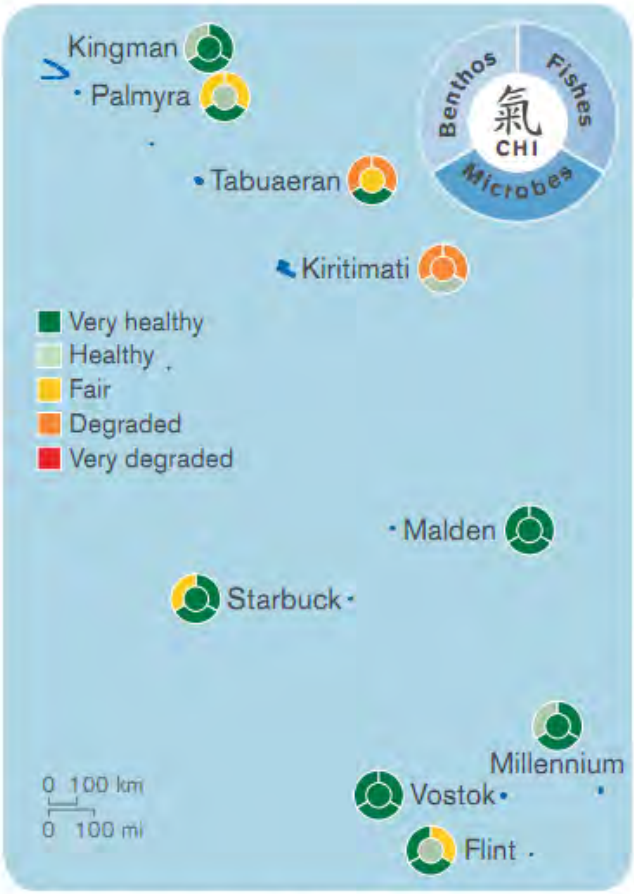
STATE OF THE SOUND • WWW.PSAT.WA.GOV/SOS

State of the Sound's Habitat

The Puget Sound region contains an amazing variety of habitats, each supporting diverse communities of plant and animal life, and each an integral part of a healthy Puget Sound. Extensive development, land conversion and the establishment of non-native and invasive species over the past 100 years have destroyed many once-intact habitats. As habitats become smaller and more isolated, they are less able to sustain the ecological processes necessary to support life. The loss and alteration of key habitats places more pressure on many of the Sound's living resources, from forage fish to salmon, and marine birds to orca whales.

INDICATOR	DESCRIPTION	STATUS/TREND
HABITAT		
Forest loss in Puget Sound lowlands	Loss of forested lands and corridors can dramatically impact river and stream systems and the species that depend on them. Between 1991 and 2001, approximately 190 square miles of forest (about 2.3 percent of the total forested area of the Puget Sound basin) was converted to other uses. In areas below 1,000 feet elevation, the change was more dramatic: 3.9 percent of total forest area was lost between 1991 and 2001.	NEGATIVE POSITIVE
Eelgrass	Eelgrass grows in tidelands and shallow waters along much of Puget Sound's shoreline. Eelgrass habitat plays a critical role in the health of many Puget Sound fish and wildlife species, providing them with food, breeding areas and protective nurseries. Between 2003 and 2004, eelgrass declined Soundwide by four percent, but has not changed measurably since.	NEGATIVE POSITIVE
Aquatic nuisance species	Puget Sound has become home to a number of non-native species. Two species of significant concern are tunicates, commonly called sea squirts, and spartina, a type of salt marsh grass. Significant progress has been made in the eradication of spartina. However, the recent establishment and spread of three species of non-native tunicates are a negative trend.	NEGATIVE POSITIVE

