State of the Ocean
California MLPA Initiative &
MPAs of the Central Coast

Meg Caldwell, Stanford University

Hearst Castle, San Simeon

October 31, 2009

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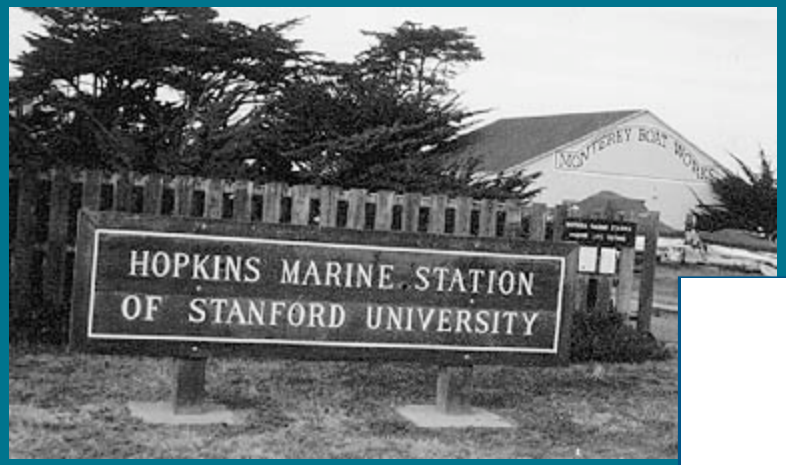

M B A R I

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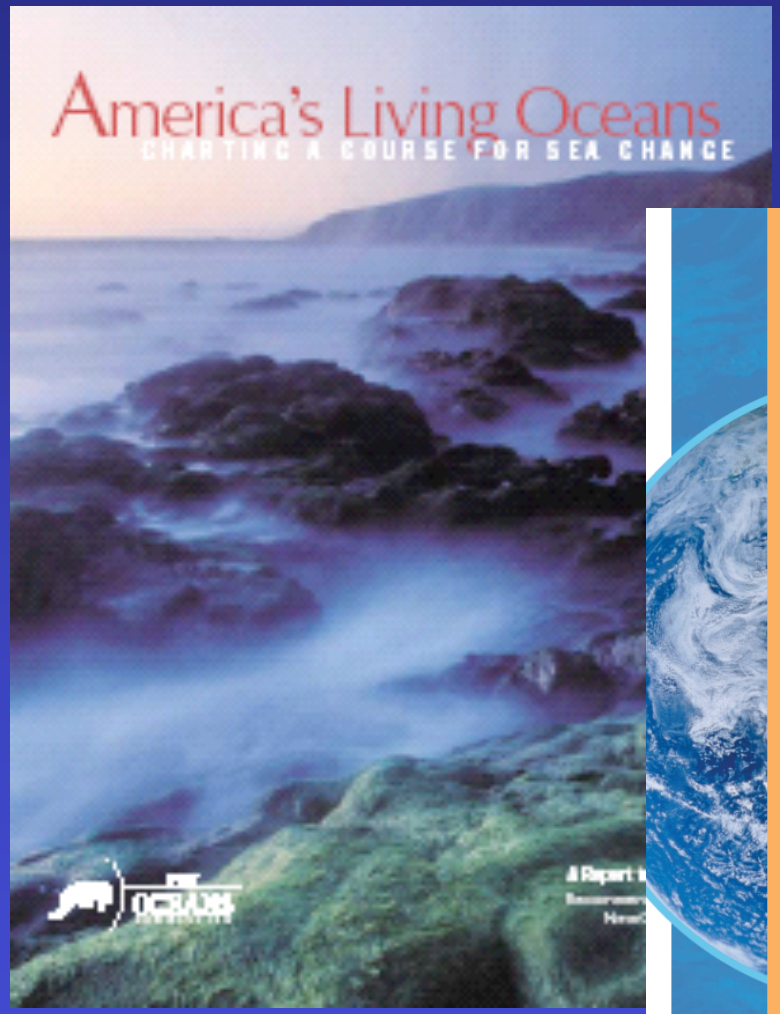
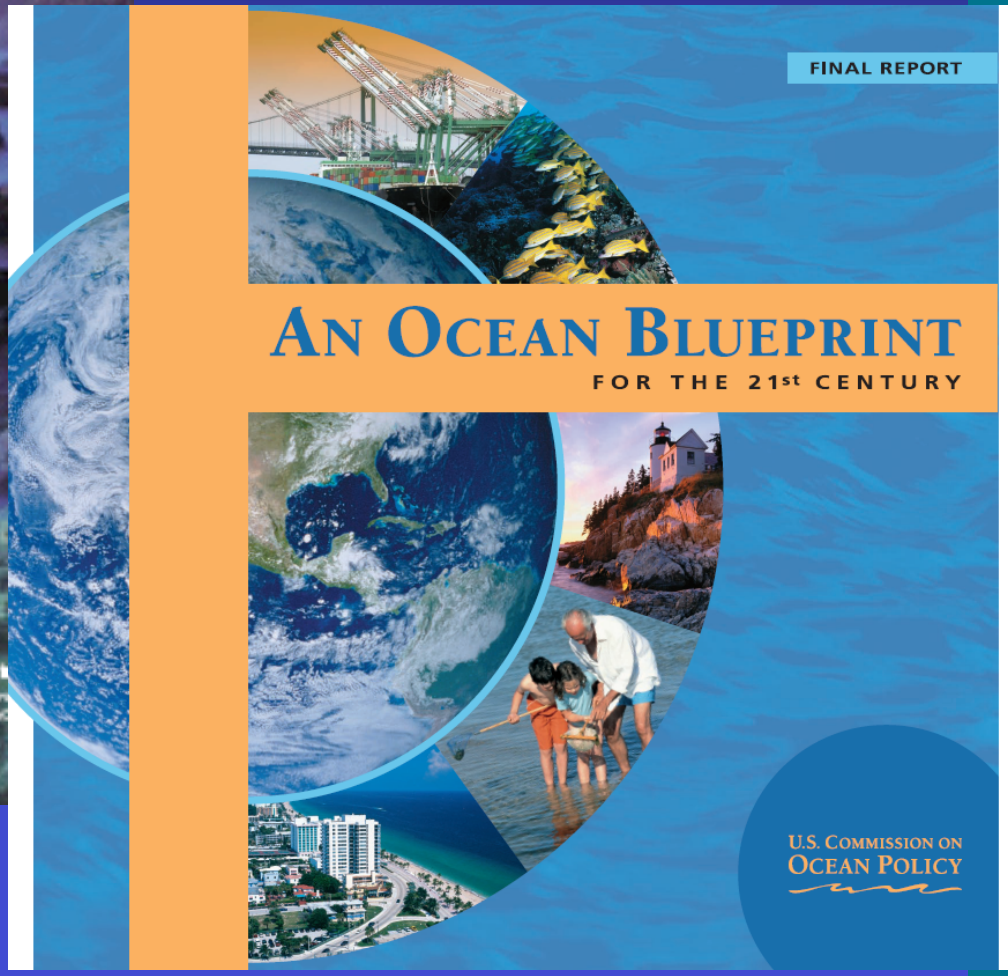
MONTEREY BAY AQUARIUM
...inspiring conservation of the oceans



Pew Oceans
Commission 2003

U.S. Commission
on Ocean Policy 2004



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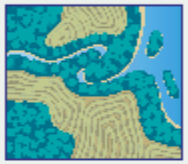
Major Threats to Our Oceans

BOX ONE

Major Threats to Our Oceans



NONPOINT SOURCE POLLUTION

- A recent National Academy of Sciences study estimates that the oil running off our streets and driveways and ultimately flowing into the oceans is equal to an *Exxon Valdez* oil spill—10.9 million gallons—every eight months (NRC, 2002a).
- The amount of nitrogen released into coastal waters along the Atlantic seaboard and the Gulf of Mexico from anthropogenic sources has increased about fivefold since the preindustrial era, and may increase another 30 percent by 2030 if current practices continue (Howarth et al., 2000).
- Two-thirds of our estuaries and bays are either moderately or severely degraded by eutrophication (Bricker et al., 1999).
- More than 13,000 beaches were closed or under pollution advisories in 2001, an increase of 20 percent from the previous year (NRDC, 2002).

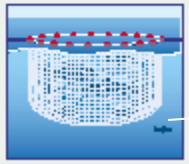
POINT SOURCE POLLUTION

- In the U.S., animal feedlots produce about 500 million tons of manure each year, more than three times the amount of sanitary waste produced by the human population (EPA, 2002).
- Based on EPA estimates, in one week a 3000-passenger cruise ship generates about 210,000 gallons of sewage, 1,000,000 gallons of gray water (shower, sink, and dishwashing water), 37,000 gallons of oily bilge water, more than 8 tons of solid waste, millions of gallons of ballast water containing potential invasive species, and toxic wastes from dry cleaning and photo-processing laboratories (Royal Caribbean Cruises Ltd., 1998; Eloy, 2000; Holland America, 2002).

INVASIVE SPECIES

- Introduced species crowd out native species, alter habitats, and impose economic burdens on coastal communities.
- The rate of marine introductions has risen exponentially over the past 200 years and shows no sign of leveling off (Carlton, 2001).
- More than 175 species of introduced marine invertebrates, fish, algae, and higher plants live in San Francisco Bay (Cohen and Carlton, 1995, 1998; Cohen and Carlton, unpublished data).

AQUACULTURE



- A December 2000 storm resulted in the escape of 100,000 salmon from a single farm in Maine, about 1,000 times the number of documented wild adult salmon in Maine (NRC, 2002b).
- A salmon farm of 200,000 fish releases an amount of nitrogen, phosphorus, and fecal matter roughly equivalent to the nutrient waste in the untreated sewage from 20,000, 25,000, and 65,000 people, respectively (Hardy, 2000).
- Over the past decade, nearly one million non-native Atlantic salmon have escaped from fish farms and established themselves in streams in the Pacific Northwest.

Art: John Michel Tobin

Nonpoint Source Pollution

Point Sources Pollution

Invasive Species

Aquaculture

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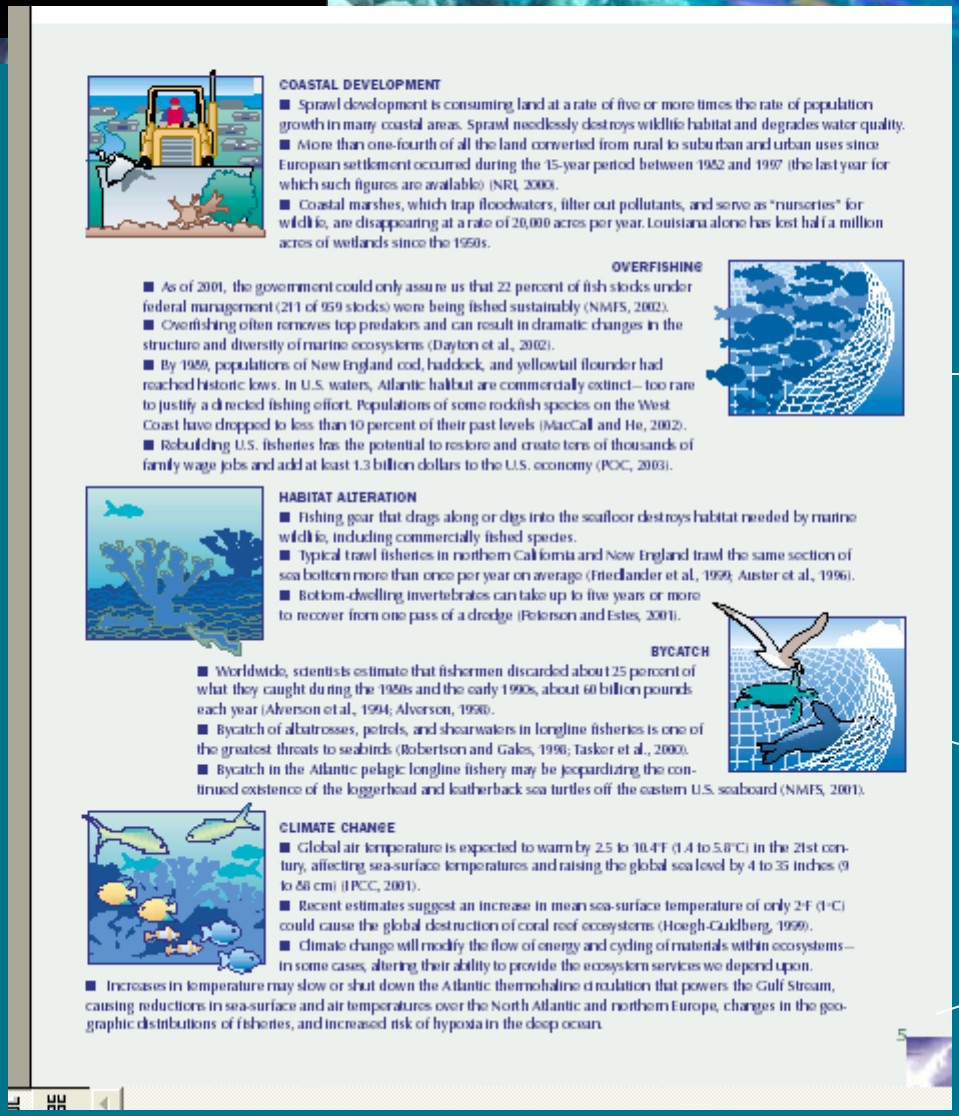
Major Threats cont'd



COASTAL DEVELOPMENT

- Sprawl development is consuming land at a rate of five or more times the rate of population growth in many coastal areas. Sprawl needlessly destroys wildlife habitat and degrades water quality.
- More than one-fourth of all the land converted from rural to suburban and urban uses since European settlement occurred during the 15-year period between 1982 and 1997 (the last year for which such figures are available) (NRI, 2000).
- Coastal marshes, which trap floodwaters, filter out pollutants, and serve as "nurseries" for wildlife, are disappearing at a rate of 20,000 acres per year. Louisiana alone has lost half a million acres of wetlands since the 1950s.

