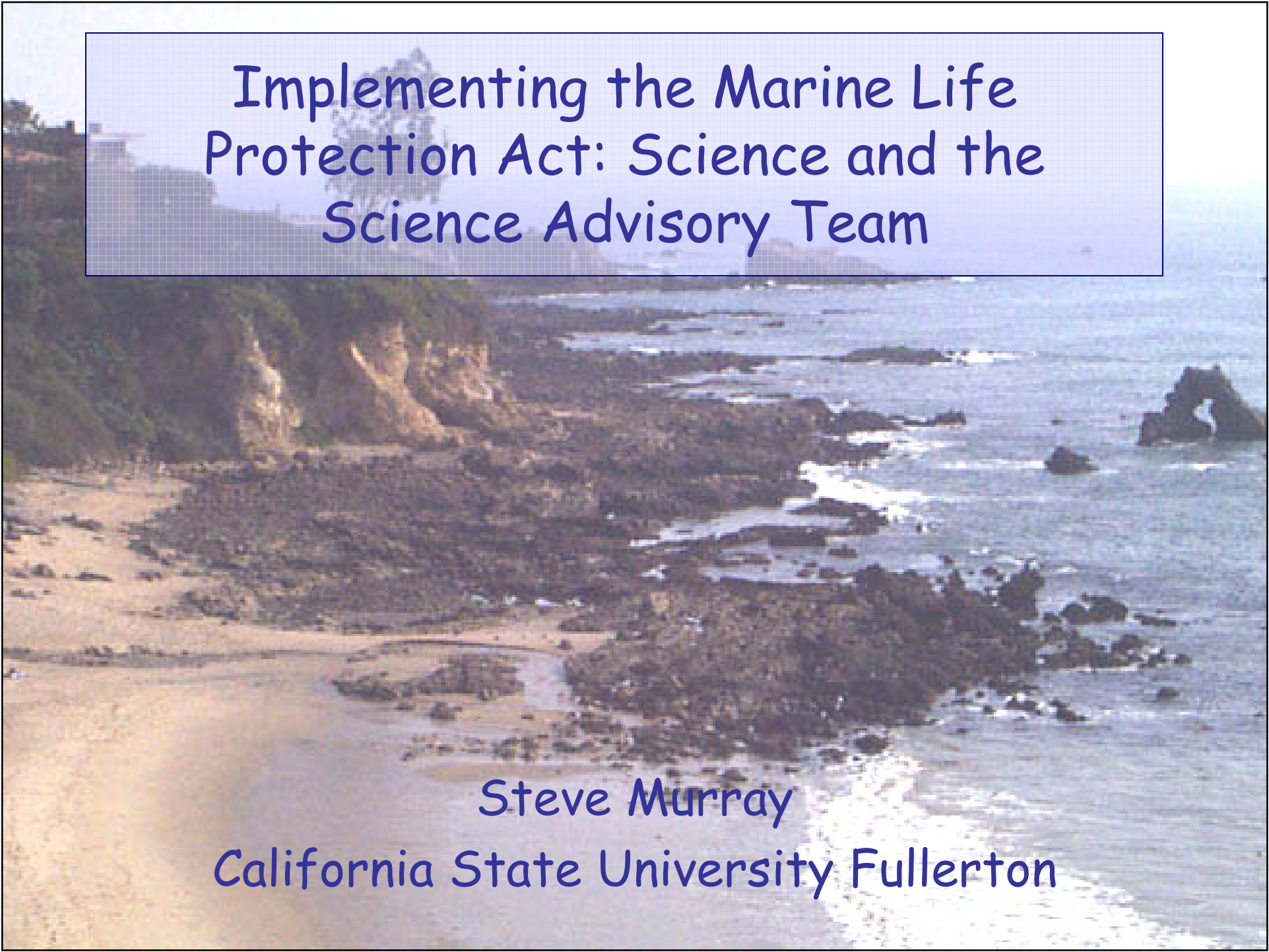
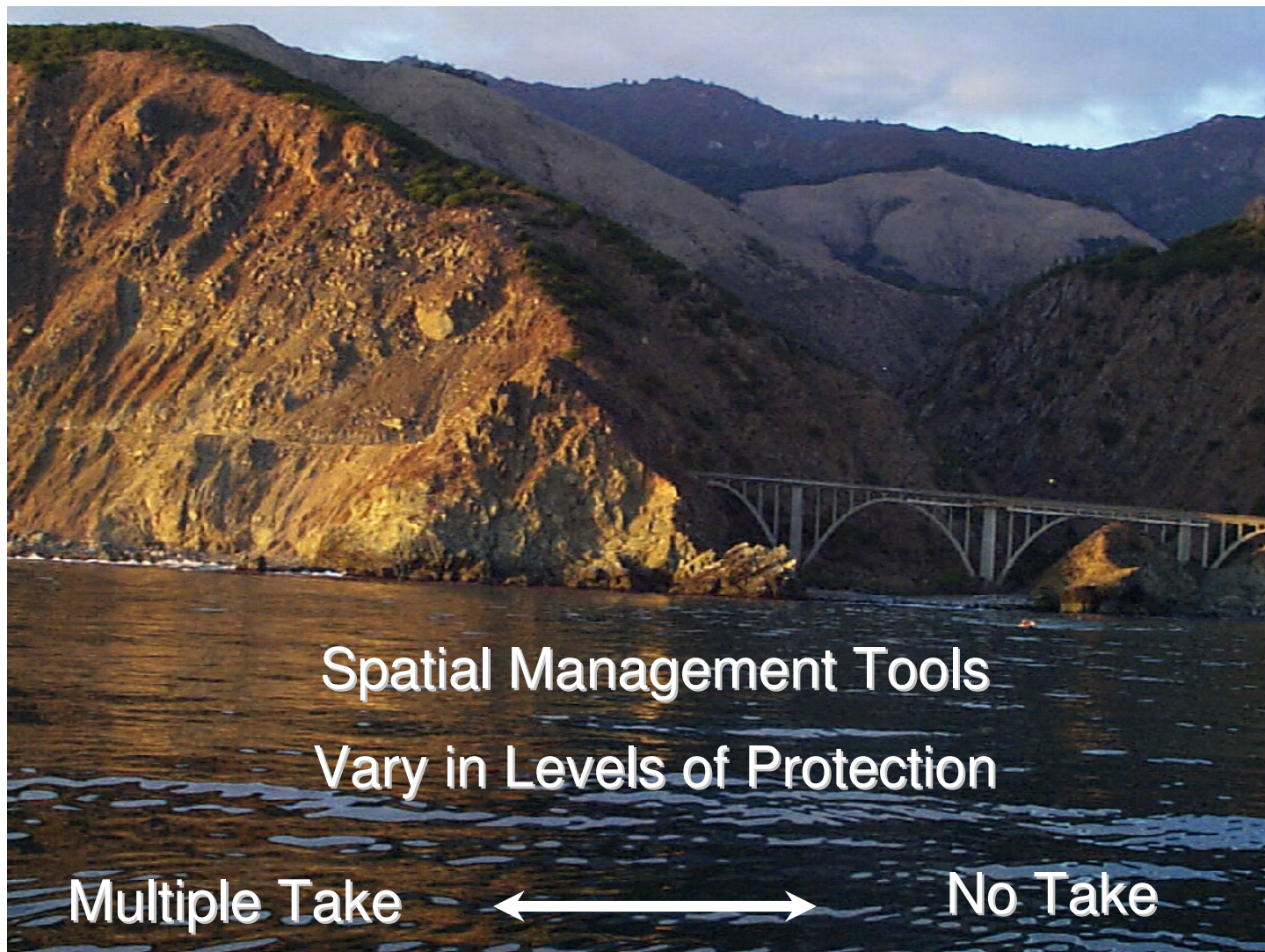


The background of the slide is a photograph of a coastal landscape. On the left, there is a steep, green cliff with some rocky outcrops. Below the cliff is a sandy beach. The ocean is on the right, with waves breaking against a rocky shoreline. The sky is blue with some light clouds. A semi-transparent blue box with a grid pattern is overlaid on the top left of the image, containing the title text.

