Science for adaptive management: Monitoring California's MPAs

Fisheries Forum, Monterey, November 2013

Liz Whiteman, MPA Monitoring Enterprise, California Ocean Science Trust

California's Marine Life Protection Act

- Act passed in 1999
- Directed the state to redesign California's MPAs to form a more cohesive network
- Mandated a role for science

With broad goals

'protect the natural abundance & diversity of marine life'

'protect structure, function & integrity of marine ecosystems'

'rebuild depleted populations'

'improve recreational opportunities'

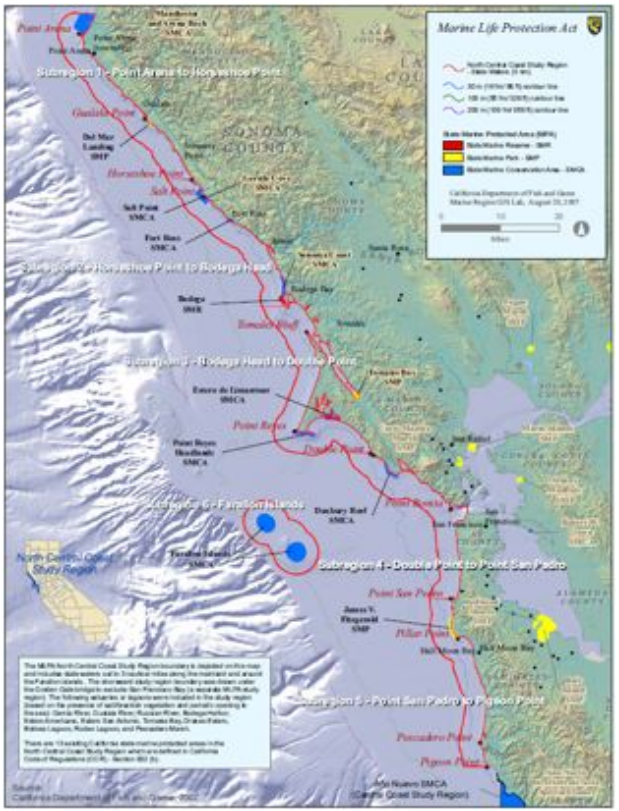
'protect natural marine heritage'

And a promise of adaptive management

"a management policy that seeks to **improve management of biological resources**, particularly in areas of scientific uncertainty, by viewing **program actions as tools for learning**. Actions shall be designed so that, even if they fail, they will provide useful information for future actions, and **monitoring and evaluation shall be emphasized** so that the interaction of different elements within marine systems may be better understood"

(MLPA, Section 2852 (a)).

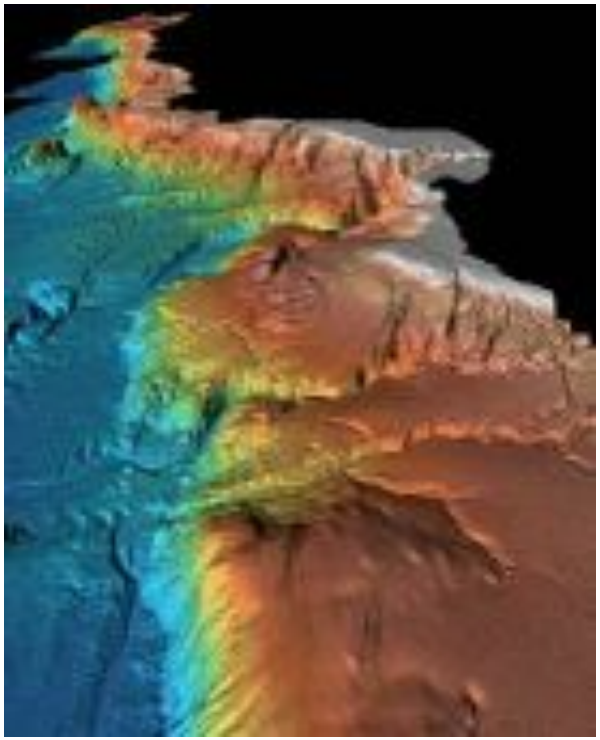
…drawing on our scientific knowledge

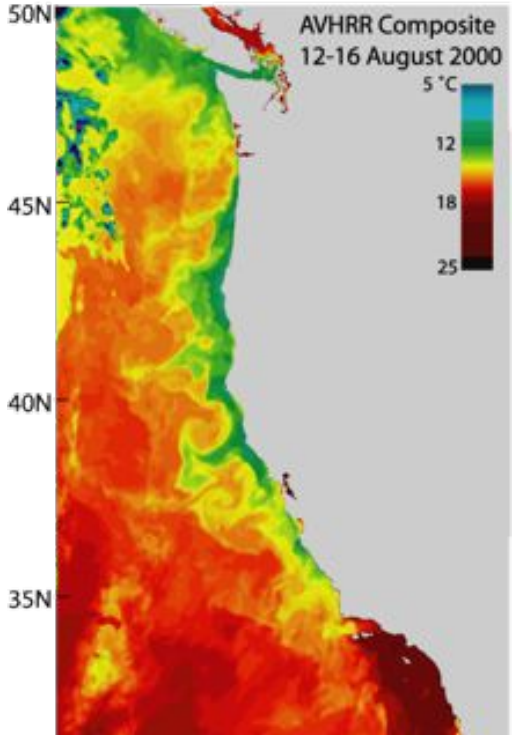


in California's academic, agency and citizen scientists

…and sharing as 'rules of thumb'