OVERFISHING

- As of 2001, the government could only assure us that 22 percent of fish stocks under federal management (211 of 959 stocks) were being fished sustainably (NMFS, 2002).
- Overfishing often removes top predators and can result in dramatic changes in the structure and diversity of marine ecosystems (Dayton et al., 2002).
- By 1989, populations of New England cod, haddock, and yellowtail flounder had reached historic lows. In U.S. waters, Atlantic halibut are commercially extinct—too rare to justify a directed fishing effort. Populations of some rockfish species on the West Coast have dropped to less than 10 percent of their past levels (MacCall and He, 2002).
- Rebuilding U.S. fisheries has the potential to restore and create tens of thousands of family wage jobs and add at least 1.3 billion dollars to the U.S. economy (POC, 2003).

HABITAT ALTERATION

- Fishing gear that drags along or digs into the seafloor destroys habitat needed by marine wildlife, including commercially fished species.
- Typical trawl fisheries in northern California and New England trawl the same section of sea bottom more than once per year on average (Friedlander et al., 1999; Auster et al., 1996).
- Bottom-dwelling invertebrates can take up to five years or more to recover from one pass of a dredge (Peterson and Estes, 2001).

BYCATCH

- Worldwide, scientists estimate that fishermen discarded about 25 percent of what they caught during the 1980s and the early 1990s, about 60 billion pounds each year (Alverson et al., 1994; Alverson, 1998).
- Bycatch of albatrosses, petrels, and shearwaters in longline fisheries is one of the greatest threats to seabirds (Robertson and Gales, 1998; Tasker et al., 2000).
- Bycatch in the Atlantic pelagic longline fishery may be jeopardizing the continued existence of the loggerhead and leatherback sea turtles off the eastern U.S. seaboard (NMFS, 2001).

CLIMATE CHANGE

- Global air temperature is expected to warm by 2.5 to 10.4°F (1.4 to 5.8°C) in the 21st century, affecting sea-surface temperatures and raising the global sea level by 4 to 35 inches (9 to 88 cm) (IPCC, 2001).
- Recent estimates suggest an increase in mean sea-surface temperature of only 2°F (1°C) could cause the global destruction of coral reef ecosystems (Hoegh-Guldberg, 1999).
- Climate change will modify the flow of energy and cycling of materials within ecosystems—in some cases, altering their ability to provide the ecosystem services we depend upon.
- Increases in temperature may slow or shut down the Atlantic thermohaline circulation that powers the Gulf Stream, causing reductions in sea-surface and air temperatures over the North Atlantic and northern Europe, changes in the geographic distributions of fisheries, and increased risk of hypoxia in the deep ocean.

Coastal Development

Overfishing

Habitat Alteration

Bycatch

Climate Change

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Progress

JOINT OCEAN COMMISSION INITIATIVE

EXECUTIVE SUMMARY

Our Ocean and Coasts Are in Tr

In 2003 and 2004, two national Commissions—the
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Yet th in a time of unprecedented opportunity.

Today, as never before, we recognize the links among the land, air, oceans, and human activi-

nonfederal partners at the regional, state,
sing current problems and to anticipating

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Pacific Ocean Facts

- 165.2 million sq.km (64m sq miles) or half the world's ocean area or a third of the earth's total surface area

- 56 Pacific Island and Rim Countries and Territories with a total population of 2.9 billion

- Combined Economic value of US $34.7 trillion, or 57% of global GDP

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Pacific Ocean Synthesis Methodology

- **Literature review**
  - more than 3,400 papers covering more than 45 countries
- **Vetted by scientists representing 30+ countries**
- **Pacific Ocean Library (library.centerforoceansolutions.org)**

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7 Regions of the Pacific

Pacific Ocean Library

The Center for Ocean Solutions Pacific Ocean Library is a unique resource housing scientific articles, reports, government publications, and gray literature on Pacific Ocean's greatest threats, environmental and socioeconomic impacts, and potential **solutions** for the region. Designed for managers and researchers worldwide, regardless of affiliation, the library provides timely research and foundational readings on all aspects of these topics.

The Pacific Ocean Library emerged from an extensive literature review prepared for a group of scientists developing a Pacific Ocean Scientific Consensus Statement, which prioritizes key threats to the health of the Pacific Ocean, highlights the impacts of these threats, and outlines a road map for action. This statement—signed by 380 scientists around the world—is in turn part of a larger Pacific Ocean Initiative and Pacific Ocean 2020 Challenge to sustainably manage this vast and complex region.

Features of the Pacific Ocean Library include:

- Fully browsable and searchable database
- Search by threats, impacts, and **solutions**
- Foundational readings by Pacific Ocean region
- Citations from peer-reviewed journals, books, reports, and conference proceedings
- Article abstracts
- Links to help you find online sources of complete works (e.g. article PDFs)
- Ability to export citations in a number of popular formats
- Citations added and database improved on an ongoing basis

We are currently seeking permissions to post full-text articles and will continue to upgrade the library's content. Please email us at library@centerforoceansolutions.org with any suggestions you have for improving the database.

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Ecosystems and People of the Pacific Ocean -

Threats and Opportunities for Action:

A Scientific Consensus Statement

Executive Summary:

The people from around the Pacific Ocean, from the Arctic to Antarctic, from countries populous and sparse, are witnessing a decline of the Pacific Ocean's vast resources and in the ability of people to use those resources. Pollutants, nutrient and sediment run-off from land, overfishing, habitat destruction, and climate change emerge repeatedly as the major causes. Though this wide-spread similarity of threats across the

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AN EXECUTIVE SUMMARY OF

Pacific Ocean Synthesis

Scientific Literature Review of Coastal and Ocean Threats, Impacts, and Solutions

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May 2009

South East Pacific Ocean

Photo: Regional cooperation via the multinational Eastern Tropical Pacific Seascape Initiative is geared towards protecting entire ranges of highly migratory species such as this Green turtle (Chelonia mydas) from the Galapagos. (David Lee, courtesy Conservation International)

GEOGRAPHIC OVERVIEW

Four South American countries comprise the South East Pacific Ocean region: Chile, Colombia, Ecuador, and Peru. The South East Pacific contains high biodiversity in its various coastal and ocean ecosystems, from reefs and islands, to wetlands, estuaries, fjords, and highly threatened mangroves. The Humboldt Current, which flows along the west coast of South America from southern Chile to northern Peru before deflecting offshore to Ecuador's Galapagos Islands, produces a rich ecosystem and the world's largest upwelling area, influencing much of the region. These upwelling waters support some of the most significant fisheries in the world. Throughout the region, aquaculture and fishing are the most important economic activities, second only to the North West Pacific in terms of global fishing production. Periodically, ENSO events disrupt the upwelling that drives this region's productivity, affecting fish abundance and distribution, often leading to fishery stock crashes and negative socioeconomic impacts.

Source: International Ocean Commission and The United Nations (www.unep-wcmc.org/[cannot] 2008 Lucidity Information Design, LLC

THREATS

All four broad threats (overfishing and exploitation, climate change, habitat destruction, and pollution) have overall severe to moderate impacts across the South East Pacific, with invasive species noted as a moderate impact. An extremely grave threat is pollution—largely from land-based chemicals and nutrients, aquaculture wastewater, and oil spills. This pollution can create dead zones and algal blooms, alter ecosystem structure, and jeopardize human systems. Other primary concerns include land-based sedimentation, a form of habitat destruction that can lead to the degradation of critical ecosystems, and commercial fishing, which causes ecological shifts and reduces fish stocks and food supply, thereby endangering human economies and livelihoods. As in other regions, climate change—in particular sea surface temperature increase—also severely affects all countries in the region. A breakdown of the region's threats with overall severe and moderate impacts can be found in the bullets on this page.

Based on this assessment, the threats with overall severe impacts across the entire South East Pacific region are:

- land-based chemicals and nutrient pollution identified in four countries.
- land-based sedimentation identified in four countries.
- commercial overfishing identified in four countries.
- wastewater from aquaculture, oil spills, and antifouling chemicals across region.
- coastal development/land reclamation across the region.
- climate change, specifically sea surface temperature increase.

The threats with overall moderate impacts across the region are:

- coastal modification from aquaculture, solid waste disposal, thermal pollution, and artisanal/recreation/subsistence fishing.
- invasive species.
- by-catch and discharge.
- offshore oil/mining.

Key observations regarding research gaps and identified impacts:

- These countries' marine environment is one of the least protected, and most exploited, in South America.
- Ecuador has the greatest documented number of moderate (nine) to severe (eight) impacts. Colombia has the lowest number of documented moderate (seven) to severe (four) impacts in the region.
- Large gaps in the research include studies on aquaculture and the impacts of threats in Colombia and Peru as well as ocean-based pollution (ocean waste, toxic dumping, and fishing lines/nets) throughout the region, impacts of climate change, and coastal development/land reclamation.

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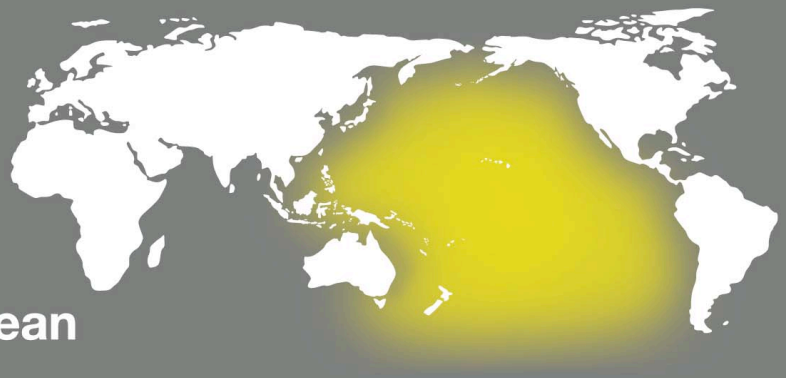

Major Threats Facing the Pacific Ocean

- **POLLUTION**

  Organic pollutants from sewage, nutrient pollution from fertilizer run-off, plastic marine debris, toxic dumping and oil spills, urban run-off and other pollutants combine to create one of the most critical classes of ocean threats.

- **HABITAT DESTRUCTION**

  Productive marine and coastal habitats are lost to destructive fishing practices, poor agricultural land use, inappropriate coastal development, and industrial wastewater.

- **OVERFISHING & EXPLOITATION**

  Unsustainable resource use reduces fish stocks throughout the Pacific, limiting fish catches and often causing ecological shifts that further reduce biodiversity and productivity.