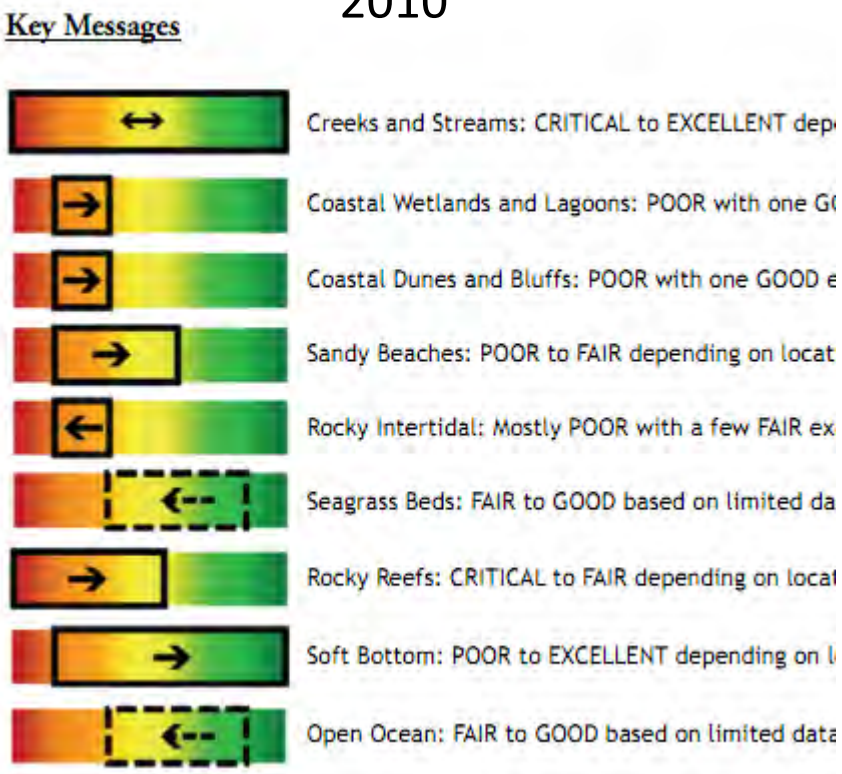
To raise awareness



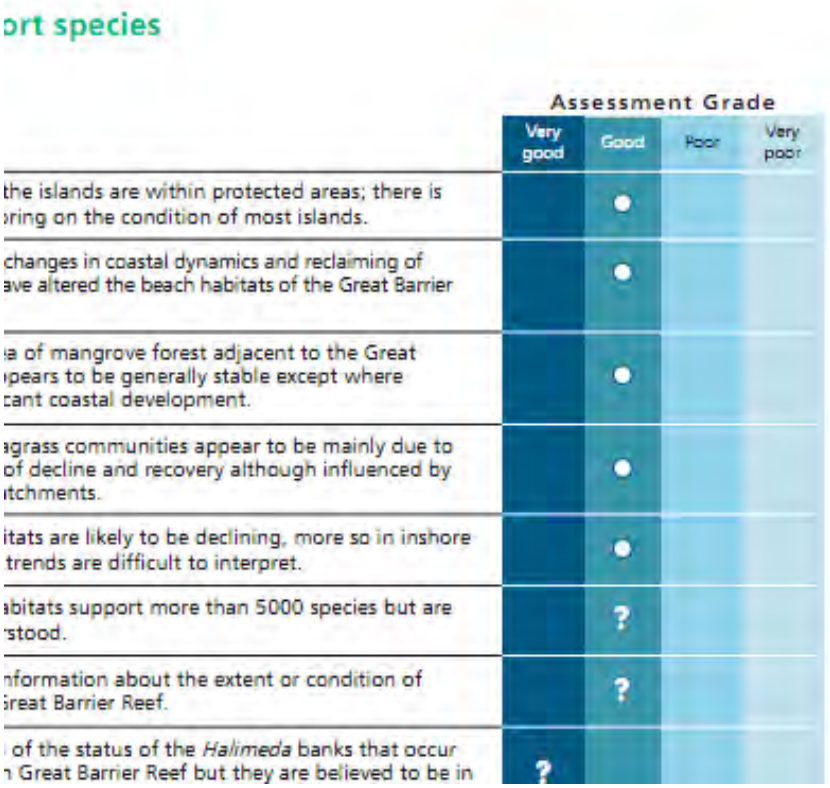
Coral Health Index calculated for reefs across the Line Islands archipelago.

To inform management decisions

Santa Monica Bay Restoration Commission, State of the Bay 2010



Great Barrier Reef Marine Park Authority Outlook Report 2009



Providing guidance on where to act

Rockfish Reef State Marine Reserve

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Overall Assessment

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Title of Charts Below can go here if needed

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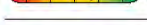
Kelp & Shallow Rock		Cdoloremdolore dip esto consequat. Acip ea ad dignit incilit nummy num irit nulla facipsici sit lumqte eu feui blaor adiamcon venim veliquip eugait, volendriemodion euguerc ipsummo dolorperos ex er suscips uscidunt veliqua tuercilisi.
Deep Rock		Cdoloremdolore dip esto consequat. Acip ea ad dignit incilit nummy num irit nulla facipsici sit lute eu feui blaor adiamcon venp eugait, volendrm quate euismodion euguerc ipsummo dolorperos ex er suscips uscidunt veliqua tuercilisi.
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Conditions & Trends in Monitored MPAs

If necessary, a description or key can go here.