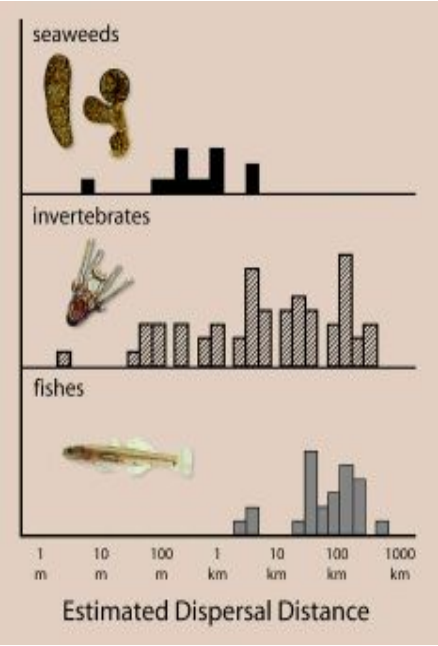
At least three to five replicate MPAs should be designed for each key habitat type within a biogeographic region

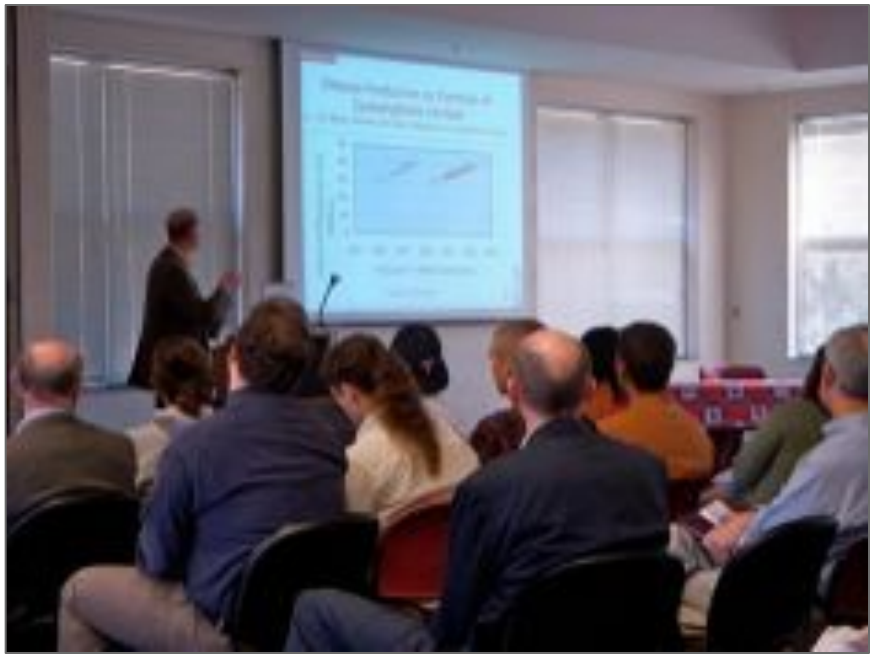




A common dialogue

…to design the first science-based statewide network