- **CLIMATE CHANGE**

  Carbon dioxide (CO_2) discharged to the atmosphere is both altering seawater chemistry resulting in ocean acidification and causing the ocean to warm leading to sea level rise, habitat shifts, increased storm intensity, altered precipitation patterns, and coral bleaching.

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Threats & Impact Analysis

Impact Levels:

High Impact: Severely affects both environment and society; recovery will take years, if ever

Medium Impact: Environment may be altered/destroyed; impact smaller in scale and can recover in shorter timeframe than high impact threat

Low Impact: Environment altered but not destroyed; impact to fewer people and places

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Focus on California

- Pollution
  - Harmful Algal Blooms
  - Chemical contaminants
  - Marine Debris
- Overfishing
- Habitat Loss

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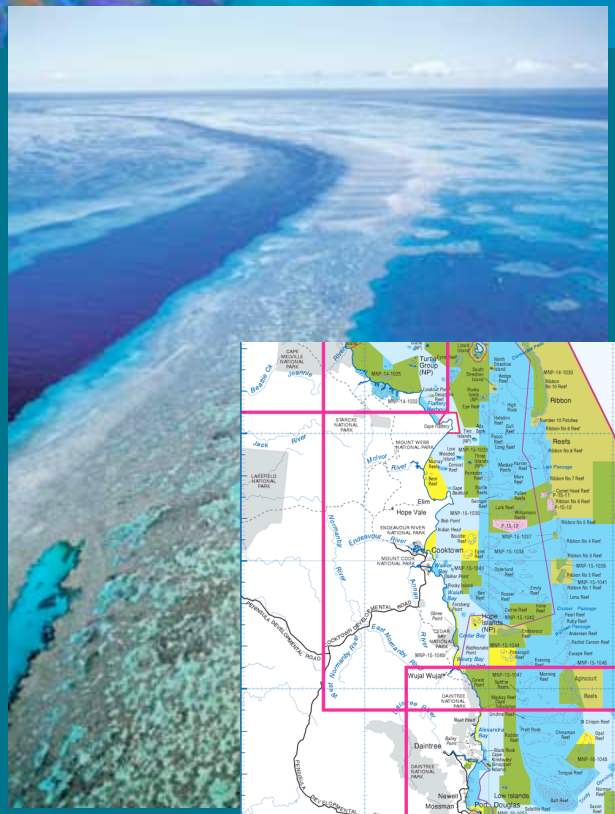
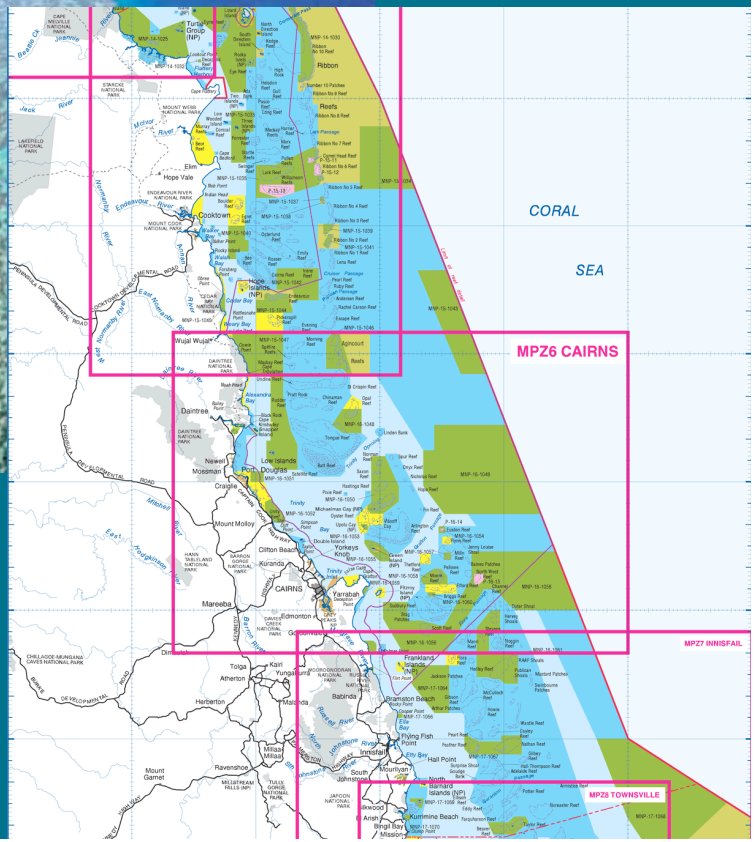
Solutions That (Can) Work

- Market-Based Solutions
- Integrated Coastal Zone Management
- Marine Protected Areas
- Governance Reform





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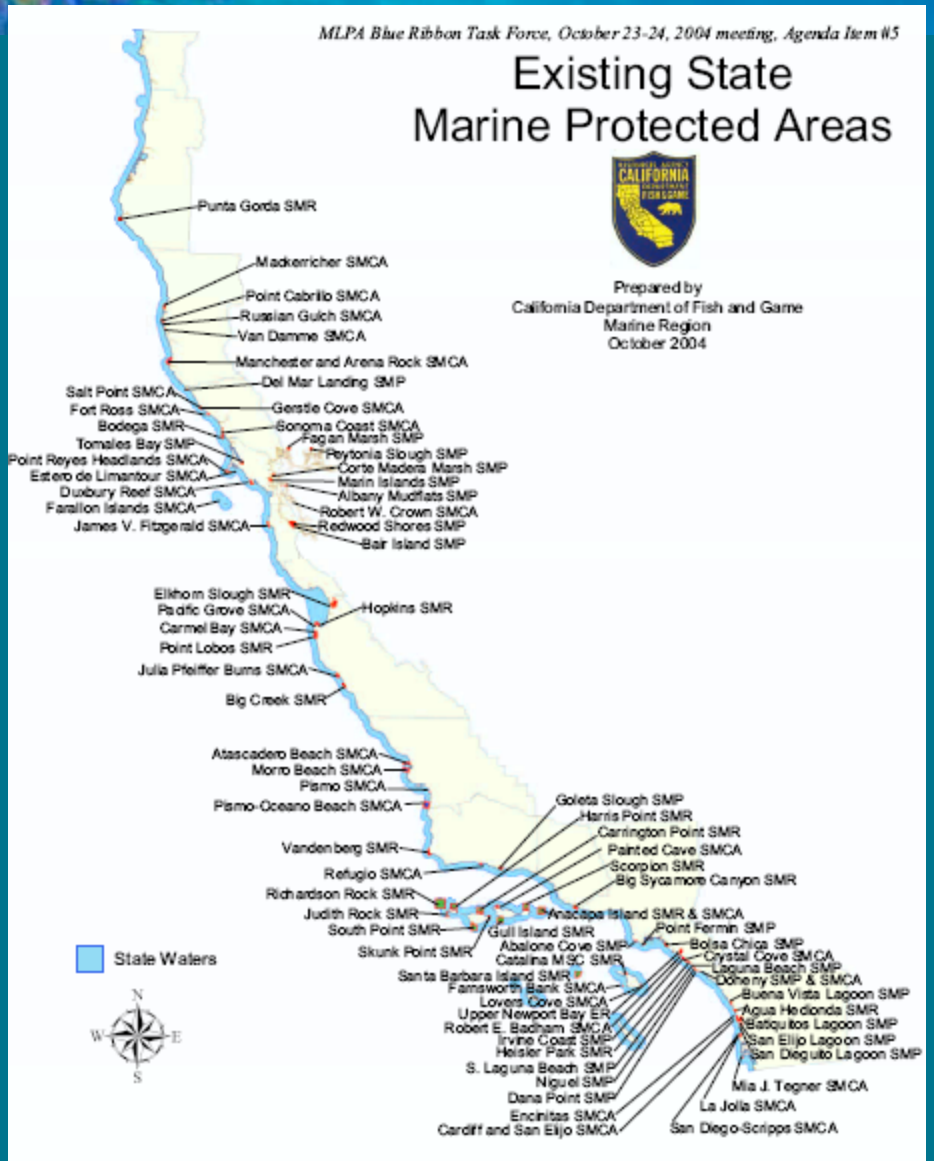
Before MLPA & MLMA

- "Incoherent" array of over 88 disjointed MPAs in state waters
- Burden on petitioner to prove need for an MPA
- Traditional fisheries management collides with ESA, MMPA… and itself and utterly fails to integrate ecosystem principles



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After MLPA & MLMA

- Mandate to establish MPA network by 2011 for improved ecosystem protection
- State fisheries managers must address ecosystem protection and coordinate FMPs with MPAs

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MLPA's 6 Goals

- To protect the natural diversity and function of marine ecosystems.
- To help sustain and restore marine life populations.
- To improve recreational, educational, and study opportunities in areas with minimal human disturbance.
- To protect representative and unique marine life habitats.
- Clear objectives, effective management, adequate enforcement.
- To ensure that the state's MPAs are designed and managed as a network.

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Basic MPA Typology

- **State Marine Reserve** (no take)
- **State Marine Park** (no commercial take, but may allow/limit recreational take)
- **State Marine Conservation Area** (allows selected recreational and commercial take)

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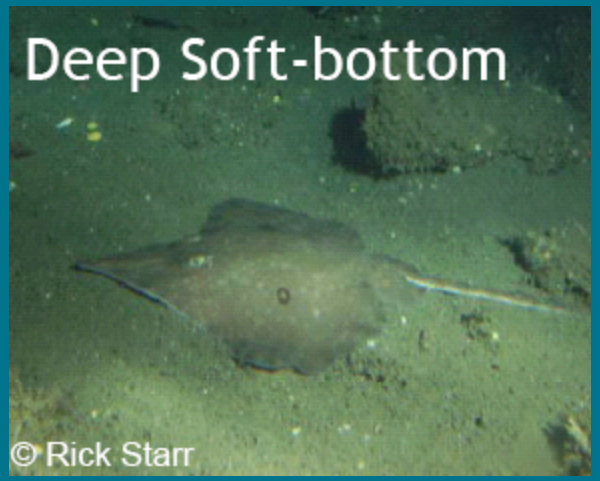
MLPA

- Is not a Fisheries Management Law
- Requires use of "Best Readily Available Science"



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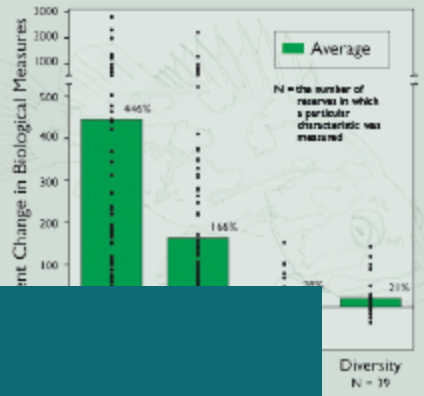
The Science of
Marine Reserves

effects of marine reserves inside their borders

Typically when a marine reserve is established, the goal is to increase the abundance and diversity of marine life inside. Scientific research shows that marine reserves consistently accomplish this goal.

More Fishes, Shellfish, and Other Marine Life

Considerable scientific documentation—published in peer-reviewed journals—provides a clear picture of what has happened after the establishment of



PISCO

Partnership for Interdisciplinary Studies of Coastal Oceans

Fast Facts

- A network of several smaller marine reserves can be a viable alternative to one large reserve.
- A network can function to protect multiple habitats and species and to provide insurance against catastrophes.
- To form a network, reserves should be spaced closely enough that young fishes and invertebrates can move among them.

summary: marine reserves contribute to ocean health

Scientific evidence clearly shows that people are causing a decline in the ocean's health. Marine reserves have proved to be an effective way to protect habitats and biodiversity in the ocean. While marine reserves are not a cure-all, they are important for sustaining ocean life and human well-being.