MPA Name

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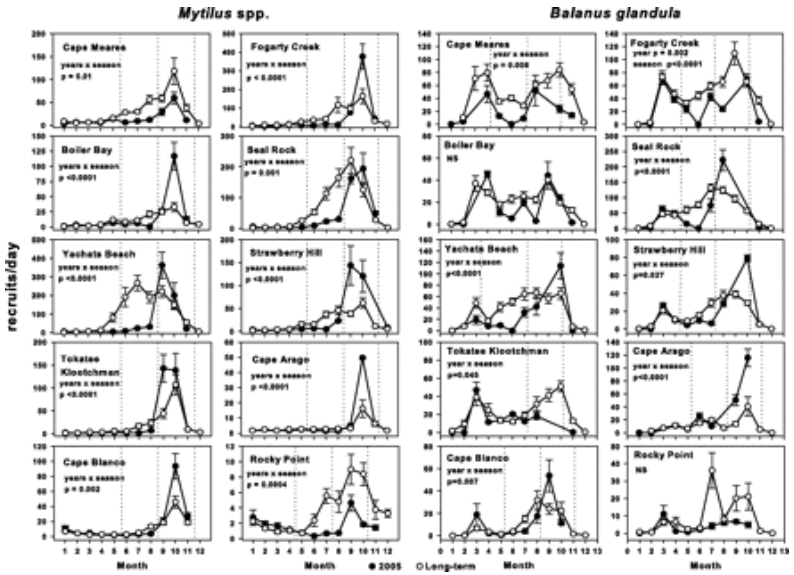
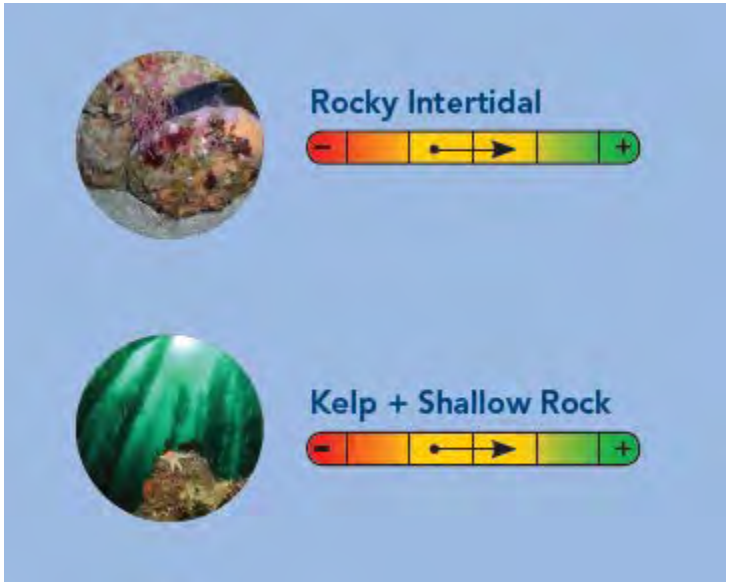
MPA Name shown in boldface indicates monitored MPAs

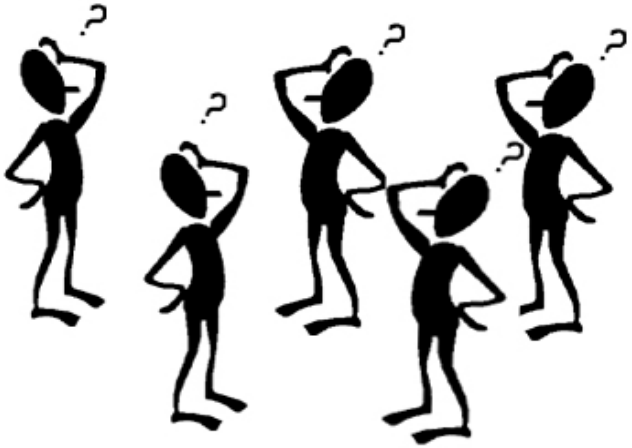
How are results produced?



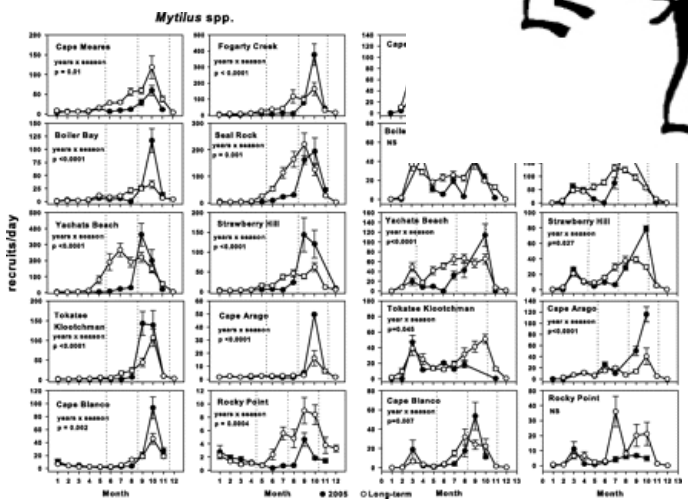


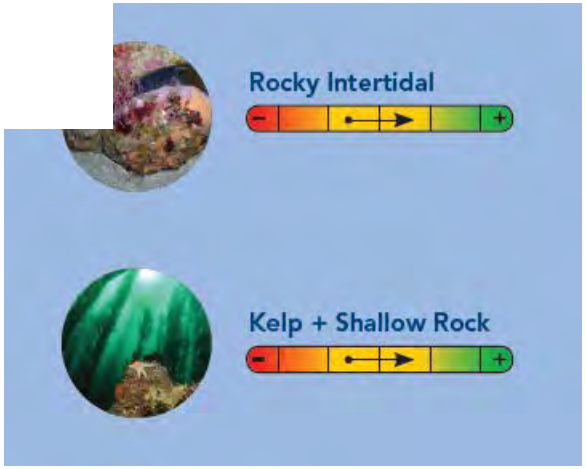
The role of expert judgment

Good?
Improving?