Implementing the Marine Life Protection Act: Science and the Science Advisory Team

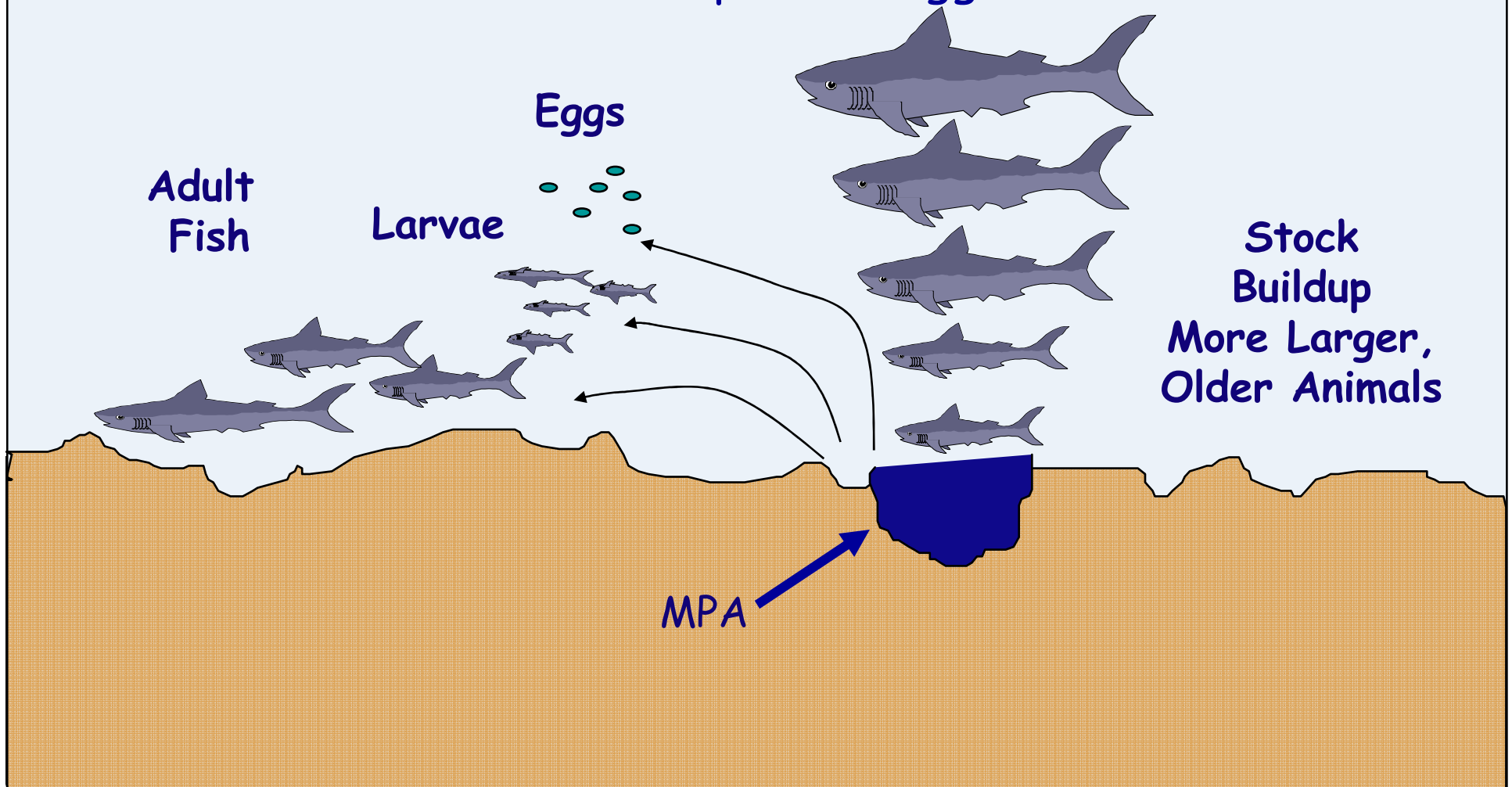
Steve Murray
California State University Fullerton

Marine Protected Areas



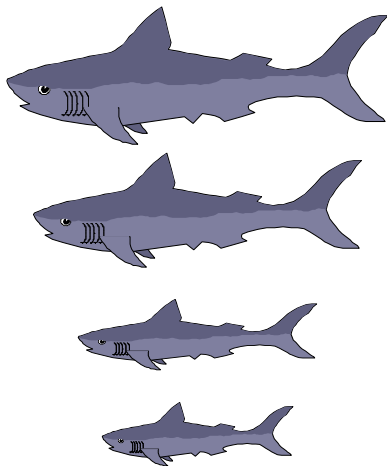
MPAs: Predicted Outcomes

Increases in Density & Size
Spillover of Adults and Juveniles
Production and Export of Eggs & Larvae