People Have Created Marine Reserves Around the World

At least 45 nations—ranging from small islands to large countries—have established marine reserves in temperate and tropical regions. Scientific studies of at least 124 marine reserves in 29 nations have been published in peer-reviewed

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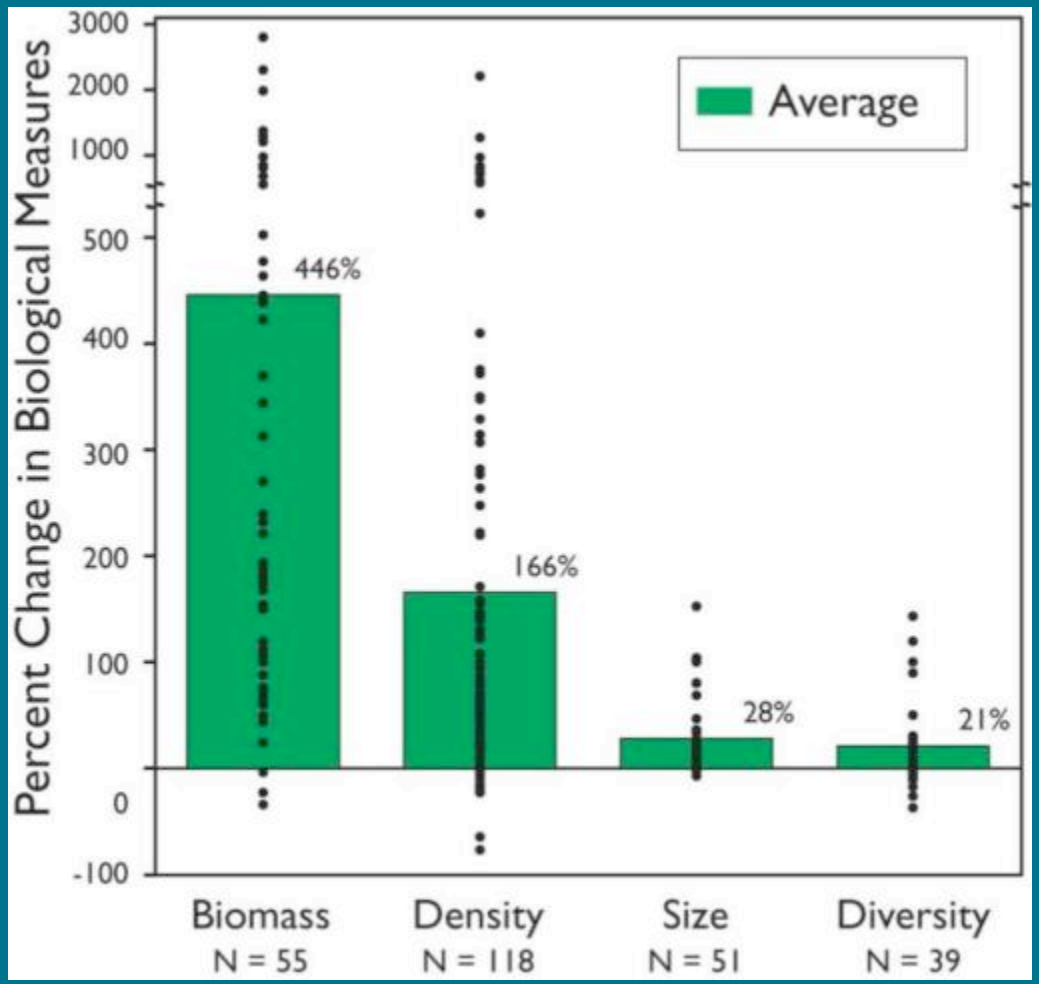
Synthesis – Marine Reserves

Inside reserves species are: more abundant, larger, and more diverse

Lester et al., in press



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MLPA Implementation

1999: MLPA becomes law

2001: $ but bad process

2002: better process but ran out of $

2004 to present (MLPA Initiative):

$, staffing, deadlines, political will, transparent public process w/ public-private partnership


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CA MLPA Central Coast (2004-07)
CA Marine Life Protection Act
Fish & Game Commission
CA Dept. of Fish & Game
Blue Ribbon Task Force
Science Advisory Team
Regional Stakeholder Group
MLPA Initiative Staff (incl. DFG)
General Public


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CA MLPA Central Coast (2004-07)
CA Marine Life Protection Act
Fish & Game Commission
CA Dept. of Fish & Game
Blue Ribbon Task Force
Science Advisory Team
Regional Stakeholder Group
MLPA Initiative Staff (incl. DFG)
General Public

BRTF Role

- Interpret MLPA
- Propel action
- Resolve uncertainties
- Frame decisions
- Ensure transparency & consistency
- Represent state interests
- Affirm authority of SAT & Initiative staff team
- Bridge RSG and FGC
- Spend $ wisely

SAT Role

- Build scientific literacy
- Develop scientific guidelines or “rules of thumb”
- Determine levels of protection “LOPs”
- Evaluate MPA alternative proposals
- Identify ways to improve proposals
- Sort science & policy

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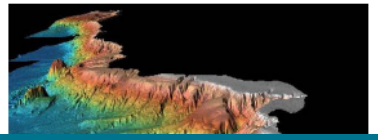
From Goals to Guidelines

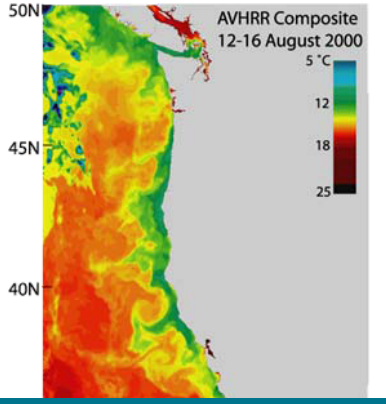
- To protect natural diversity and function of marine ecosystems

SAT Guidelines - Goals 1 and 4

Identified Key Habitats Using:

- Bottom Type and Depth Categories
- Biogenic Habitats
- Oceanographic Features





- To protect representative and unique marine life habitats

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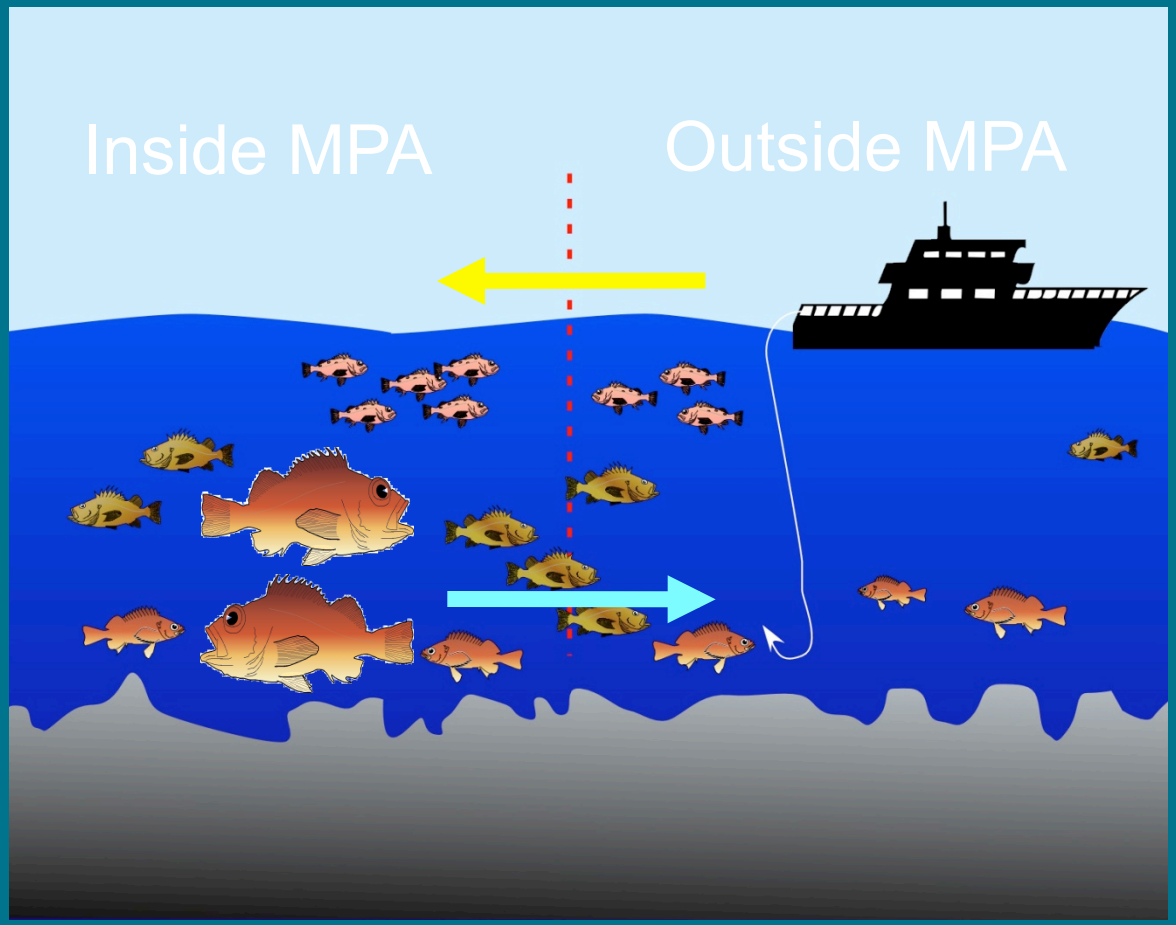
How Big Should MPAs Be?



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No Single Answer

0 – 1 km	1 – 10 km	10 – 100 km	100 – 1000 km	> 1000 km
Invertebrates	Rockfishes	Invertebrates	Fishes	Invertebrates
Abalone	Black	Dung. Crab*	Big Skate	Jumbo Squid*
Mussel	Brown	Rockfishes	Pacific Halibut	Fishes
Octopus	Copper	Bocaccio	Sablefish*	Sharks*
Sea Star	Greenspotted	Canary	Salmonids*	Tunas*
Snail	Olive	Yellowtail	Sturgeon	Turtles*
Urchin	Vermilion	Widow	Whiting*	Birds
Rockfishes	Other Fishes	Other Fishes	Birds	Albatross*
Blk. & Yellow	Cabezon	Anchovy	Gulls*	Pelican*
China	Ca. Halibut	Herring	Mammals	Shearwater*
Gopher	Lingcod	Sardine	Porpoises	Shorebirds*
Grass, Kelp		Birds	Sea Lions*	Terns*
Other Fishes		Gulls		Mammals
Sheephead		Cormorants		Dolphins
Greenling		Mammals		Sea Lions*
Surf perches		Harbor Seal		Whales*
Eels		Otter		

* Seasonal Migration

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Which Species Do You Want to Benefit?

0 – 1 km	1 – 10 km	10 – 100 km	100 – 1000 km	> 1000 km
Invertebrates	Rockfishes	Invertebrates	Fishes	Invertebrates
Abalone	Black	Dung. Crab*	Big Skate	Jumbo Squid*
Mussel	Brown	Rockfishes	Pacific Halibut	Fishes
Octopus	Copper	Bocaccio	Sablefish*	Sharks*
Sea Star	Greenspotted	Canary	Salmonids*	Tunas*
Snail	Olive	Yellowtail	Sturgeon	Turtles*
Urchin	Vermilion	Widow	Whiting*	Birds
Rockfishes	Other Fishes	Other Fishes	Birds	Albatross*
Blk. & Yellow	Cabezon	Anchovy	Gulls*	Pelican*
China	Ca. Halibut	Herring	Mammals	Shearwater*
Gopher	Lingcod	Sardine	Porpoises	Shorebirds*
Grass, Kelp		Birds	Sea Lions*	Terns*
Other Fishes		Gulls		Mammals
Sheephead		Cormorants		Dolphins
Greenling		Mammals		Sea Lions*
Surf perches		Harbor Seal		Whales*
Eels		Otter		

* Seasonal Migration

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Larger Size Benefits More Species

0 – 1 km	1 – 10 km	10 – 100 km	100 – 1000 km	> 1000 km
Invertebrates	Rockfishes	Invertebrates	Fishes	Invertebrates
Abalone	Black	Dung. Crab*	Big Skate	Jumbo Squid*
Mussel	Brown	Rockfishes	Pacific Halibut	Fishes
Octopus	Copper	Bocaccio	Sablefish*	Sharks*
Sea Star	Greenspotted	Canary	Salmonids*	Tunas*
Snail	Olive	Yellowtail	Sturgeon	Turtles*
Urchin	Vermilion	Widow	Whiting*	Birds
Rockfishes	Other Fishes	Other Fishes	Birds	Albatross*
Blk. & Yellow	Cabezon	Anchovy	Gulls*	Pelican*
China	Ca. Halibut	Herring	Mammals	Shearwater*
Gopher	Lingcod	Sardine	Porpoises	Shorebirds*
Grass, Kelp		Birds	Sea Lions*	Terns*
Other Fishes		Gulls		Mammals
Sheephead		Cormorants		Dolphins
Greenling		Mammals		Sea Lions*
Surf perches		Harbor Seal		Whales*
Eels		Otter		