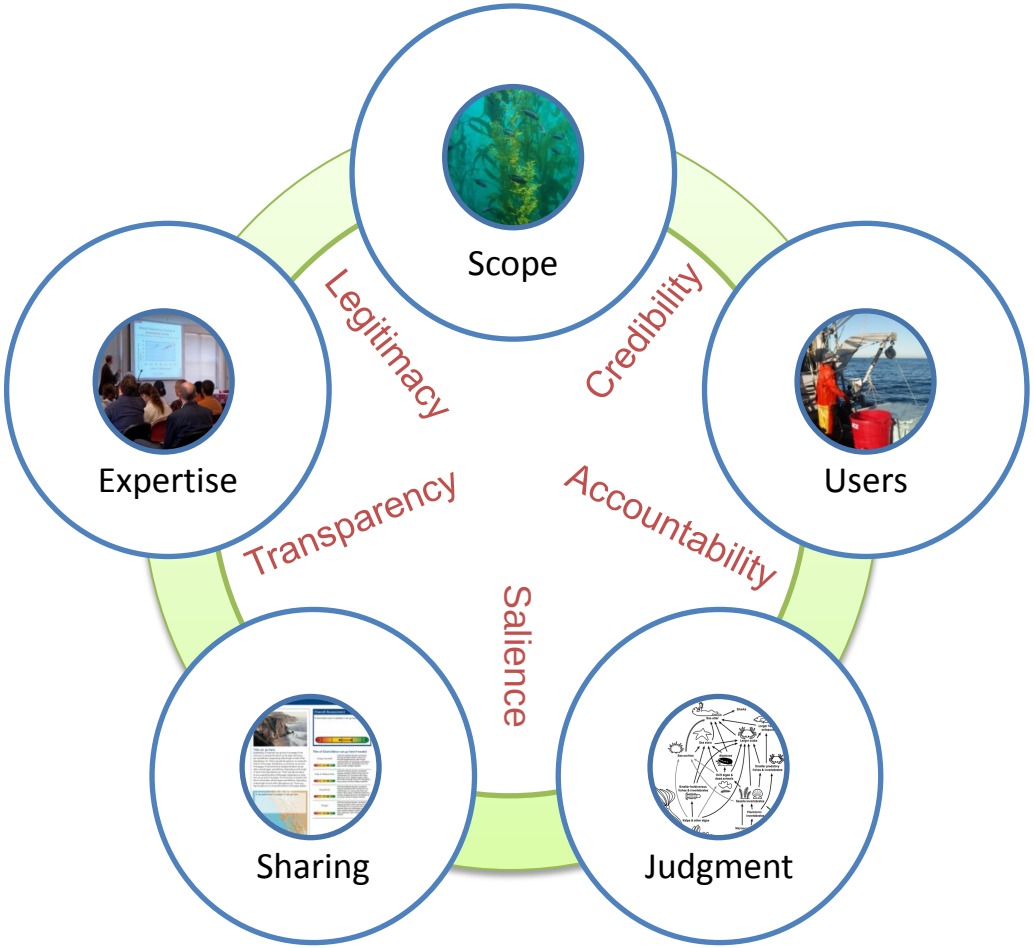


Bad?
Declining?