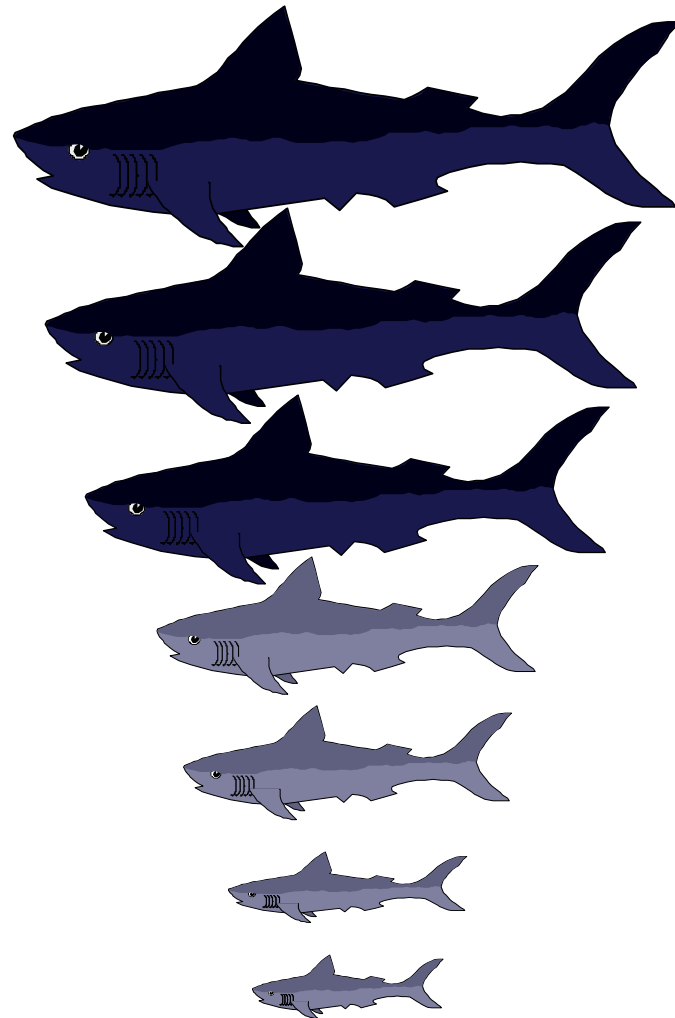


Population Structures Differ In and Outside of MPAs

More bigger,
older animals



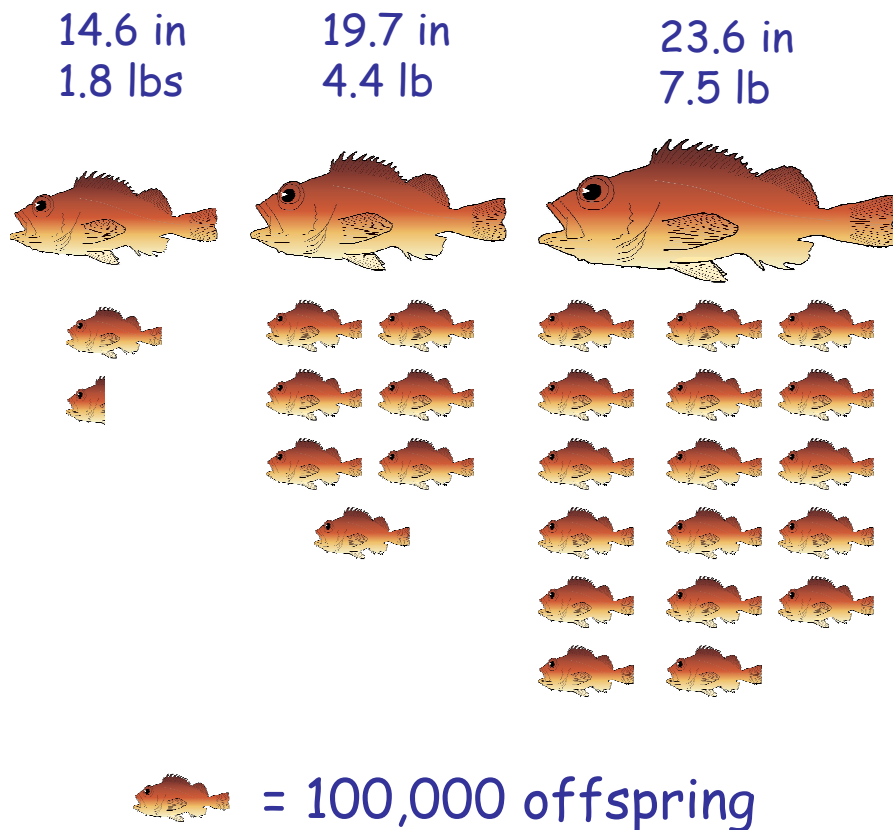
With Fishing



Inside Reserve

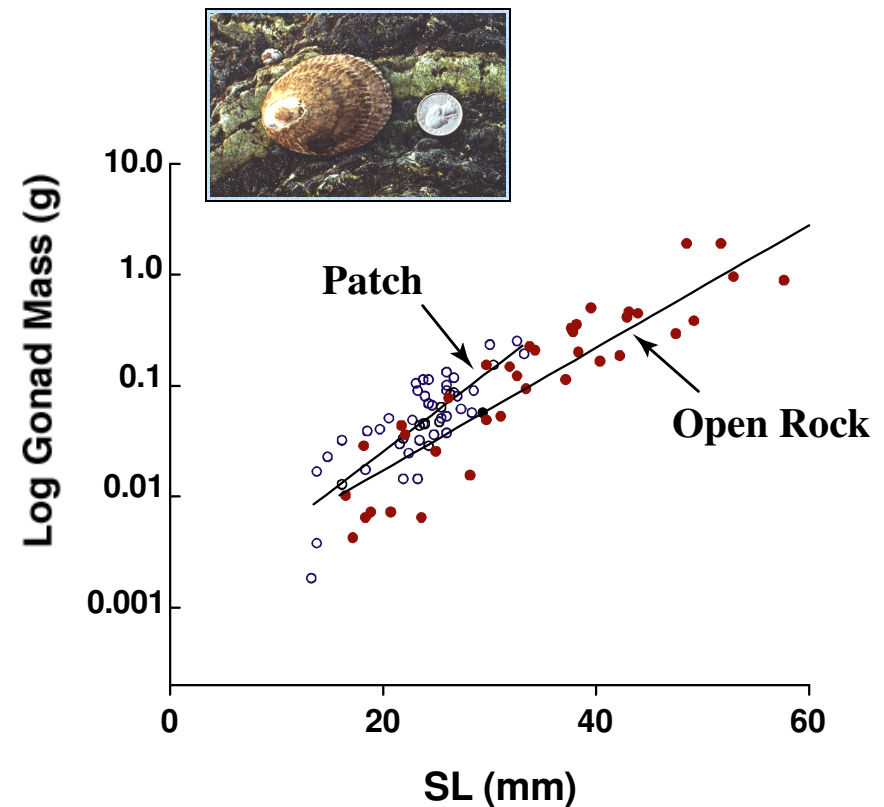
Reproductive Output is Strongly Affected by Body Size