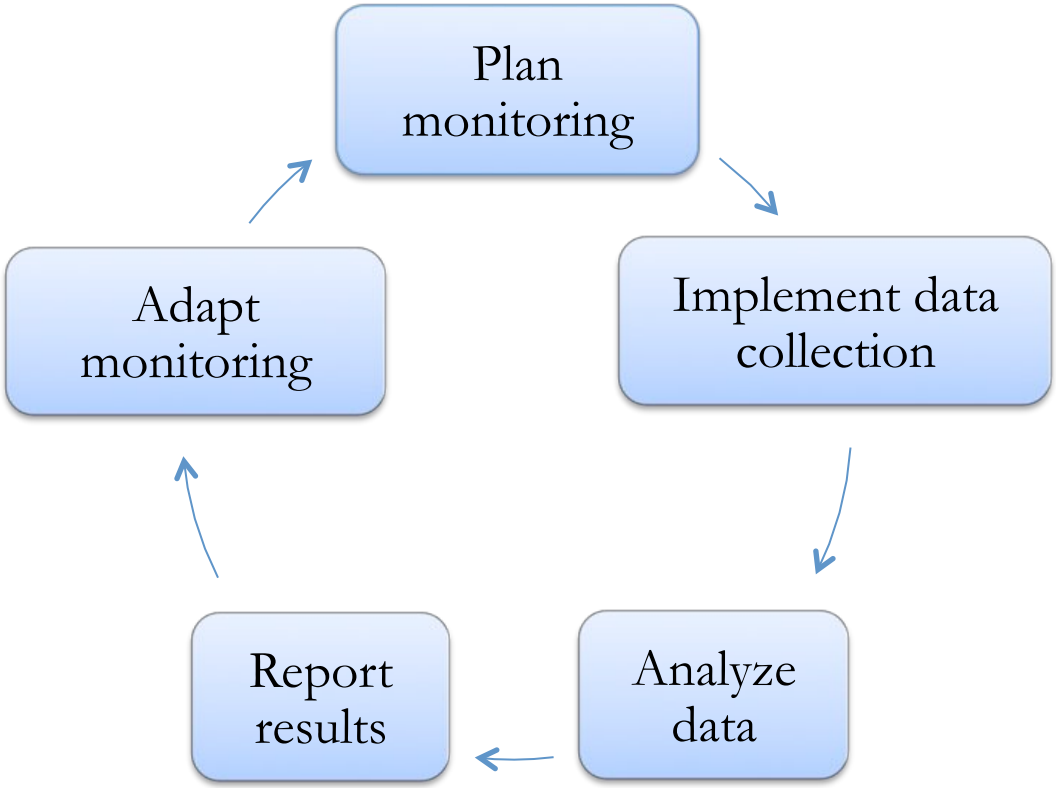
124 MPAs covering 2197km^2, 16% of California's oceans

…requires a new monitoring approach

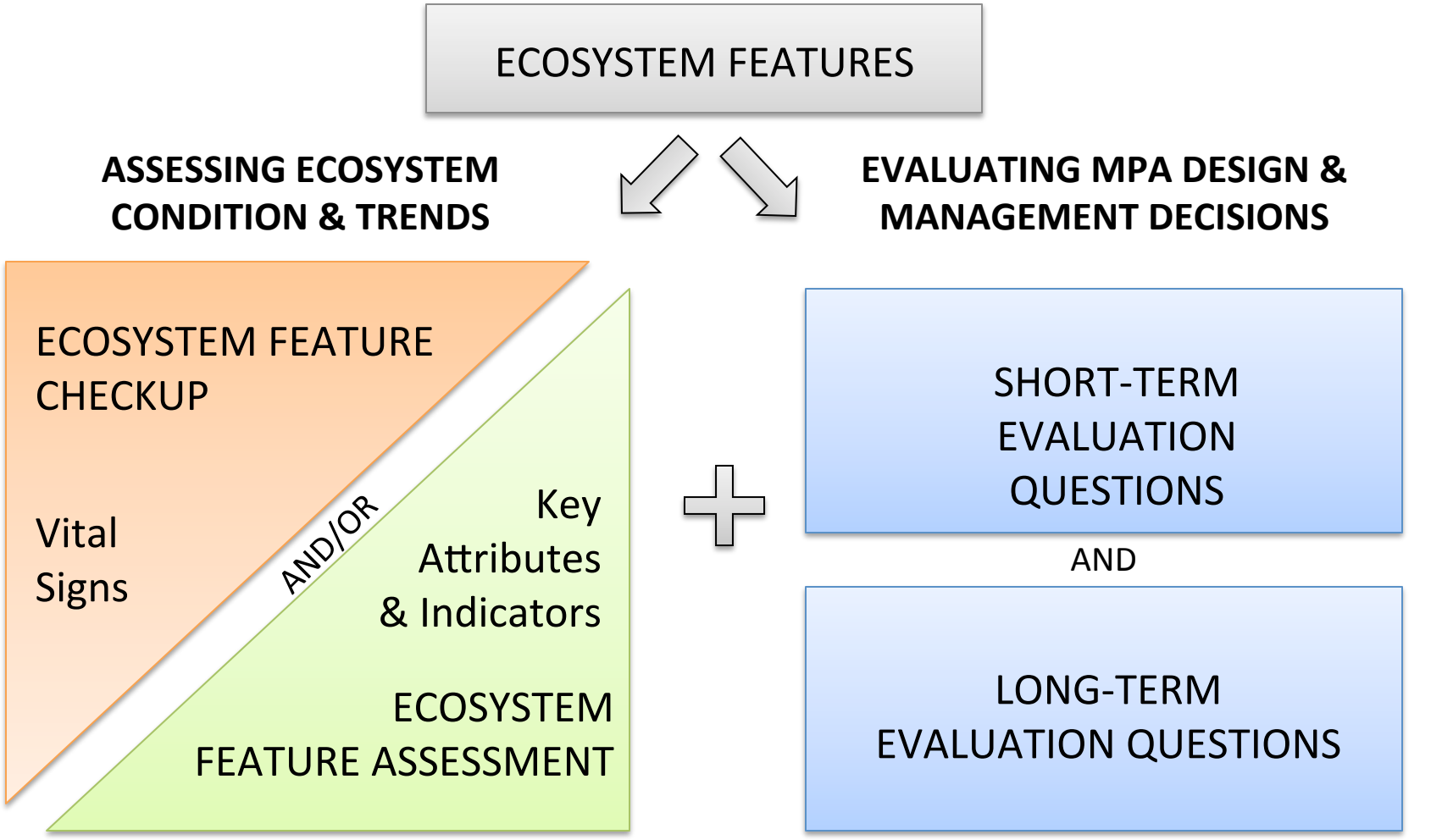
- Start with stakeholder priorities
- Engage the best scientists
- Foster new ways to participate
- Share timely information broadly