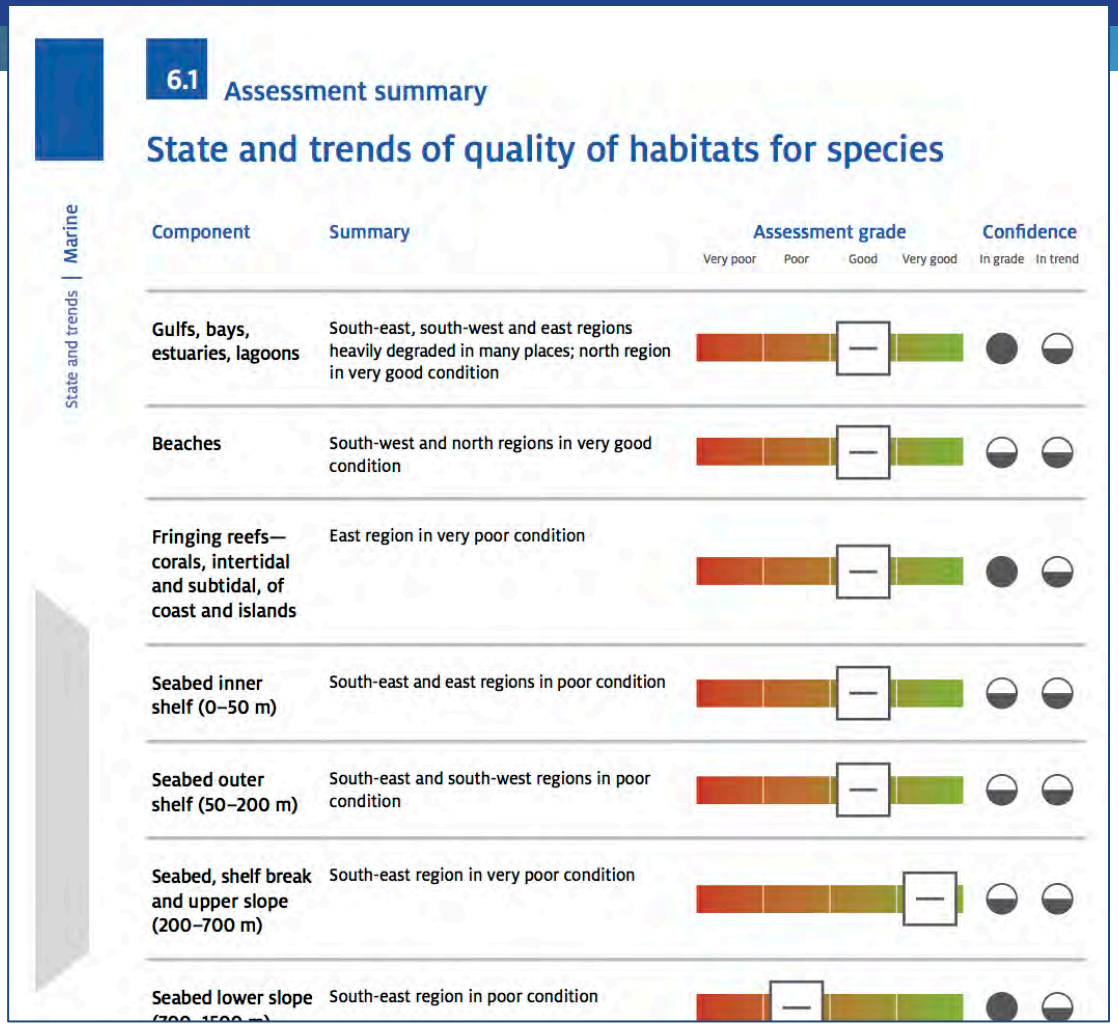
A framework for expert judgment



Piloting an ocean health report card

Focused on kelp forests in California's Central Coast region

Learning from the Australia State of the Environment Report, 2011



6.1 Assessment summary

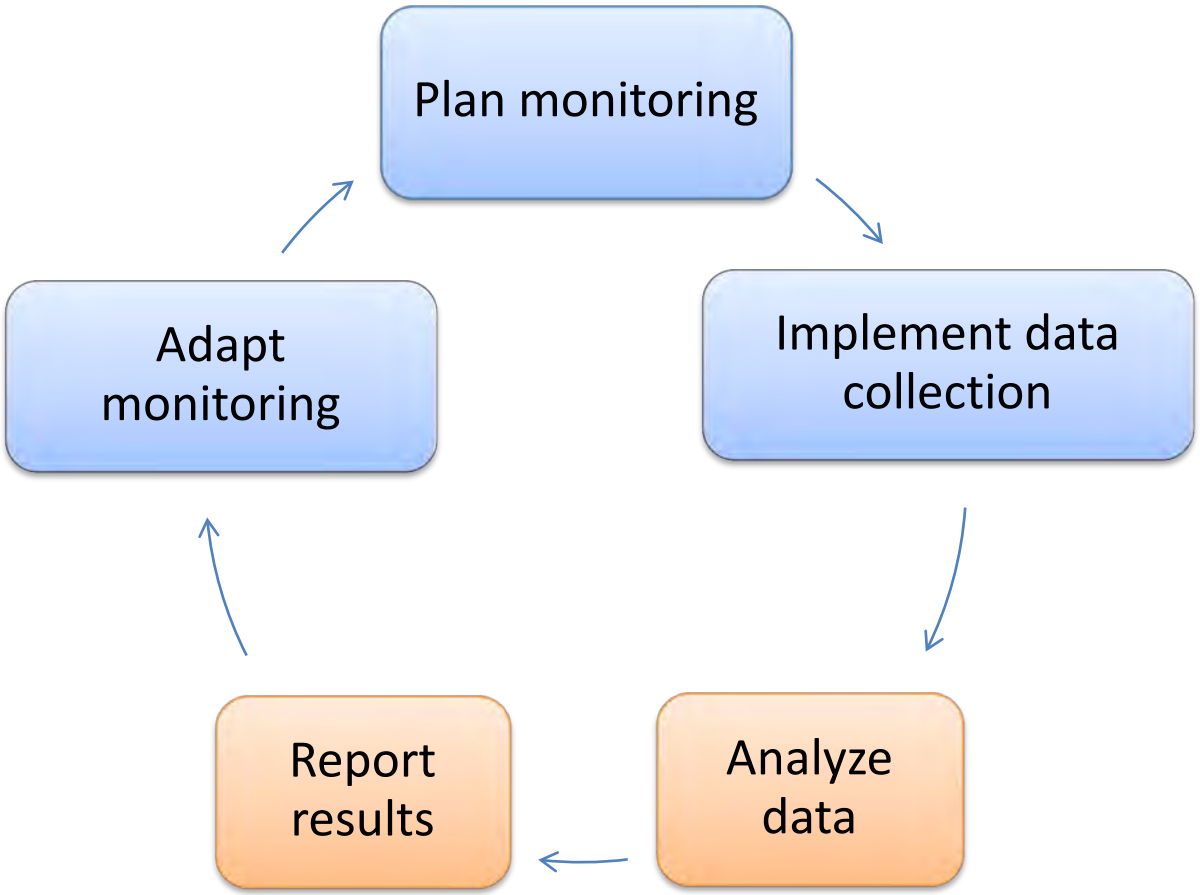
State and trends of quality of habitats for species