* Seasonal Migration

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SAT Guidelines - Size

Suggested Minimum Size Guidelines

Alongshore span of 5 – 10 km (3 - 6 miles)

Preferably 10 – 20 km (6 - 12 miles)

Extend from the intertidal zone to deep waters (3 miles offshore)

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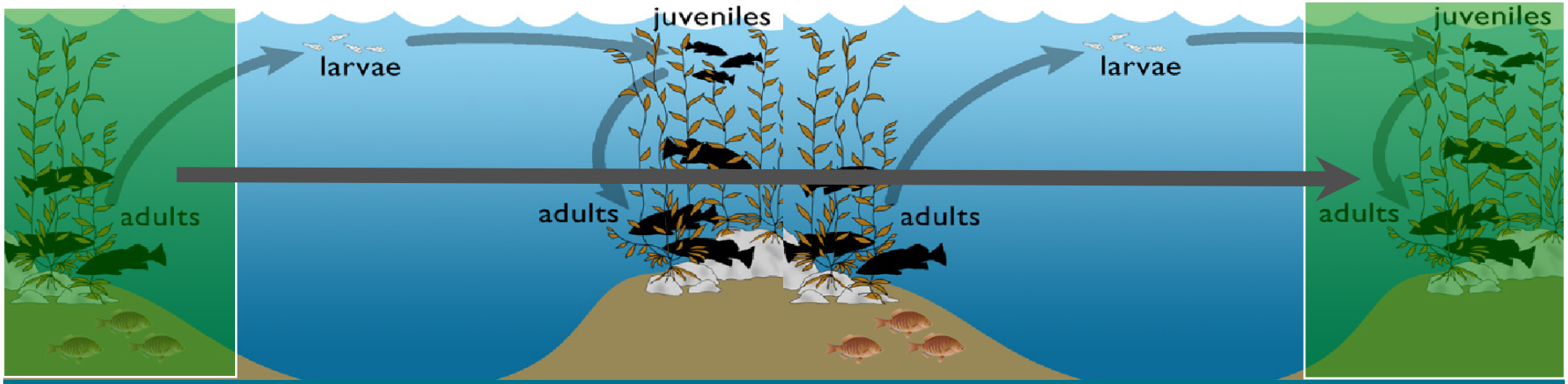
Leaving the Reserve has Few Risks for Larvae



Key Question: Can Enough Larvae get to Another Reserve?

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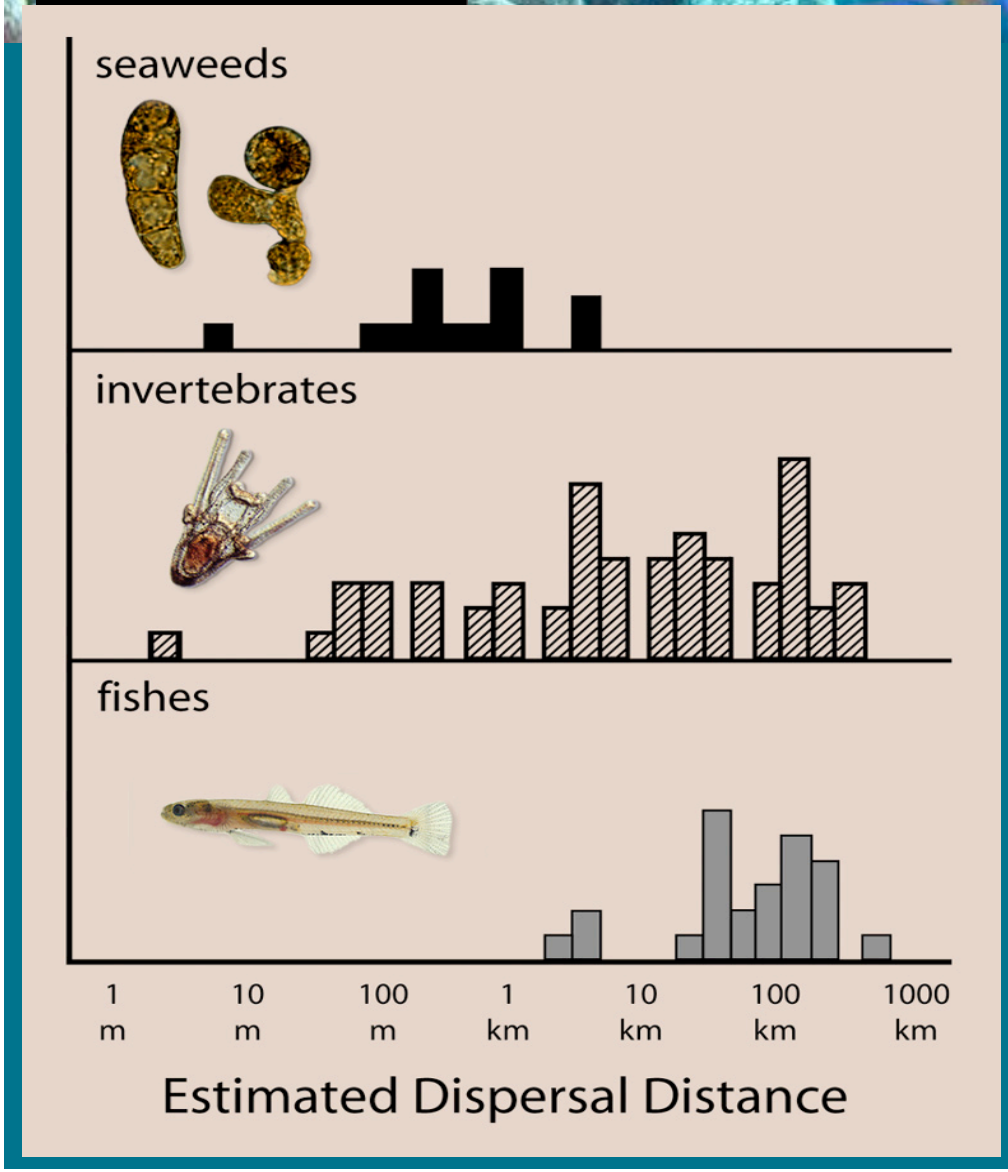
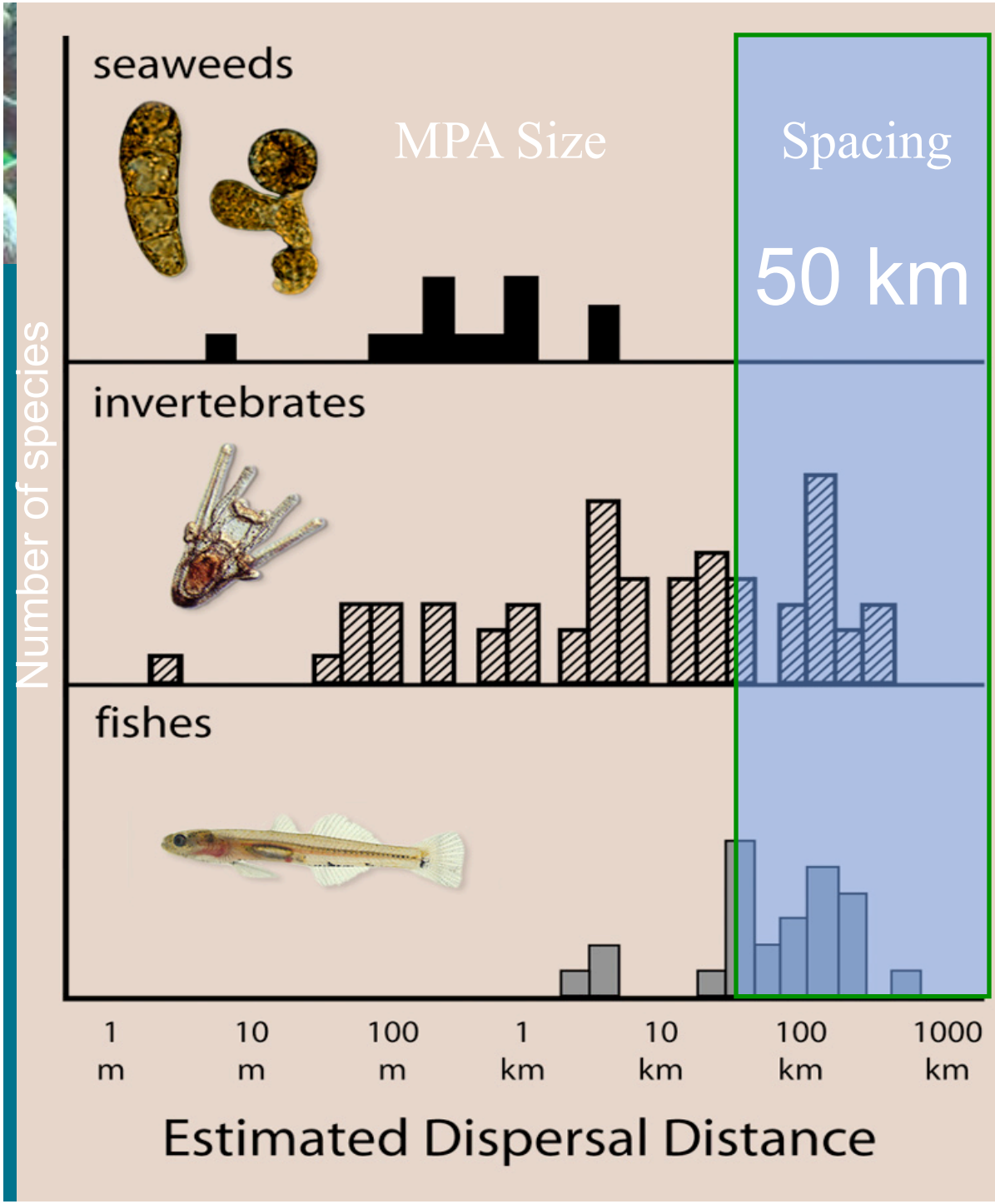
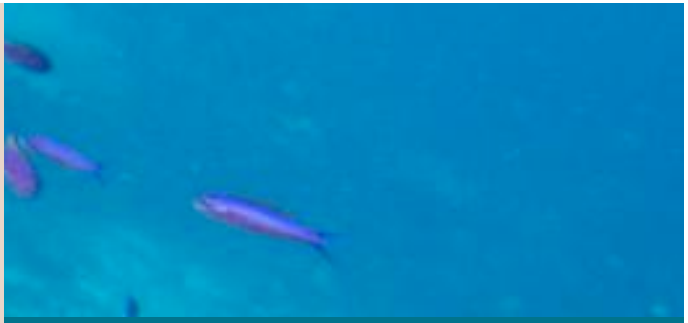
Larval Dispersal Distances Vary







MPAs should be separated by no more than 50-100 km (30-60 miles)

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Habitat representation

Habitat	Representation needed to encompass 90% of biodiversity	Data Source
Rocky Intertidal	~0.6 linear miles	PISCO Biodiversity
Shallow Rocky Reefs/Kelp Forests (0-30 M)	~1.1 linear miles	PISCO Subtidal
Deep Rocky Reefs (30-100 M)	~0.2 square miles	Starr surveys
Sandy Habitat (30-100 M)	~10 square miles	NMFS triennial trawl surveys 1977-2007
Sandy Habitat (0-30 M)	~1.1 linear miles	Based on shallow rocky reefs
Sandy Beaches	~ 1 linear mile	

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"Rules of Thumb"