Reframing the discussion

Providing useful information to inform decisions



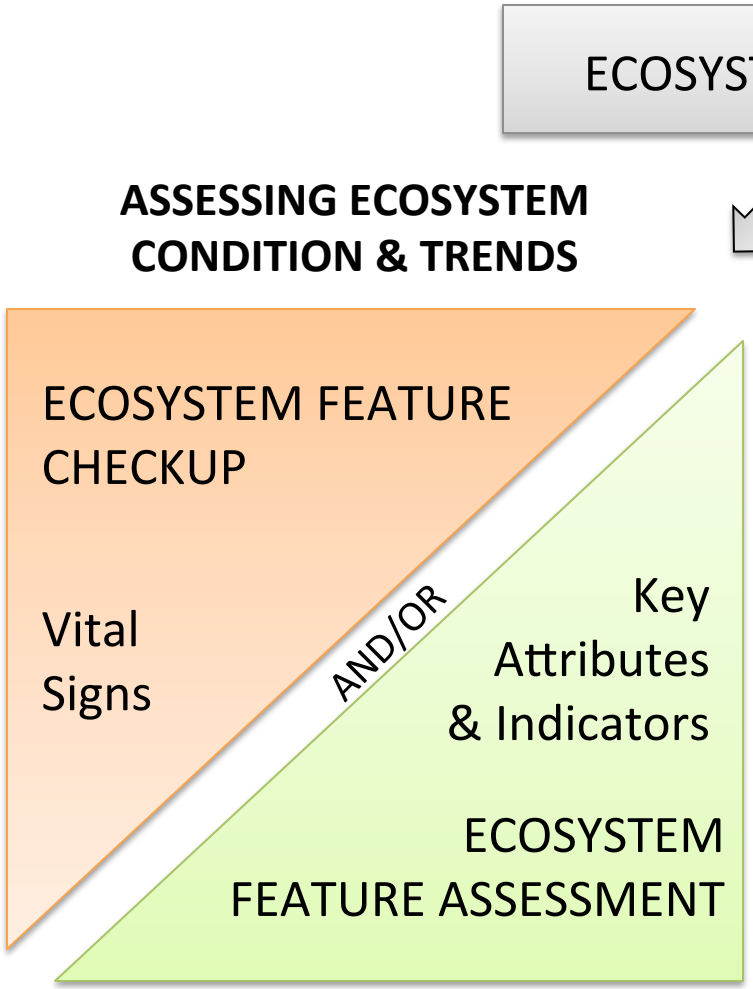
A new framework as state policy



'How is the system doing?'

'How are MPAs affecting the system?'

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?'

A consultative process

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

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?'