Vermilion Rockfish



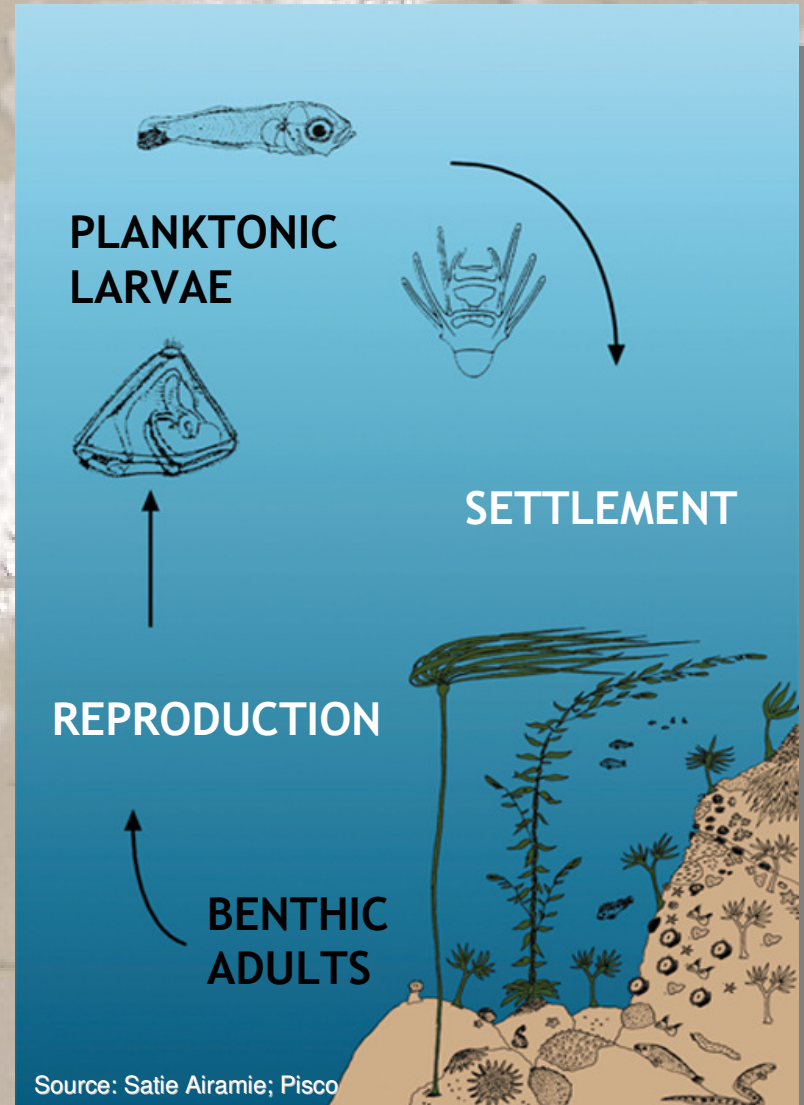
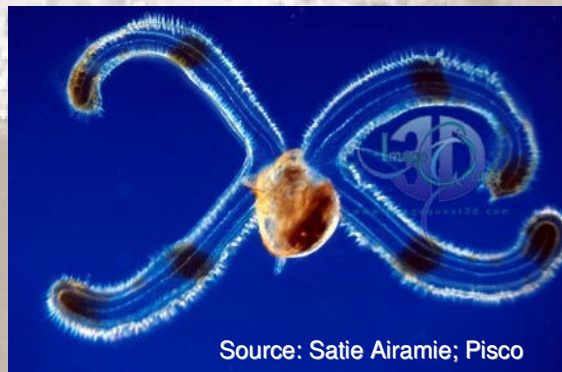
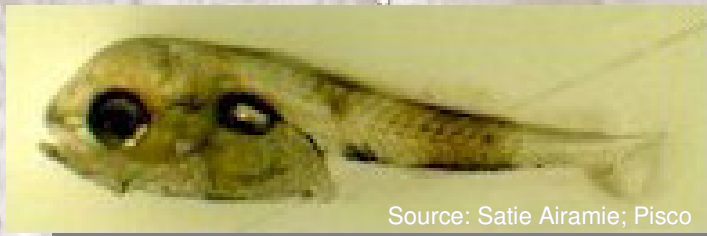
Source: Pisco

Owl Limpets



Source: Kido and Murray 2003

Export of Young



A Web of Life



California Sheephead



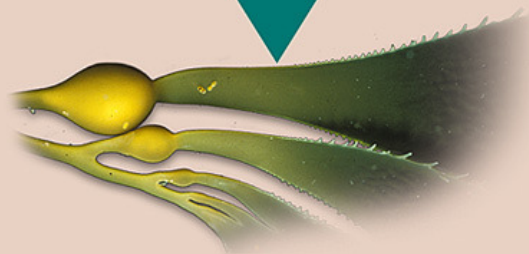
California Spiny Lobster



Purple Urchin



Giant Kelp

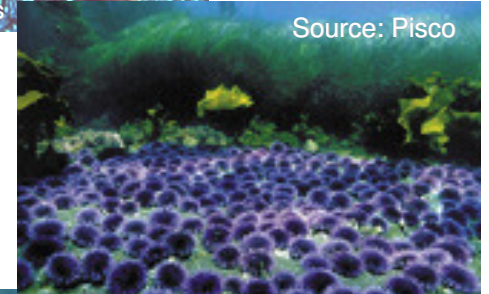


Source: Pisco

Fishing not only affects
fished populations but
also the structure of
marine communities



Source: Carlos Robles



Source: Pisco



Source: Pisco

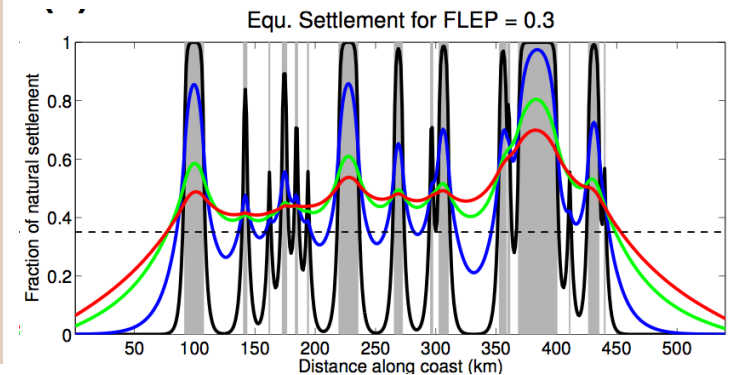
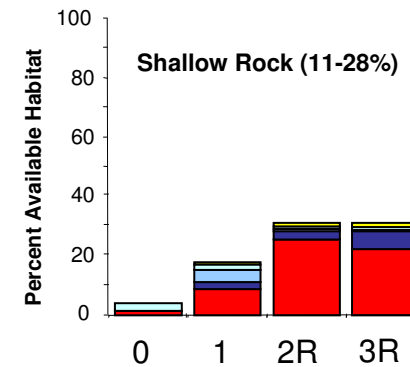
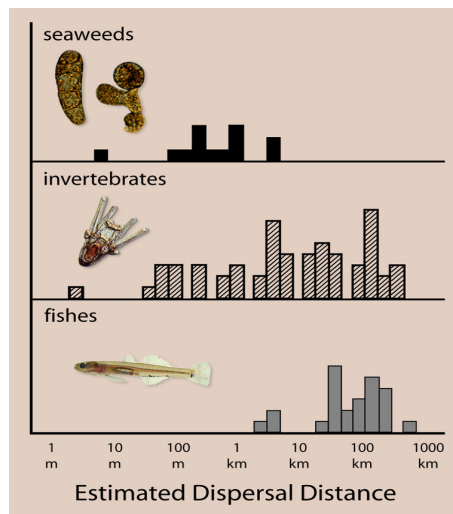
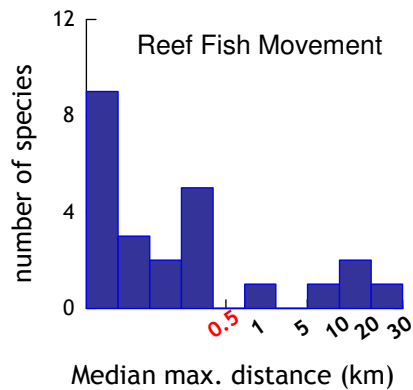
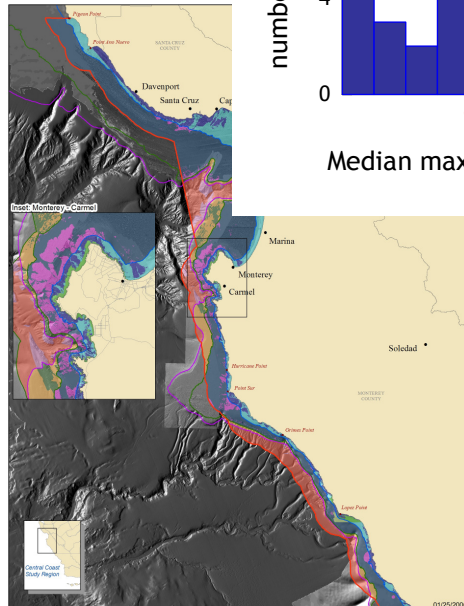
Marine Life Protection Act