Size: minimum area of 9 sq. miles
preferred area of 18-36 sq. miles

Spacing: no more than 30-60 miles apart

Habitat Coverage: all key habitats should be protected

Replication: at least 3-5 replicates of each habitat type

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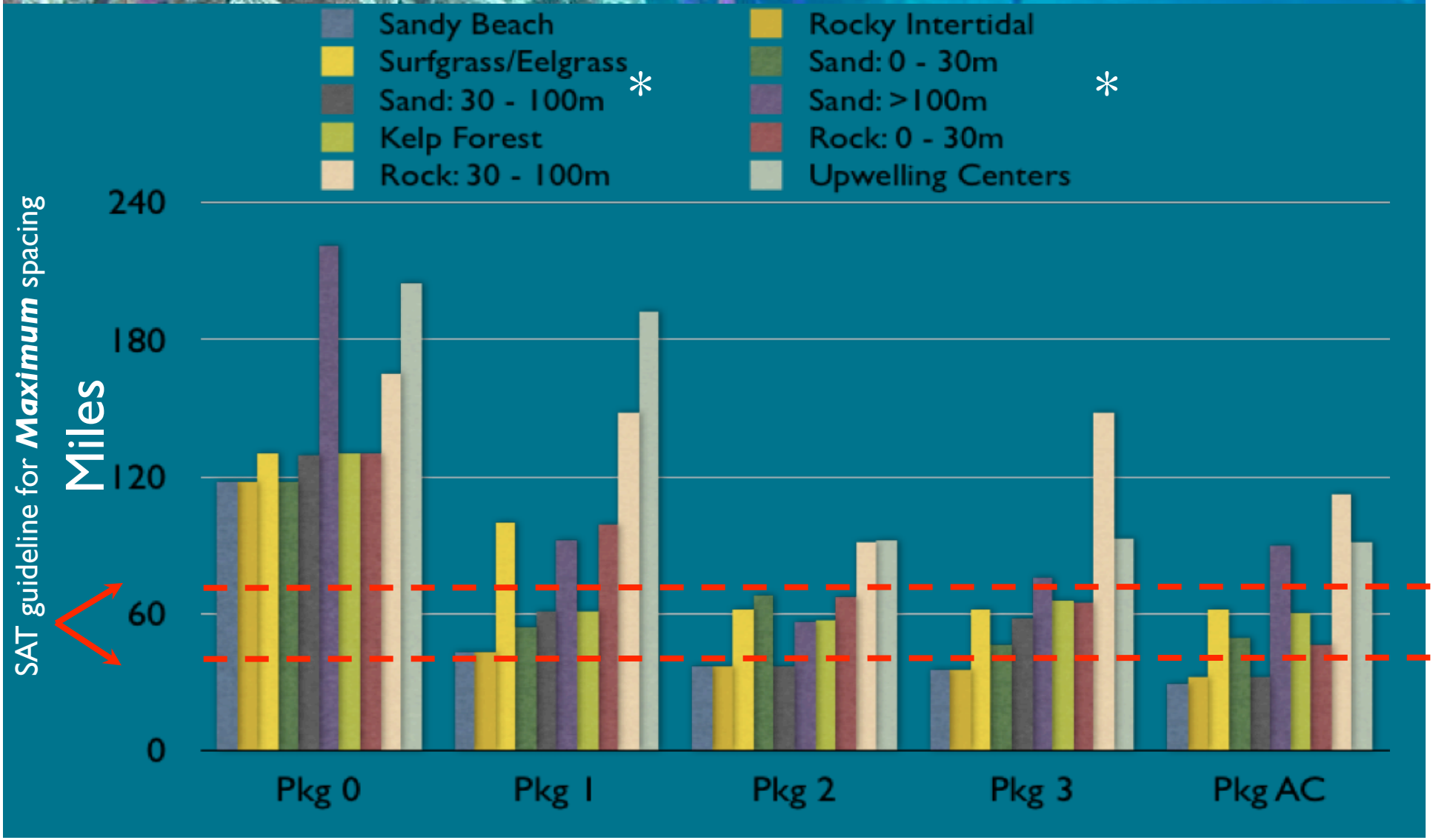
Evaluating Early Proposals for Central Coast



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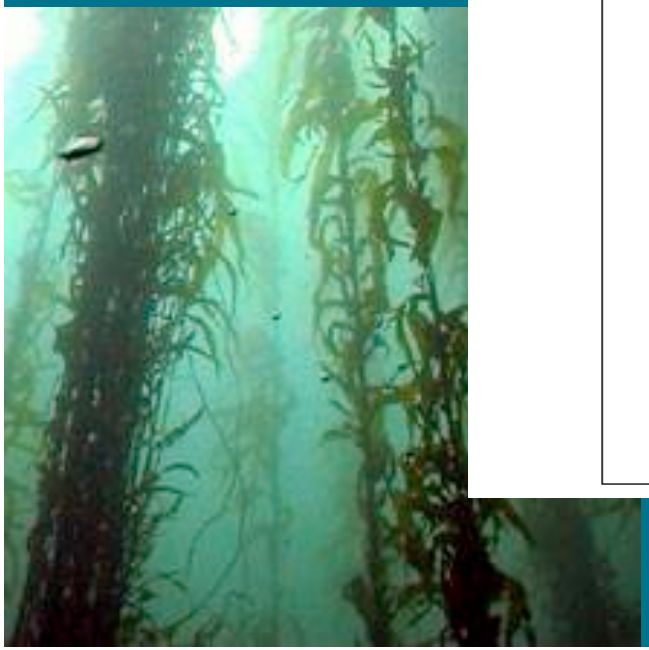
Understanding Differences for Key Habitats



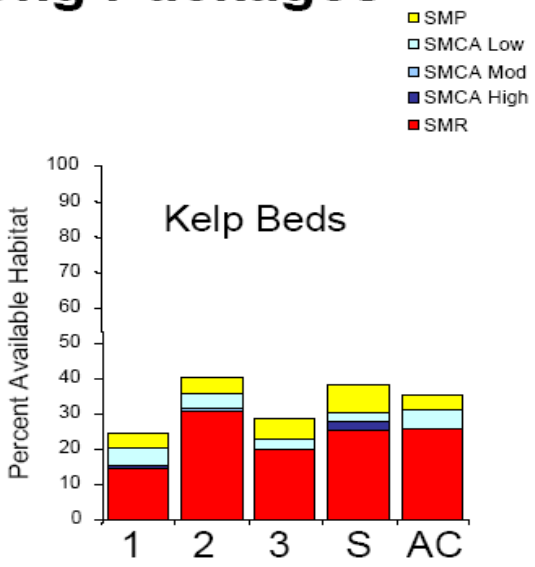
MLPA Blue Ribbon Task Force March 14-15, 2006
Meeting - Agenda Item #5 (Dr. Carr presentation)

Differences Among Packages

Across the entire study region at the highest level (SMR) of protection:

Packages 2 protects 31%
AC and S protect 25%
3 protects 20%, and
1 protects 15%.

This pattern generally applies at the subregion level as well.



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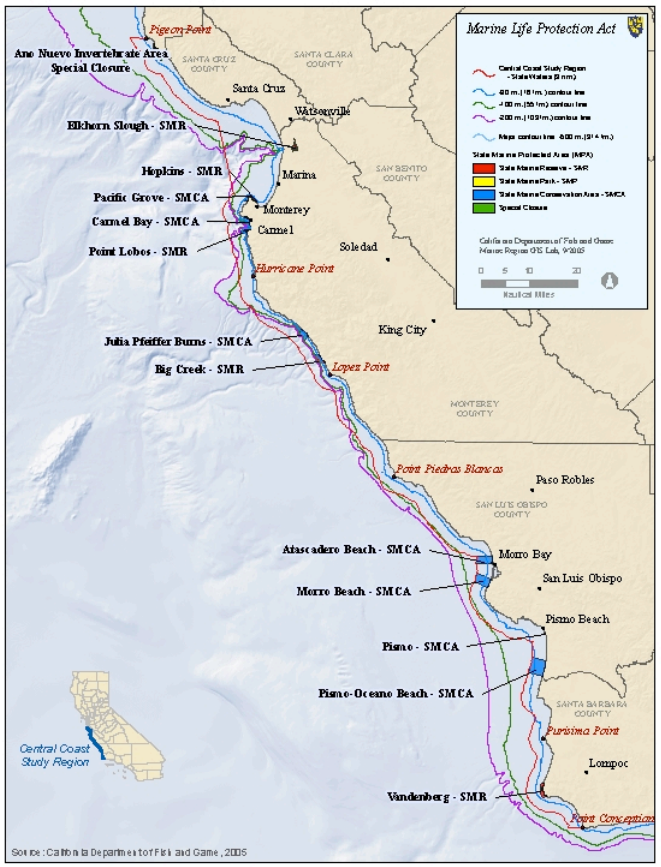
From This…

So Central Coast Region

- 12 MPAs = 3.76%
- 5 marine reserves = 0.65%



Map 1. Central Coast Study Region and Existing State Marine Protected Areas

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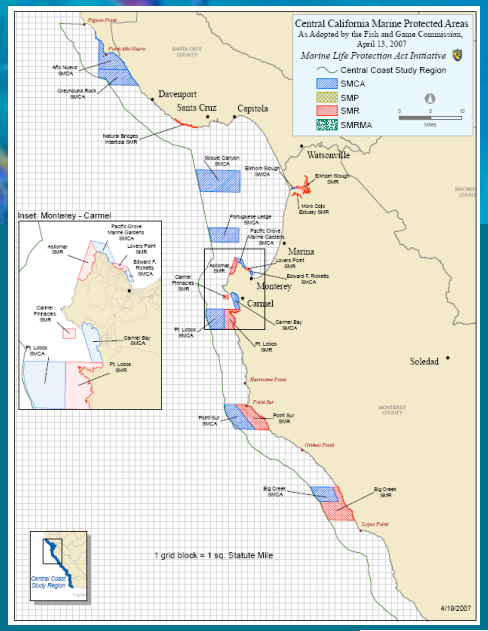
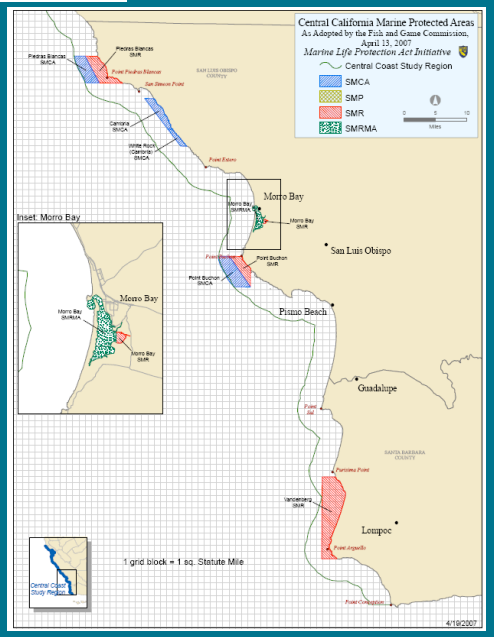
To This





- 29 MPAS = 18% of study region (204 sq.mi or 53,000 hectares)
- 7.5% area in “no take” marine reserves, remainder mostly in moderate to high protection conservation areas

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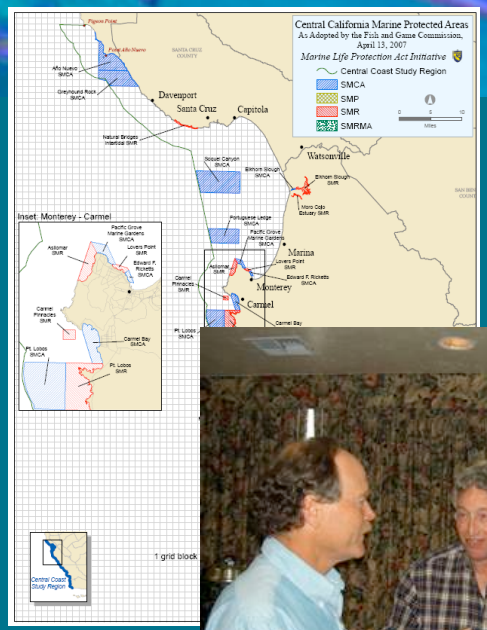
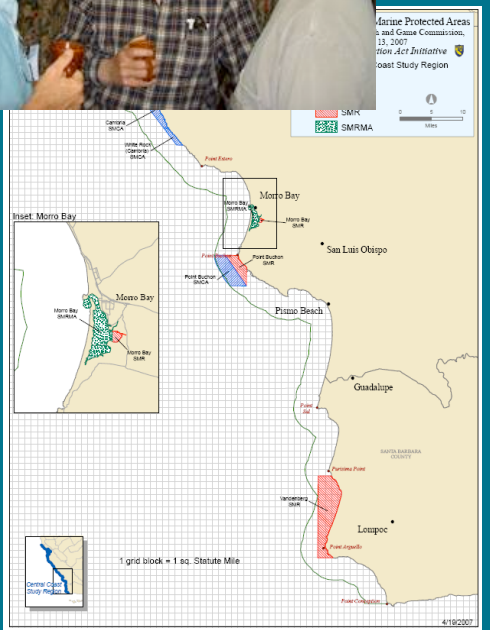
Roots of Success