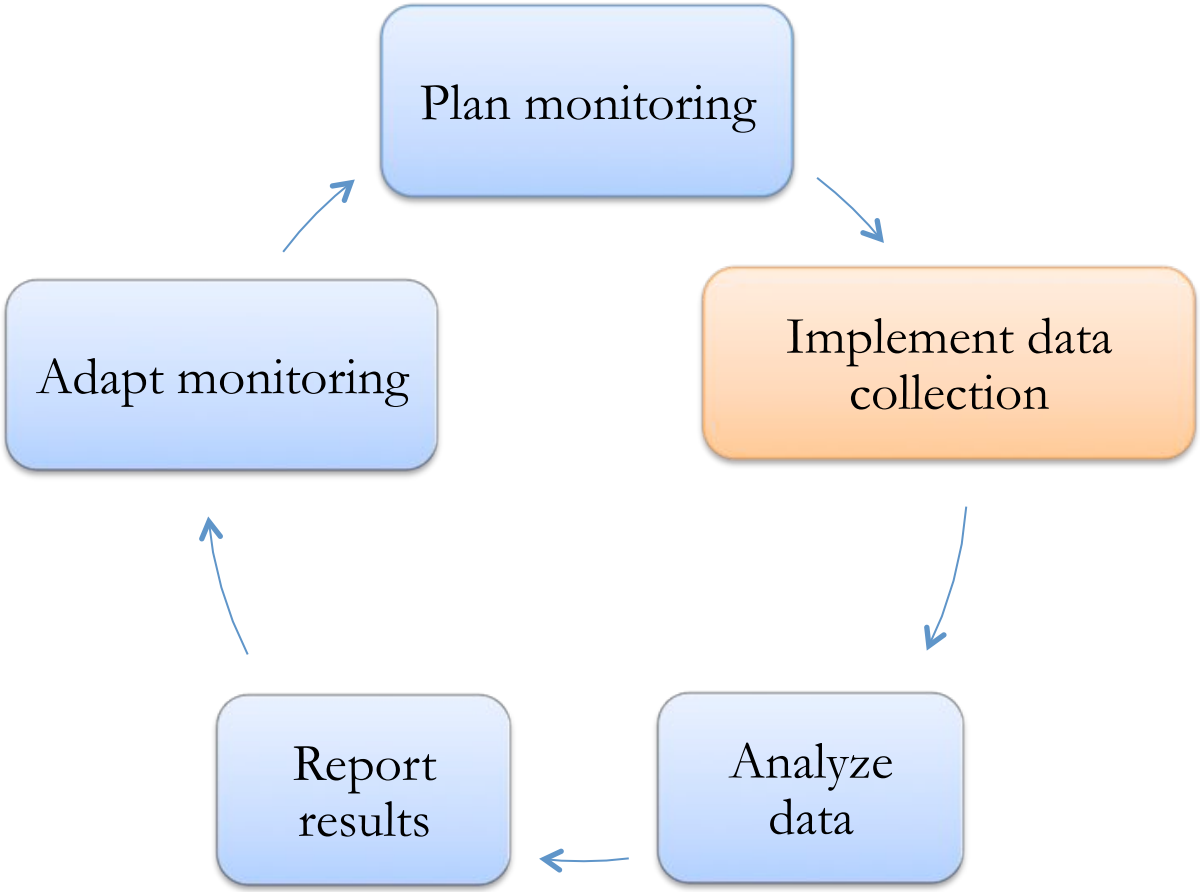
Practical in use and cost

How much does monitoring cost?

	$1 million annual budget			
	Allocated funding level			
	Year 1	Year 2	Year 3	Year 4
Assessing Ecosystem Condition & Trends				
Rocky Intertidal	$180,000		$180,000	
Kelp & Shallow Rock	$70,000	$70,000	$70,000	$70,000
Mid-depth Rock		$190,000		$190,000
Estuarine & Wetland			$310,000	
Soft-bottom Intertidal	$255,000		$255,000	
Soft-bottom Subtidal		$190,000		$190,000
Deep ecosystems				
Nearshore Pelagic		$155,000		$155,000
Consumptive Uses	$170,000	$170,000		$170,000
Non-consumptive Uses	$150,000		$150,000	
Evaluating MPA Design & Management Questions				
Short-term MPA management	$100,000	$100,000	$100,000	$100,000
Long-term MPA design and management	$50,000	$50,000	$50,000	$50,000
Research & Development				
Advancing ecosystem monitoring				$50,000
TOTAL	**$975,000**	**$925,000**	**$1,115,000**	**$975,000**

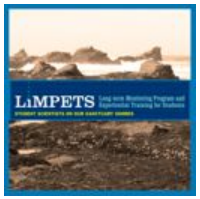
	$2 million annual budget			
	Allocated funding level			
	Year 1	Year 2	Year 3	Year 4
	$165,000		$165,000	$180,000
	$175,000	$70,000	$70,000	$175,000
	$190,000	$420,000		
				$310,000
			$305,000	$255,000
	$190,000	$190,000		
			$420,000	
	$155,000			$155,000
	$620,000	$1,120,000	$170,000	$480,000
	$150,000		$500,000	$100,000
	$100,000	$100,000	$200,000	$200,000
	$100,000	$100,000	$100,000	$100,000
	$100,000		$100,000	
	$1,945,000	**$2,000,000**	**$2,030,000**	**$1,955,000**