State and trends | Marine

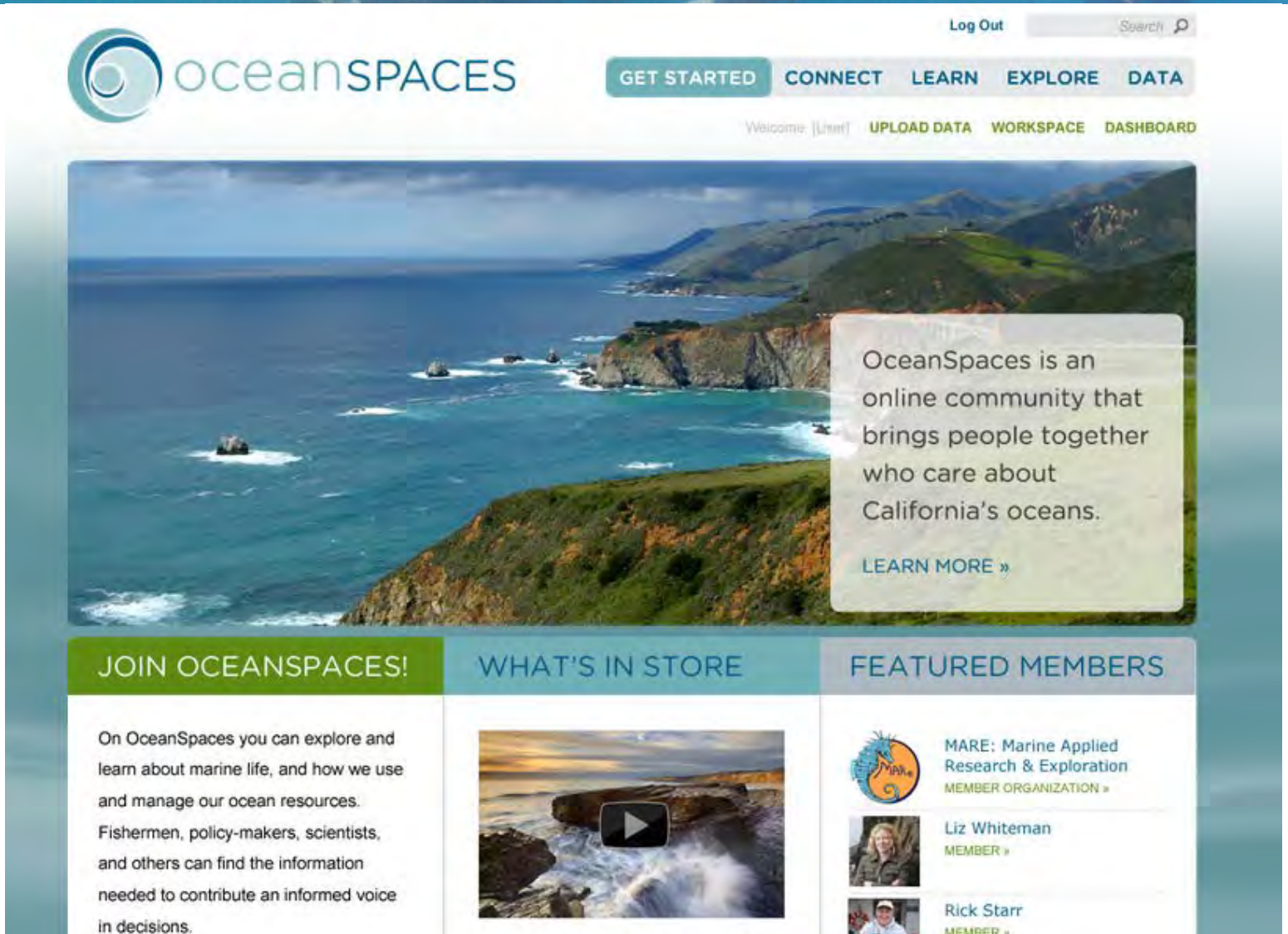
Component	Summary	Assessment grade (Very poor / Poor / Good / Very good)	Confidence (In grade / In trend)
Gulfs, bays, estuaries, lagoons	South-east, south-west and east regions heavily degraded in many places; north region in very good condition		
Beaches	South-west and north regions in very good condition		
Fringing reefs—corals, intertidal and subtidal, of coast and islands	East region in very poor condition		
Seabed inner shelf (0–50 m)	South-east and east regions in poor condition		
Seabed outer shelf (50–200 m)	South-east and south-west regions in poor condition		
Seabed, shelf break and upper slope (200–700 m)	South-east region in very poor condition		
Seabed lower slope	South-east region in poor condition		