The Process

- Blue Ribbon Task Force (8 members)
 - Oversee implementation
 - Make policy decisions
- Science Team (ca. 16 members)
 - Natural Sciences and Social Sciences
 - Provide Scientific Knowledge and Advice; Assist Stakeholders
 - Develop Scientific Framework for MPA Designs
- Stakeholder-Based Process
 - Working Groups of Stakeholders
 - Prepare Sites according to Science Team Guidelines

Science Advisory Team (SAT)

Use Best Available Science for Design and Evaluation of MPA Networks



Science Guidelines



Peer-reviewed and vetted in Public Process Then Incorporated into a Master Plan Framework



Guidelines Transmitted to Stakeholders



Used by Stakeholders to Develop MPA Packages

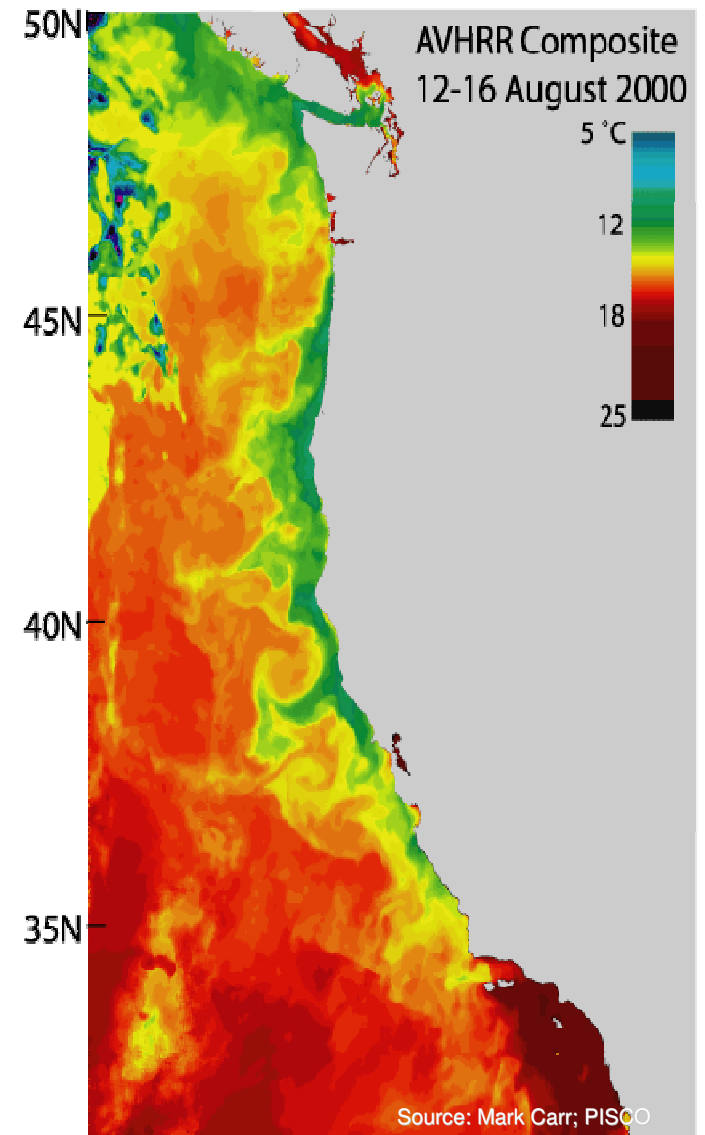
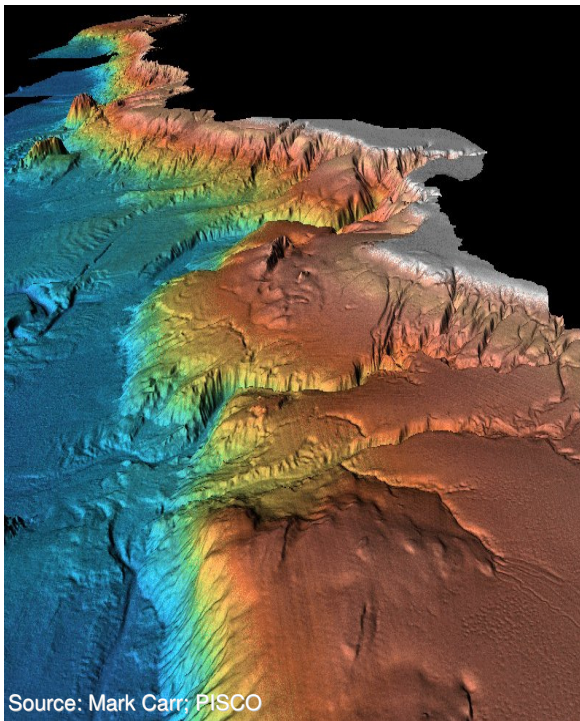


Used by SAT to Evaluate Stakeholder MPA Packages

Science Guidelines

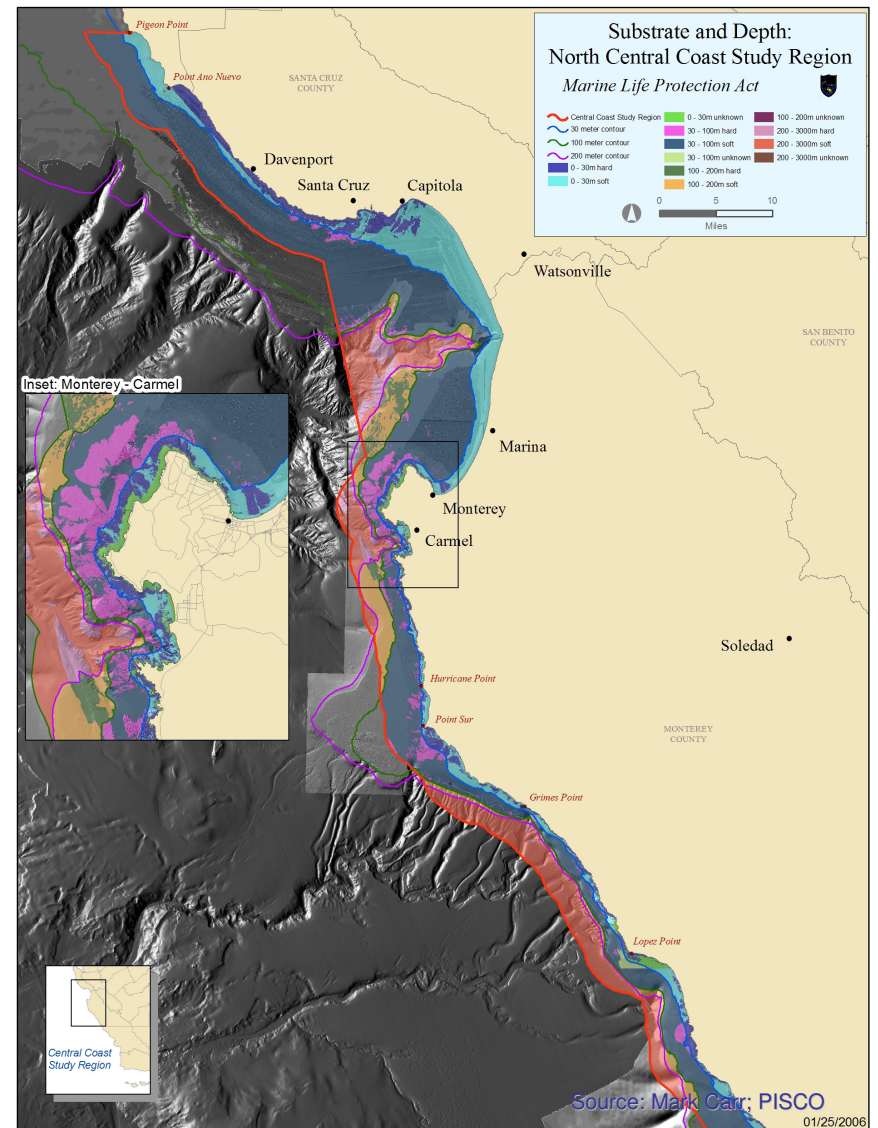
Identified Key Habitats:

- Bottom Type and Depth
- Biogenic Habitats (e.g., Kelp Beds)
- Oceanographic Features



Science Guidelines

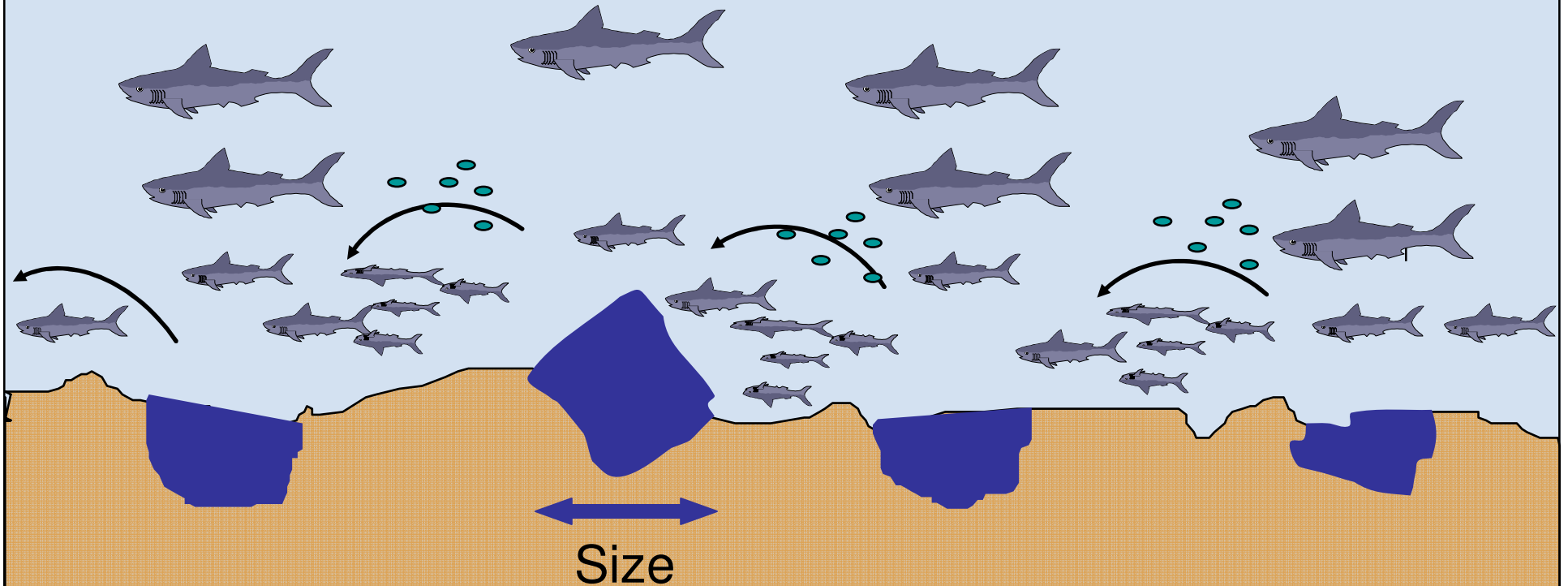
- Habitats Mapped with GIS
- Habitat Distributions Calculated
- Habitat Used as a Proxy for Species Distributions
- Habitat Information Provided to Stakeholders for MPA Designs



MLPA Dictates Networking of MPAs

Knowledge of Ocean Currents

Spacing



Science Guidelines



Published and Unpublished Models
Describing Sustainability Effects
(Size and Spacing)



Adult Movement Estimates from
Scientific Literature (Size)



Larval Dispersal Estimates from
Scientific Literature (Spacing)



How Far Do Adult Animals Move?

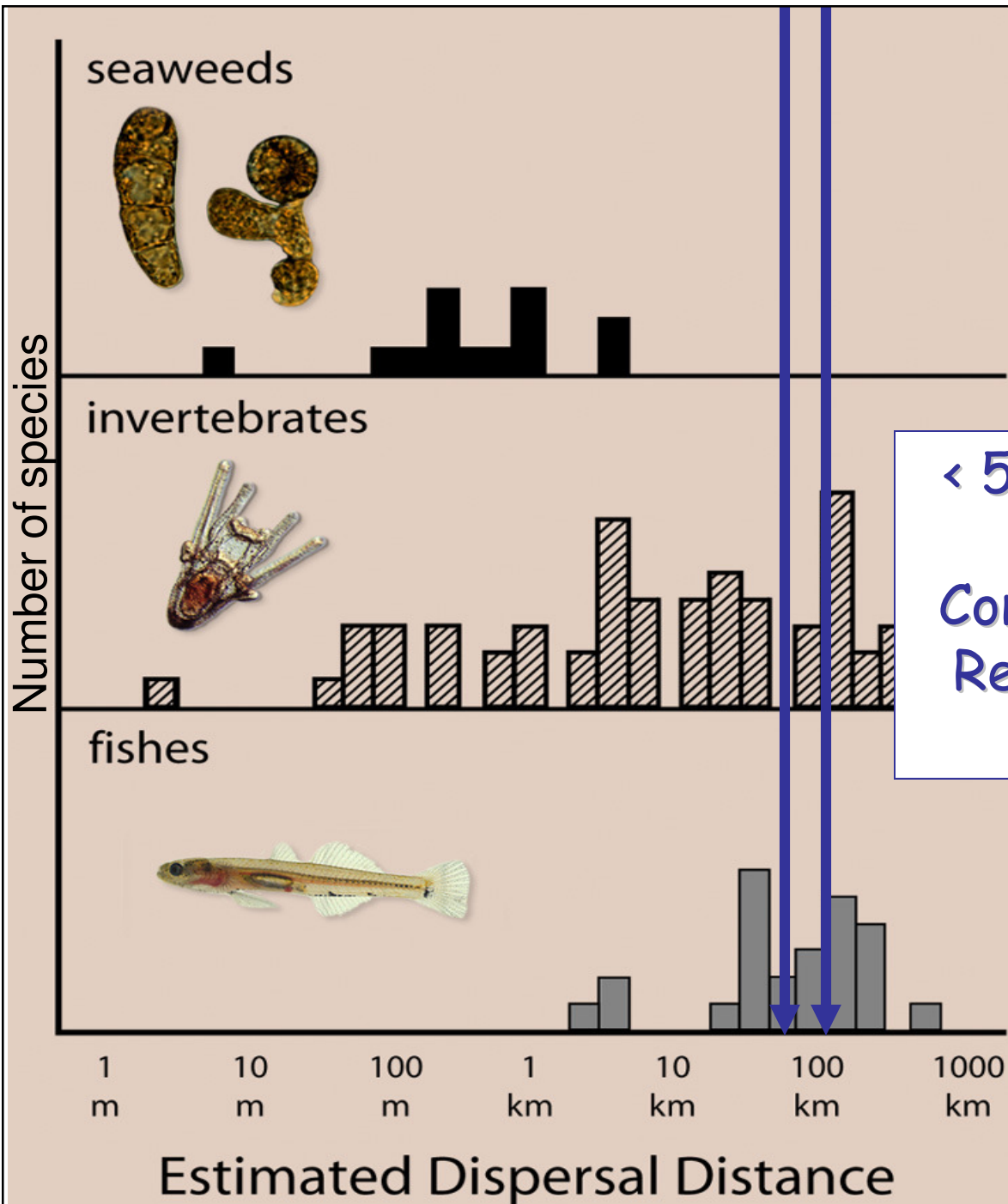
0 – 1 km	1 – 10 km	10 – 100 km	100 – 1000 km	> 1000 km
Invertebrates Abalone Mussel Octopus Sea Star Snail Urchin Rockfishes Blk. & Yellow China Gopher Grass, Kelp Other Fishes Sheephead Greenling Surf perches Eels	Rockfishes Black Brown Copper Greenspotted Olive Vermilion Other Fishes Cabezon Ca. Halibut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