An adaptive monitoring cycle



Understanding our starting point

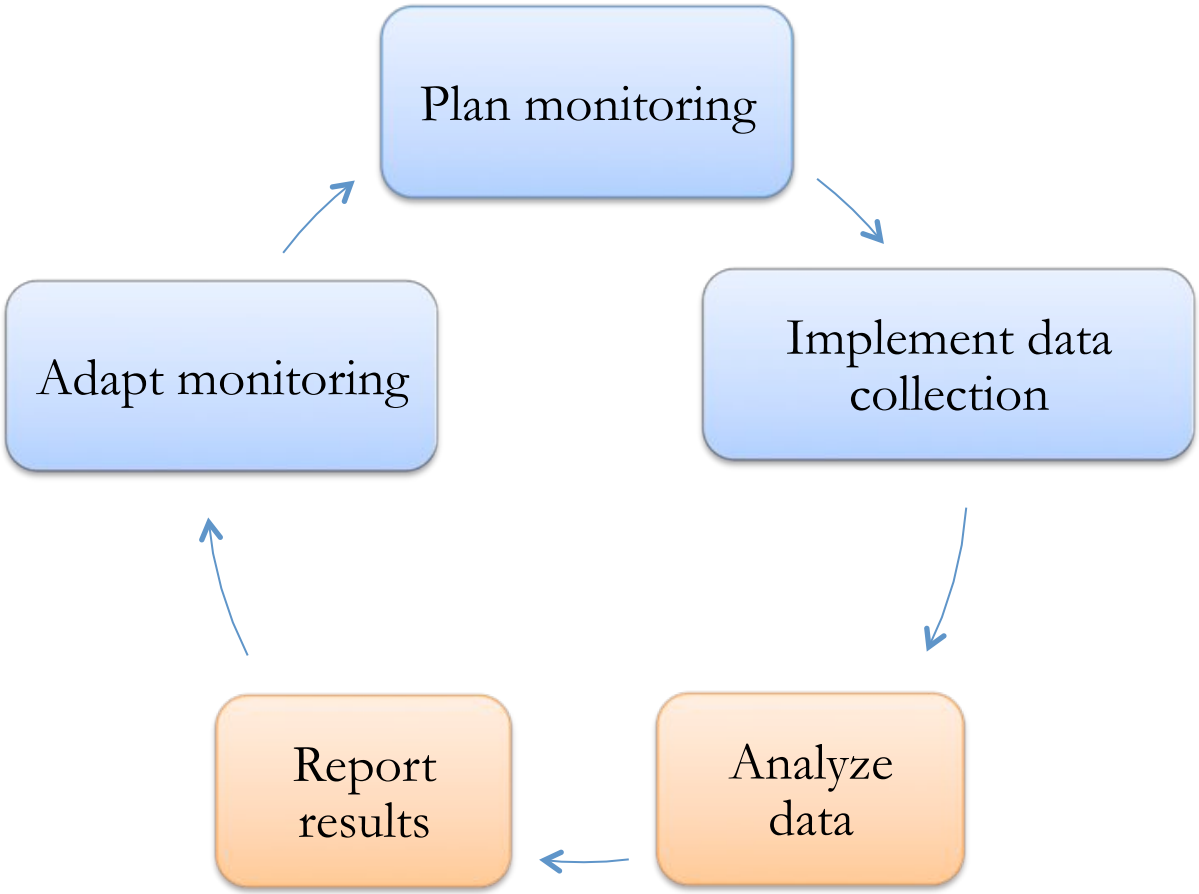
Setting a benchmark of ecological and socioeconomic conditions through baseline monitoring



Ocean Imaging

$16M invested by OPC : >50 programs

Our roles


Plan monitoring
Implement data collection
Analyze data
Report results
Adapt monitoring

Initial results are encouraging…

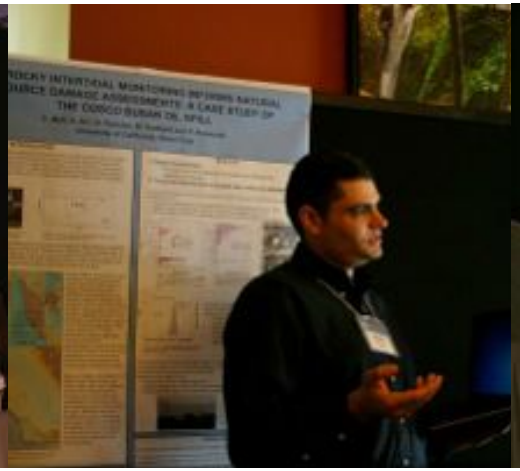
Central Coast MPAs are on track



- Some species (e.g., abalone, lingcod) have demonstrated early increases in size and abundance
- Fishing opportunities continue in a diversified economy