http://www.environment.gov.au/soe/2011/index.html

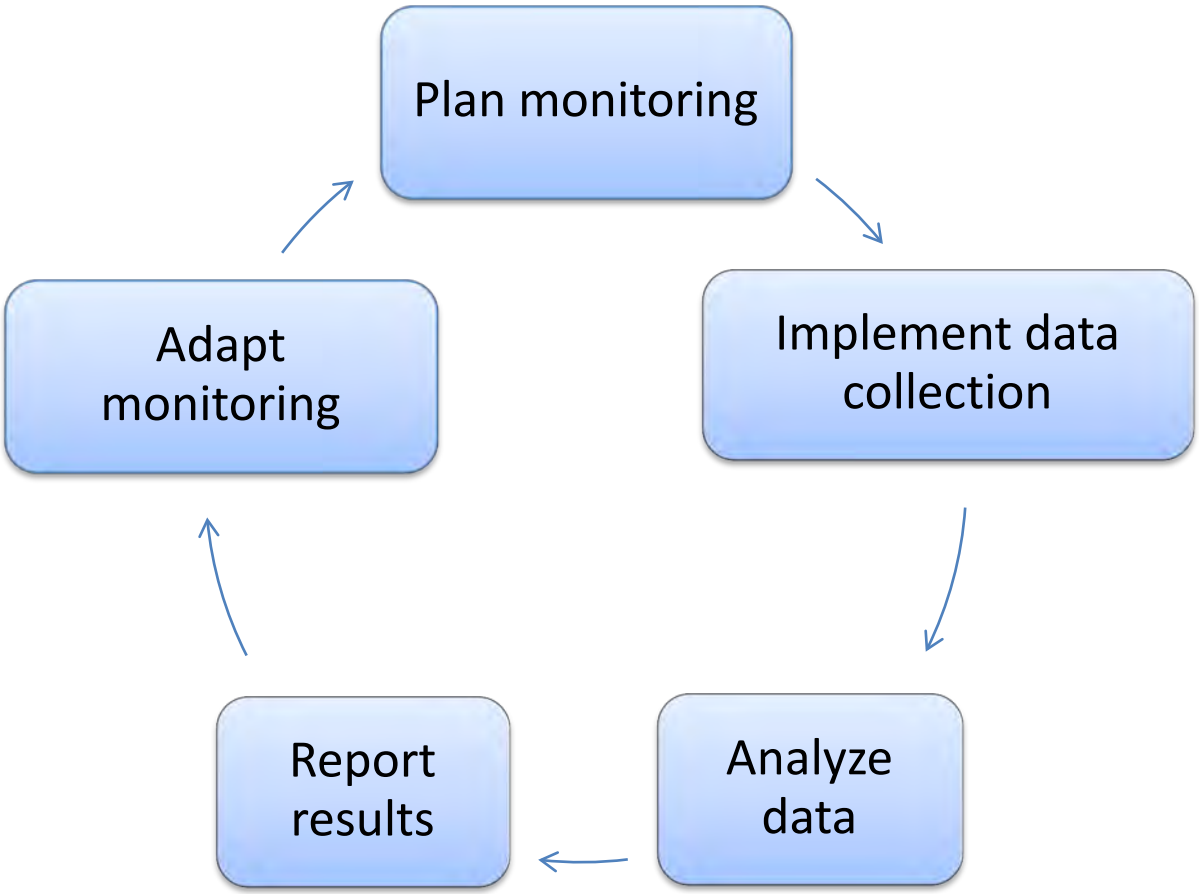
Our roles


Plan monitoring
Implement data collection
Analyze data
Report results
Adapt monitoring