- Strong Statutory mandate
- Secure funding
- Rich foundational data
- Clear scientific briefings
- Transparent process
- Political champions
- Entrepreneurial staff
- Decision support tool & hands-on training
- Firm/tight deadlines



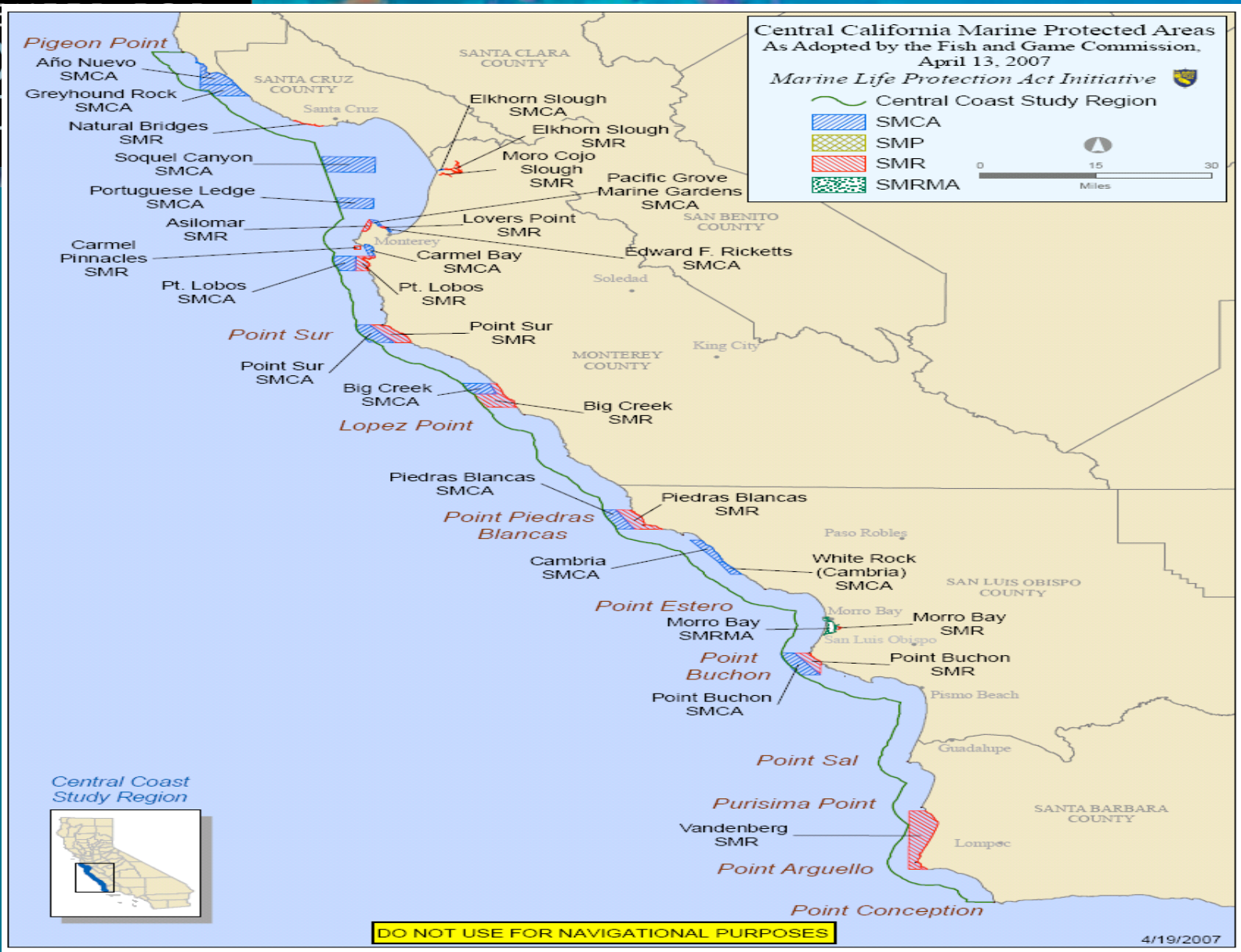
Scientists who can communi-cate!



Thank you!

http://www.dfg.ca.gov/mlpa/

For live video of all MLPA meetings go to Cal-span.org



SMCA = state marine conservation area SMP = state marine park
SMR = state marine reserve SMRMA = state marine recreational management area

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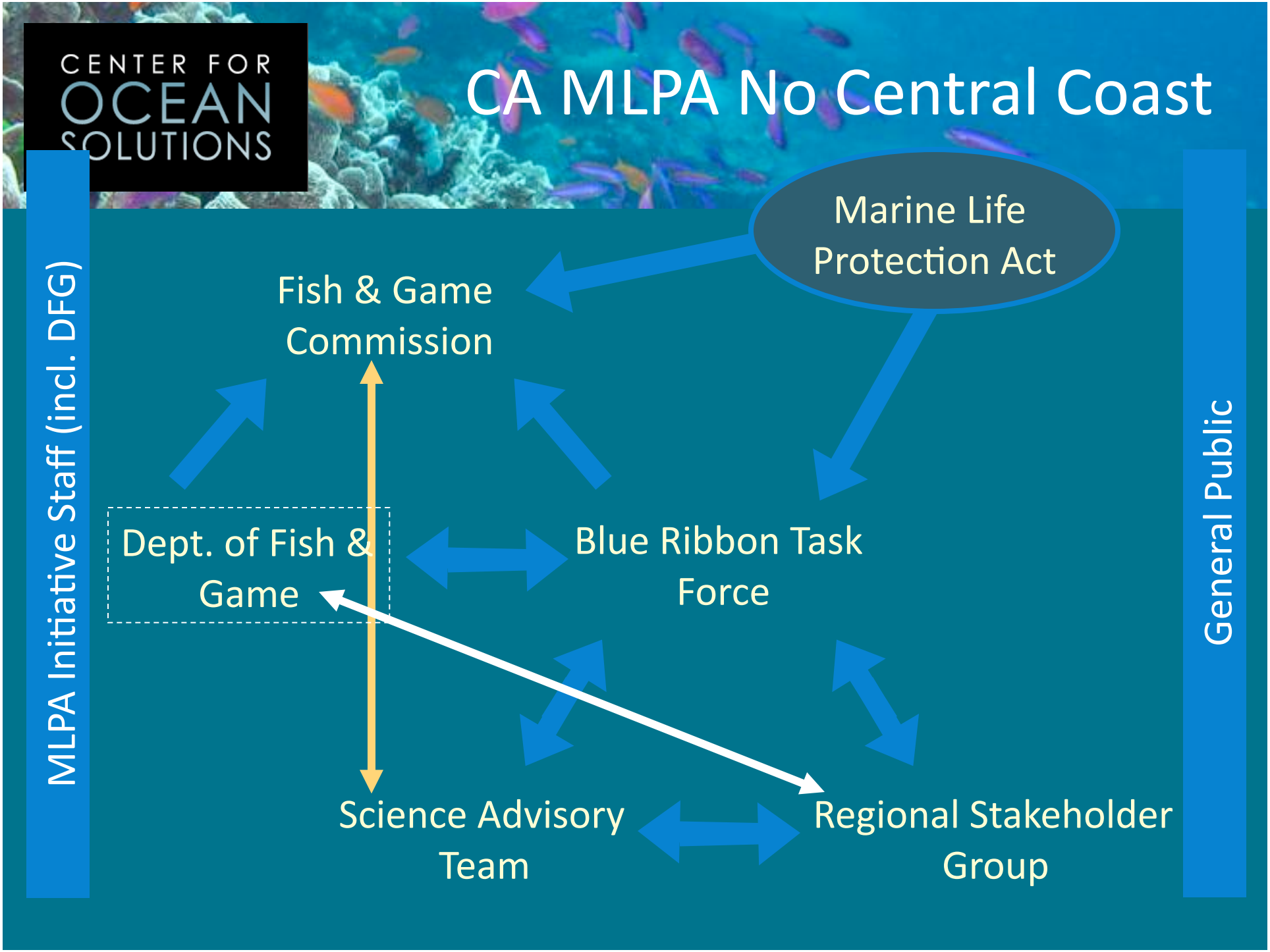
BRTF "Lessons Learned" for North Central Coast

- Use a BRTF model for next region
- Clarify roles of stakeholders, BRTF, DFG
- Keep independent professional staff
- Involve FG Commission earlier and more meaningfully with SAT, BRTF, RSG
- Enhance state agency capacity: FG Commission; DFG; State Parks; SWRCB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CA MLPA No Central Coast
Marine Life Protection Act
Fish & Game Commission
MLPA Initiative Staff (incl. DFG)
General Public
Dept. of Fish & Game
Blue Ribbon Task Force
Science Advisory Team
Regional Stakeholder Group

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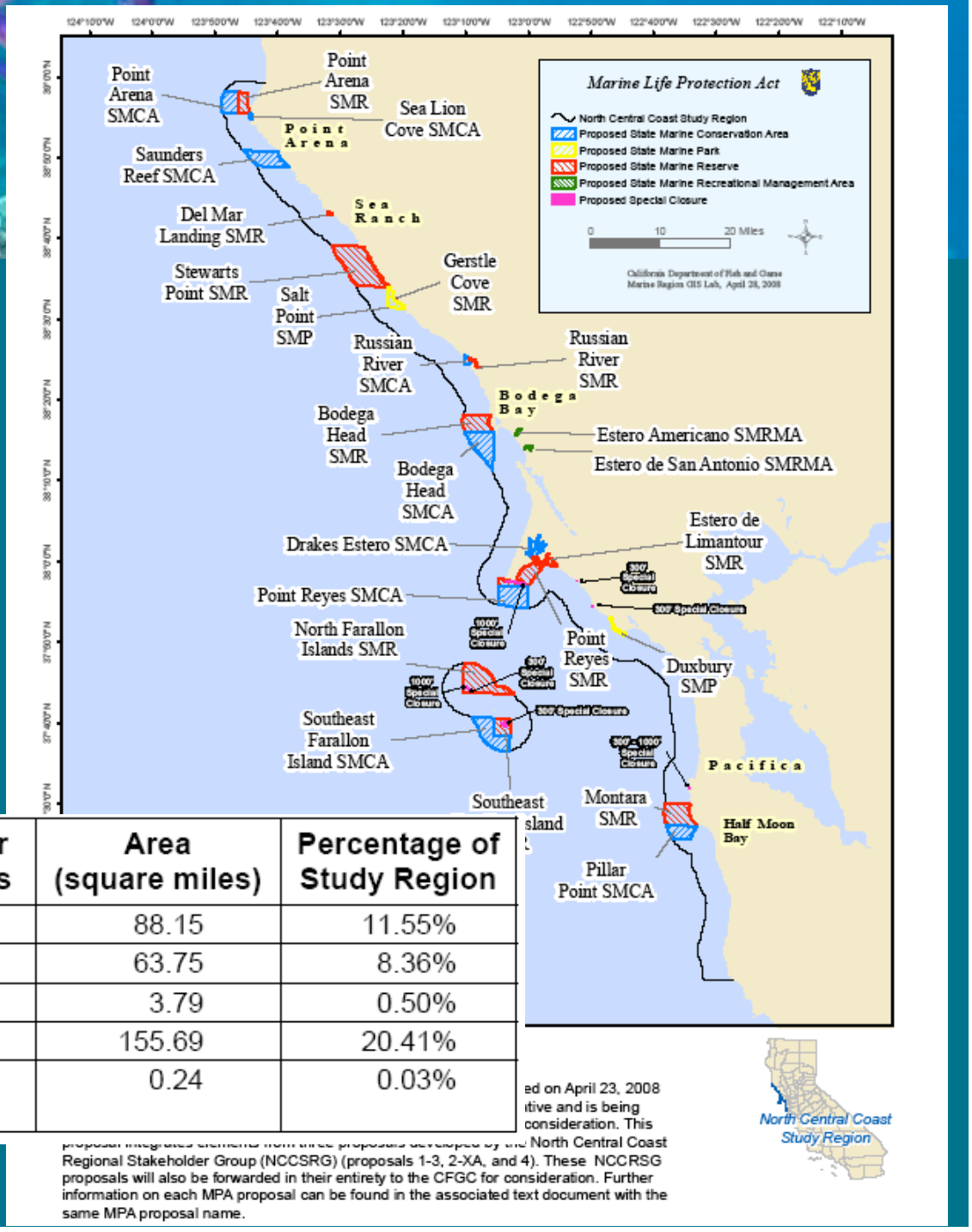
From:

- 13 MPAs (1 marine reserve of 0.28 sq mi)
- 26.9 sq mi (3.54% of study region)

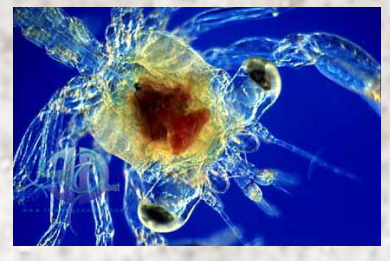
To:

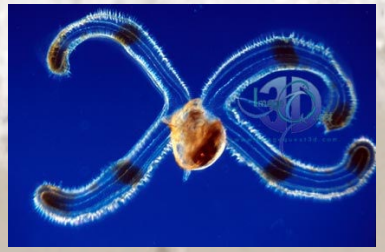


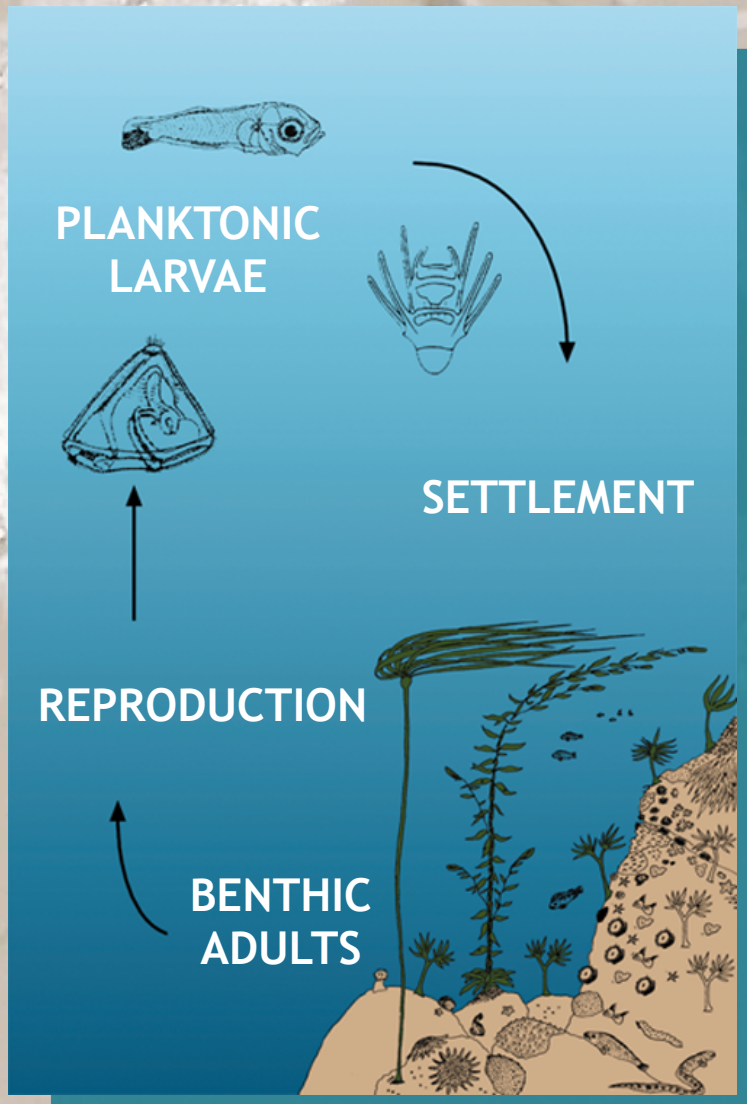
	Number of MPAs	Area (square miles)	Percentage of Study Region
State marine reserve	11	88.15	11.55%
State marine conservation area	9	63.75	8.36%
State marine park	2	3.79	0.50%
MPAs Total	22	155.69	20.41%
State marine recreational management area	2	0.24	0.03%

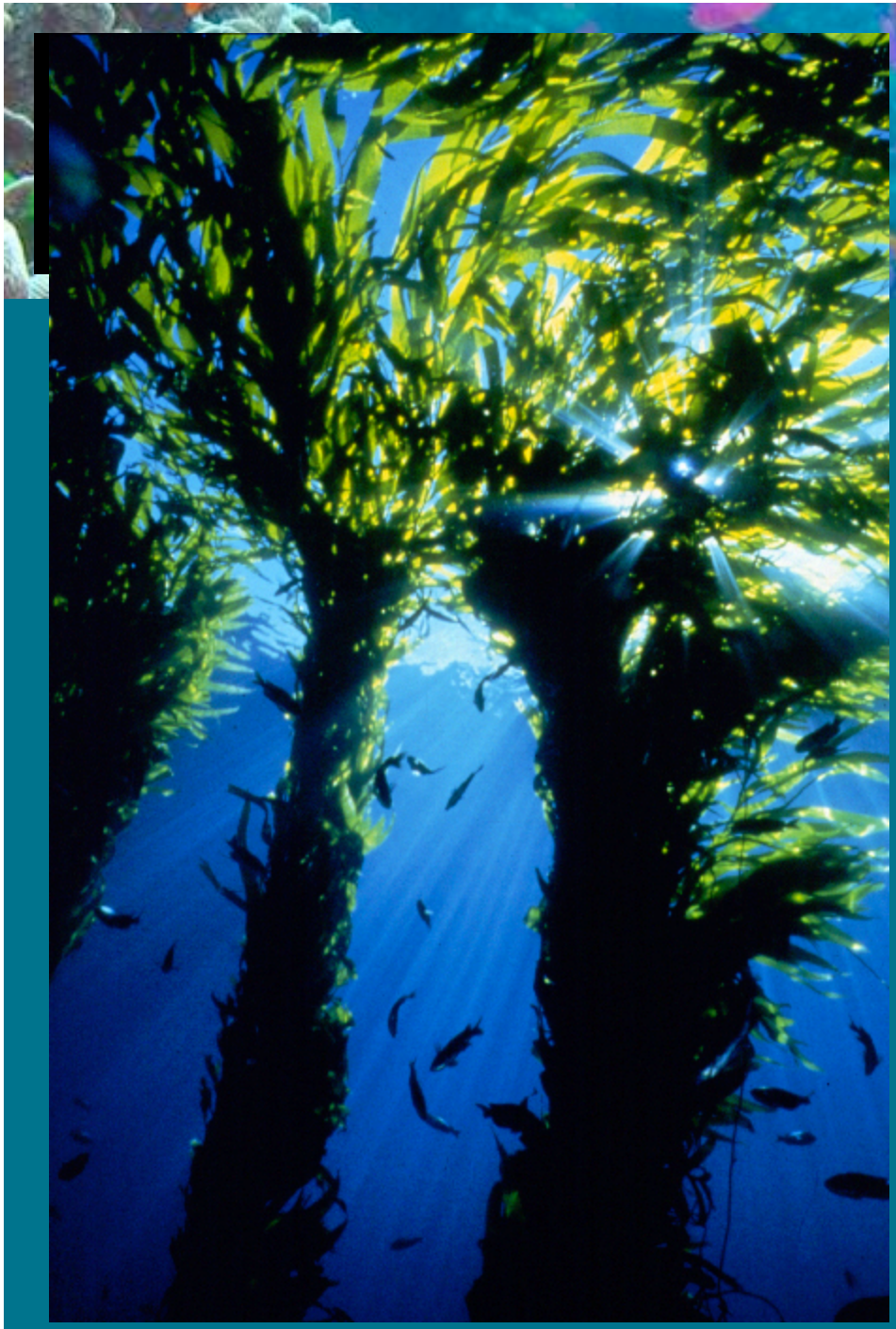
ed on April 23, 2008
itive and is being
consideration. This
North Central Coast
Regional Stakeholder Group (NCCSRG) (proposals 1-3, 2-XA, and 4). These NCCRSG proposals will also be forwarded in their entirety to the CFGC for consideration. Further information on each MPA proposal can be found in the associated text document with the same MPA proposal name.

Uncertainty on Key Part of Marine Life Cycles









Other Challenges

- Long Time Scales
- Interdisciplinary Problems
- Nearshore Oceanography
- Science – Policy Interface

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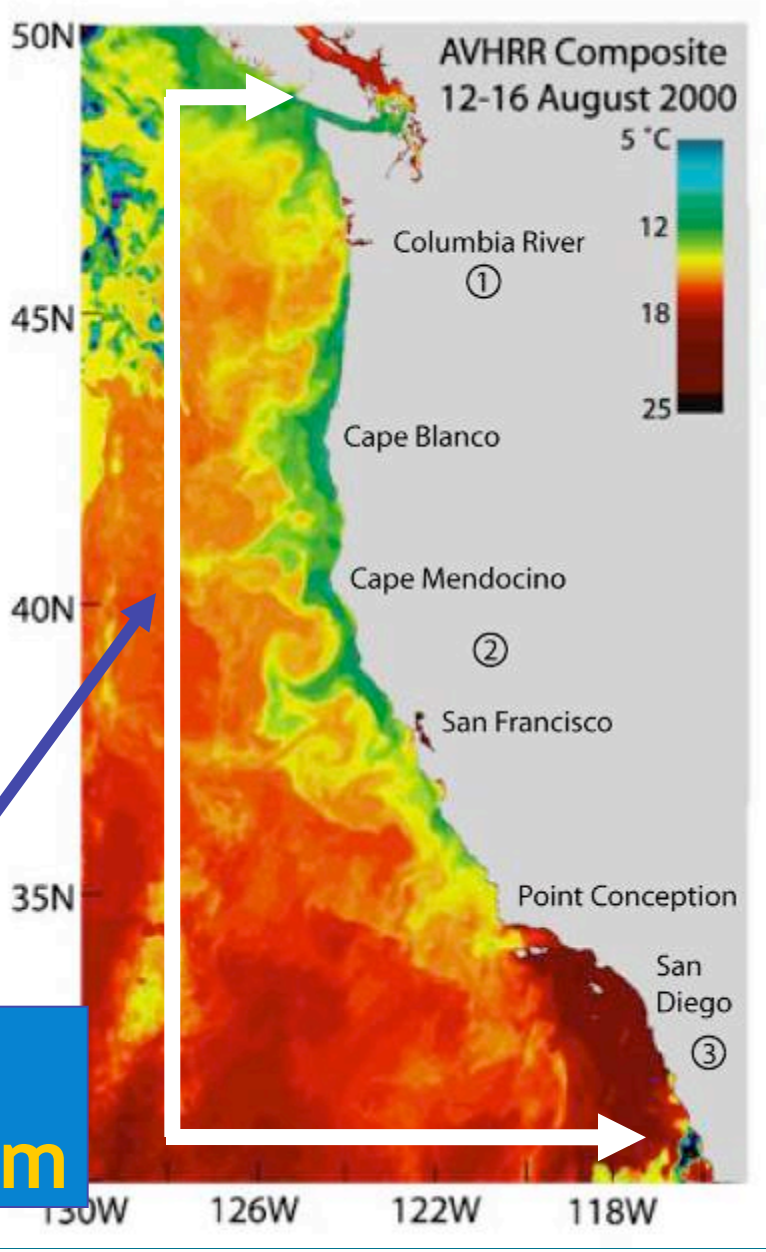
A Big Goal

1. Understand Dynamics of a Large Marine Ecosystem
   - how does it work?
   - is it changing?

2. Use this Knowledge to Improve Public Policy

California Current Large Marine Ecosystem



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Defining BioRegions