…and extend beyond the science

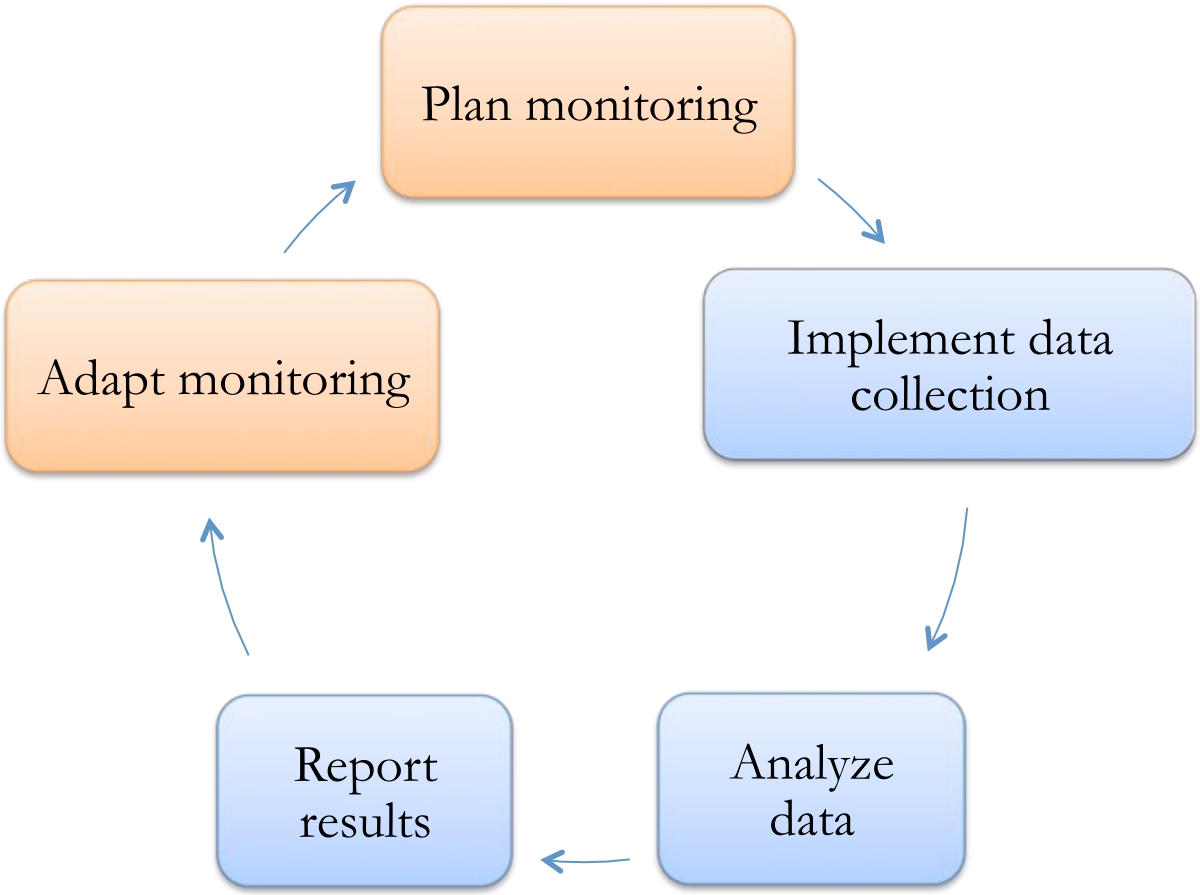
New partnerships and collaborations to steward the network



State of the
CALIFORNIA
Central Coast

A new monitoring community formed

Our roles


Plan monitoring
Implement data collection
Analyze data
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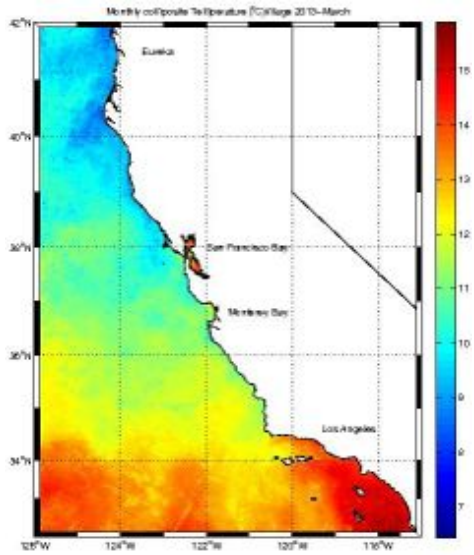
Adapt monitoring

A pragmatic approach



- Engaging citizens
- Incorporating traditional knowledge
- Incorporating water quality, compliance, oceanography

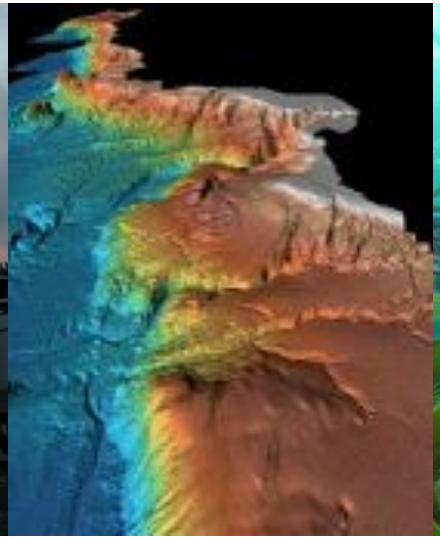
Informative for decision-making

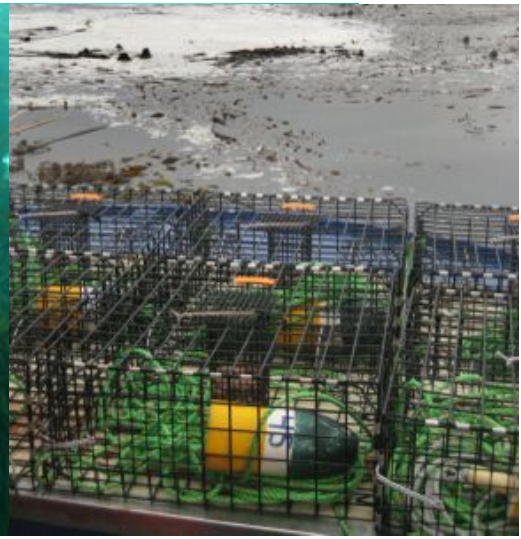
- Piloting a new approach for sharing results
- Assessing the health of Central Coast kelp forests using baseline monitoring data
- Looking forward to testing and refining this approach