10 - 20 km
to Contain
Movements
of Many
Species

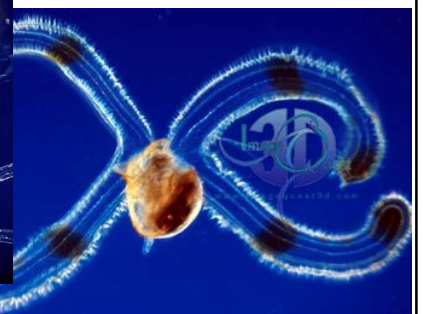
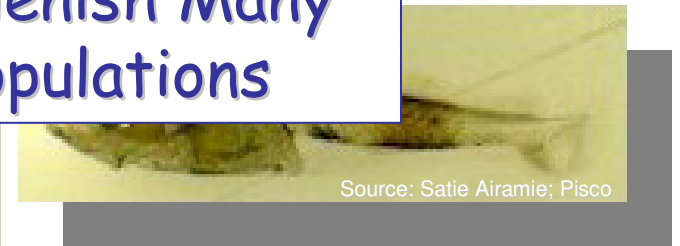
* Seasonal Migration

Source: Mark Carr

Larval Dispersal Distances



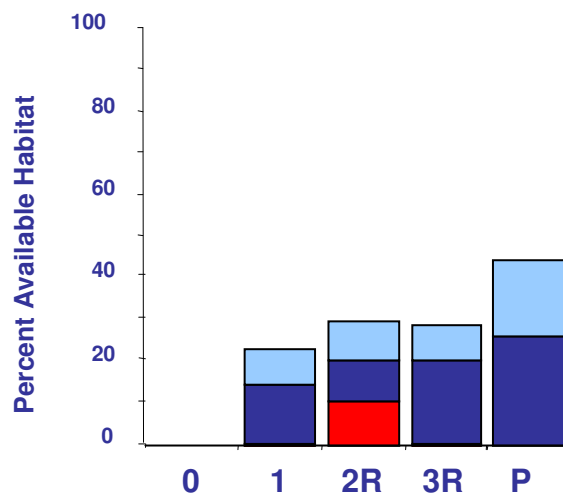
< 50 - 100 km to
Provide
Connectivity and
Replenish Many
Populations



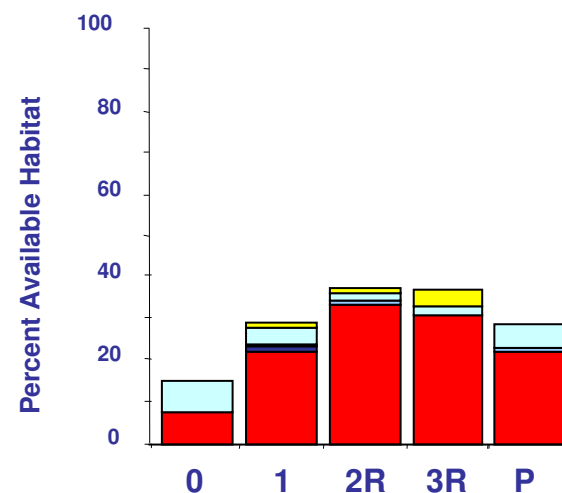
Stakeholder MPA Packages: Evaluations

Example:
MPAs with
Moderate
to High
Protection
Levels

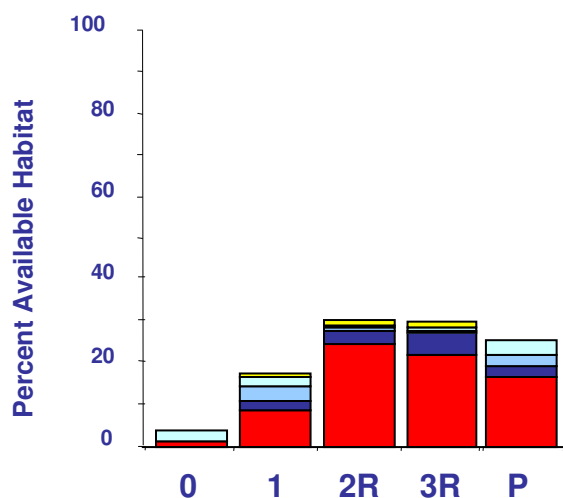
Deep Rock (23-44%)



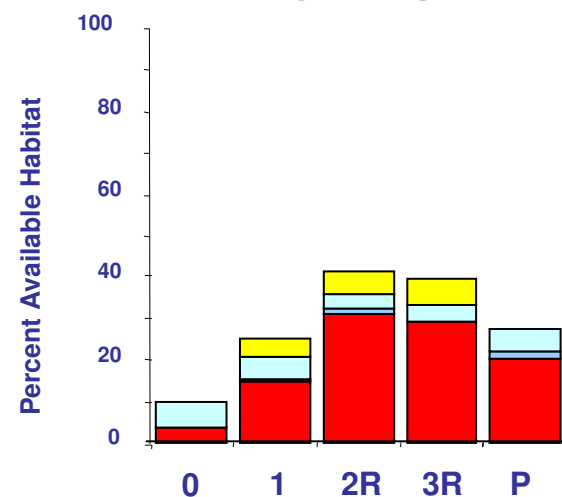
Rocky Intertidal (23-35%)



Shallow Rock (15-29%)



Average Kelp (15-32%)