Building a monitoring community



Our roles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mpa MONITORING ENTERPRISE

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Connecting Science to Ocean Management

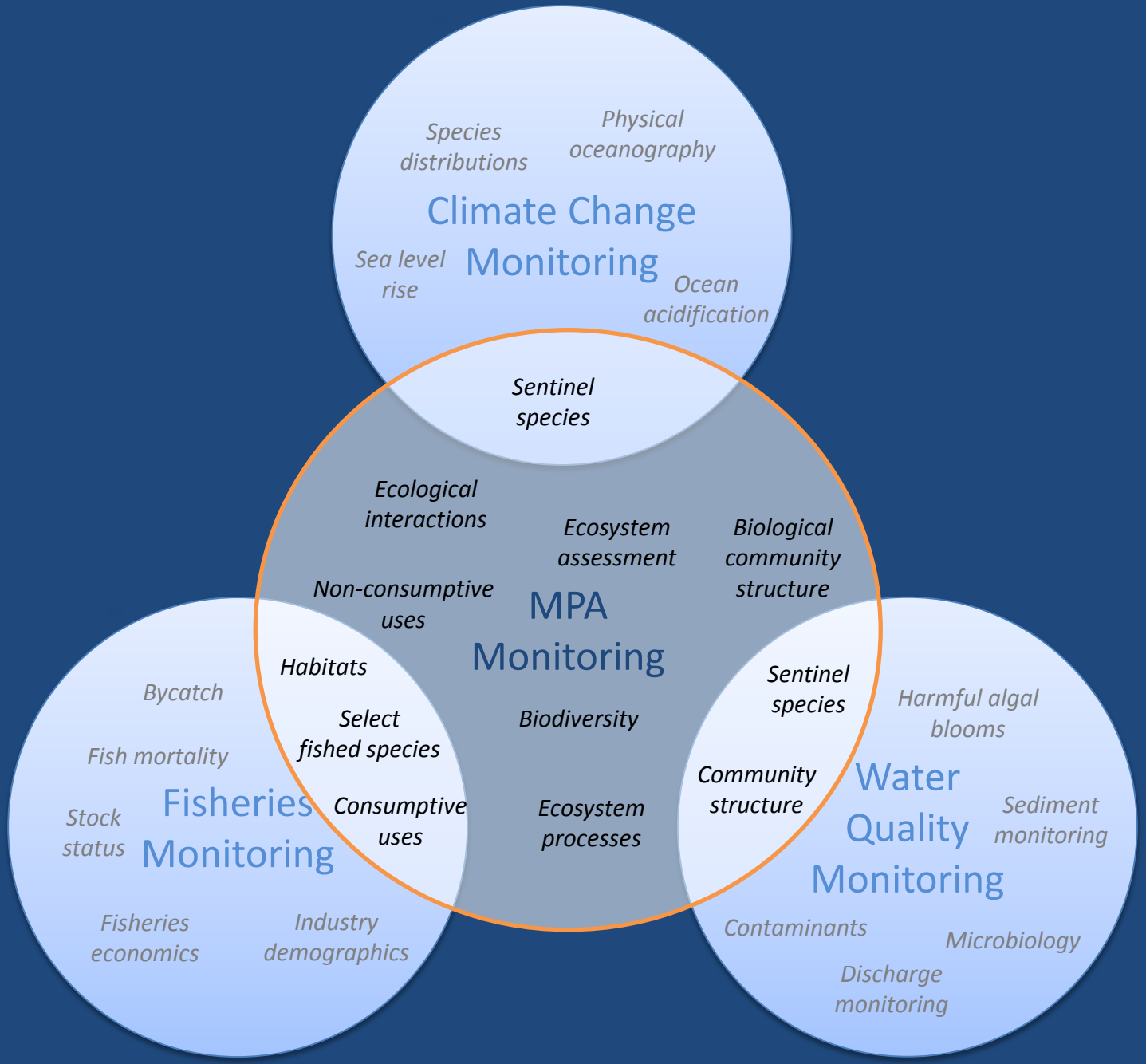
Thank you!

Email: liz.whiteman@calost.org

www.oceanspaces.org

www.calost.org

www.monitoringenterprise.org


Species distributions
Physical oceanography
Climate Change Monitoring
Sea level rise
Ocean acidification
Sentinel species
Ecological interactions
Ecosystem assessment
Biological community structure
Non-consumptive uses
MPA Monitoring
Habitats
Biodiversity
Select fished species
Consumptive uses
Ecosystem processes
Bycatch
Fish mortality
Stock status
Fisheries Monitoring
Fisheries economics
Industry demographics
Sentinel species
Community structure
Harmful algal blooms
Water Quality Monitoring
Sediment monitoring
Contaminants
Microbiology
Discharge monitoring