Realizing the value in our investment

'Putting the MPAs to work'

Climate change :: Ocean acidification :: Fisheries management



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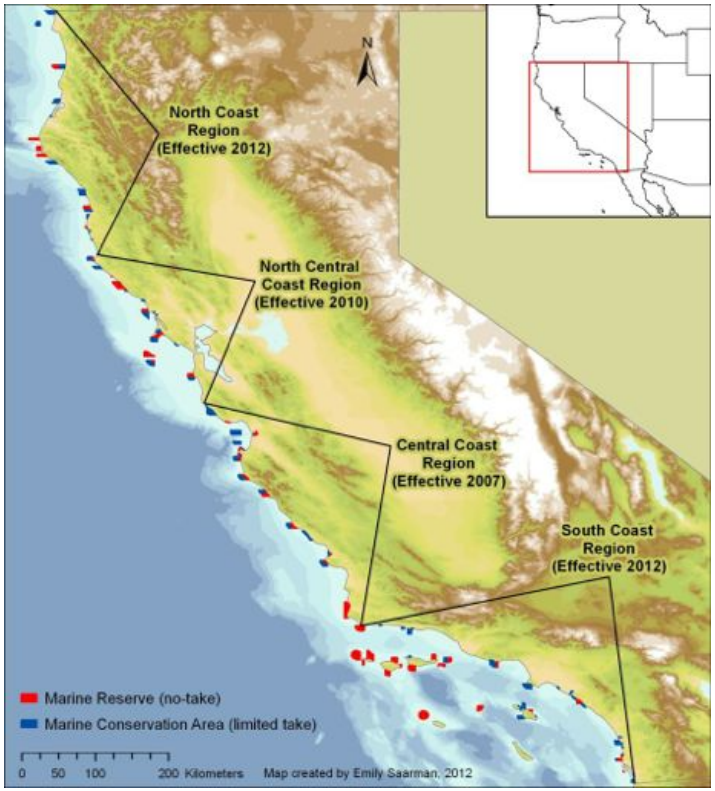
A significant investment for our future



A statewide network of 124 MPAs to protect and restore ocean ecosystems

…and sharing as 'rules of thumb'

1. MPAs should have an alongshore span of 5-10 km of coastline, and preferably 10-20 km.
2. MPAs should be placed within 50-100 km of each other.

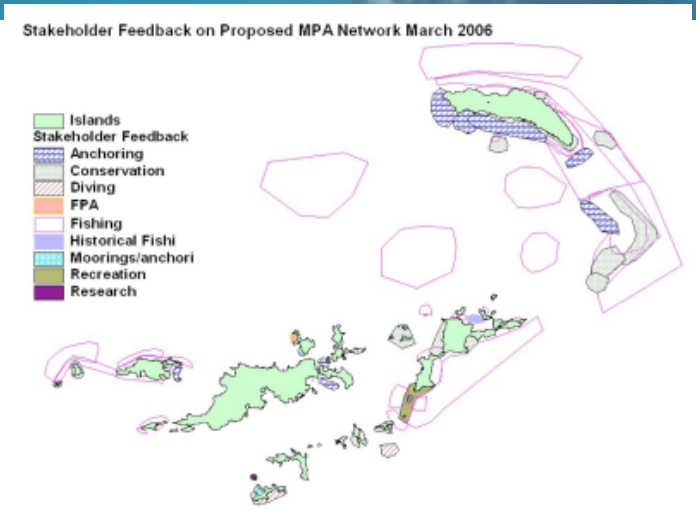
MPAs: The old days

Protect specific species, places, objects…

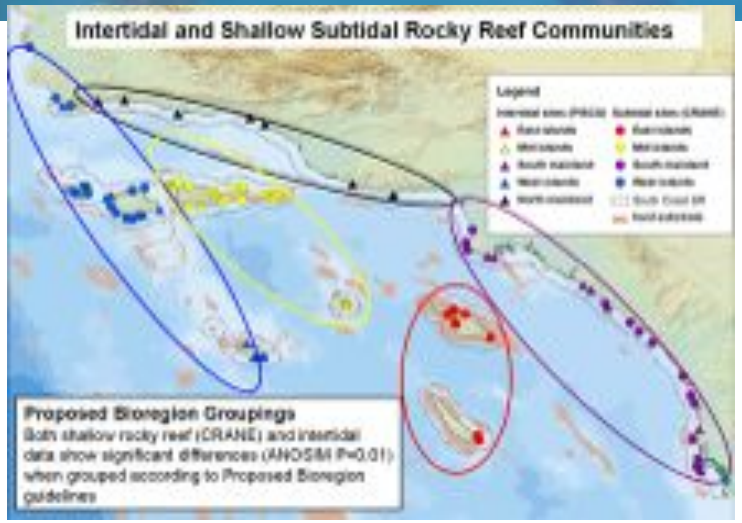
Prominent research results garnered attention…

- Loss of critical habitats
- Functional extinctions
- Loss of predators
- Simplification of food webs
- 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

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