- SMP
- SMCA Low
- SMCA Mod
- SMCA High
- SMR

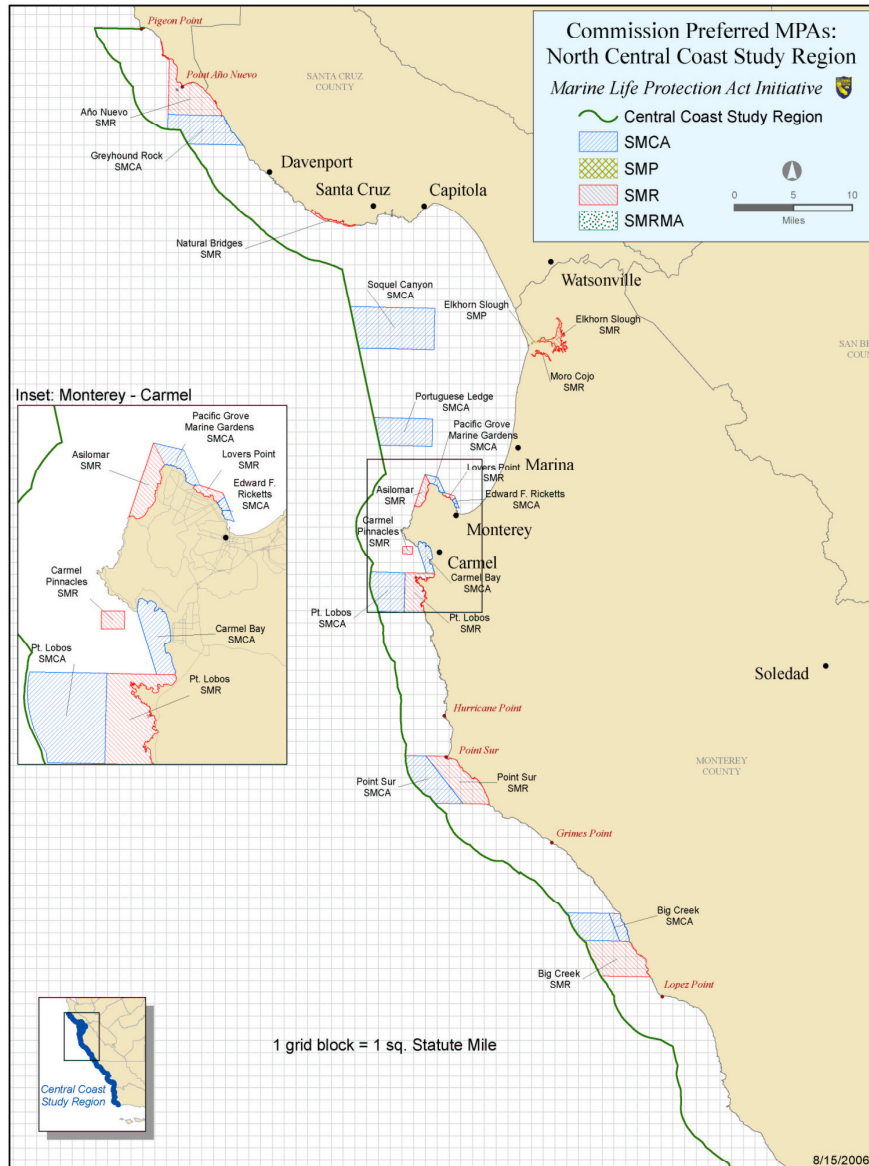
Stakeholder MPA Packages: Evaluations

SAT Size Guidelines

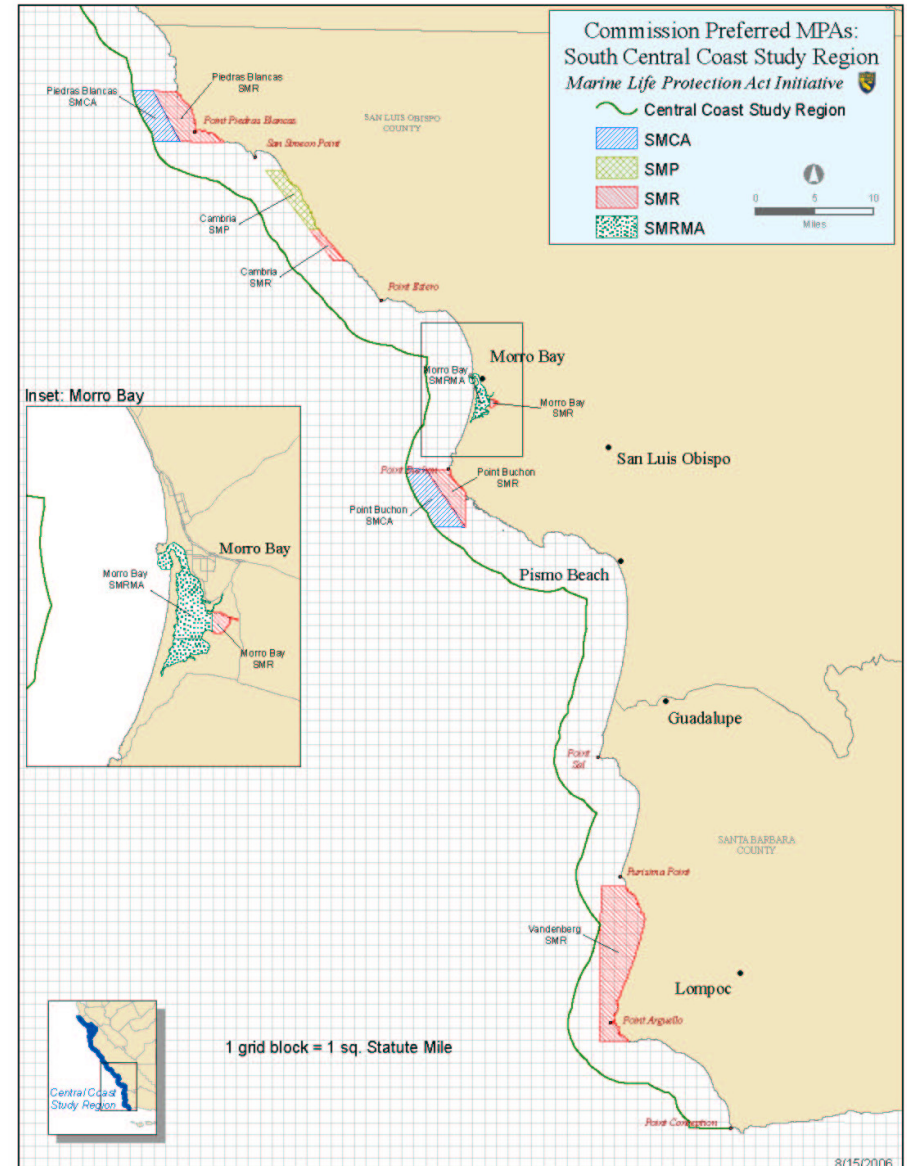
Example: Moderate to High Protection MPAs

Pkg	# of MPA Clusters	Below Minimum	At Minimum	Preferable Size
I	13	54%	31%	15%
2R	14	36%	14%	50%
3R	14	28%	22%	50%
P	11	36%	18%	46%

Central Coast Approved Plan



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

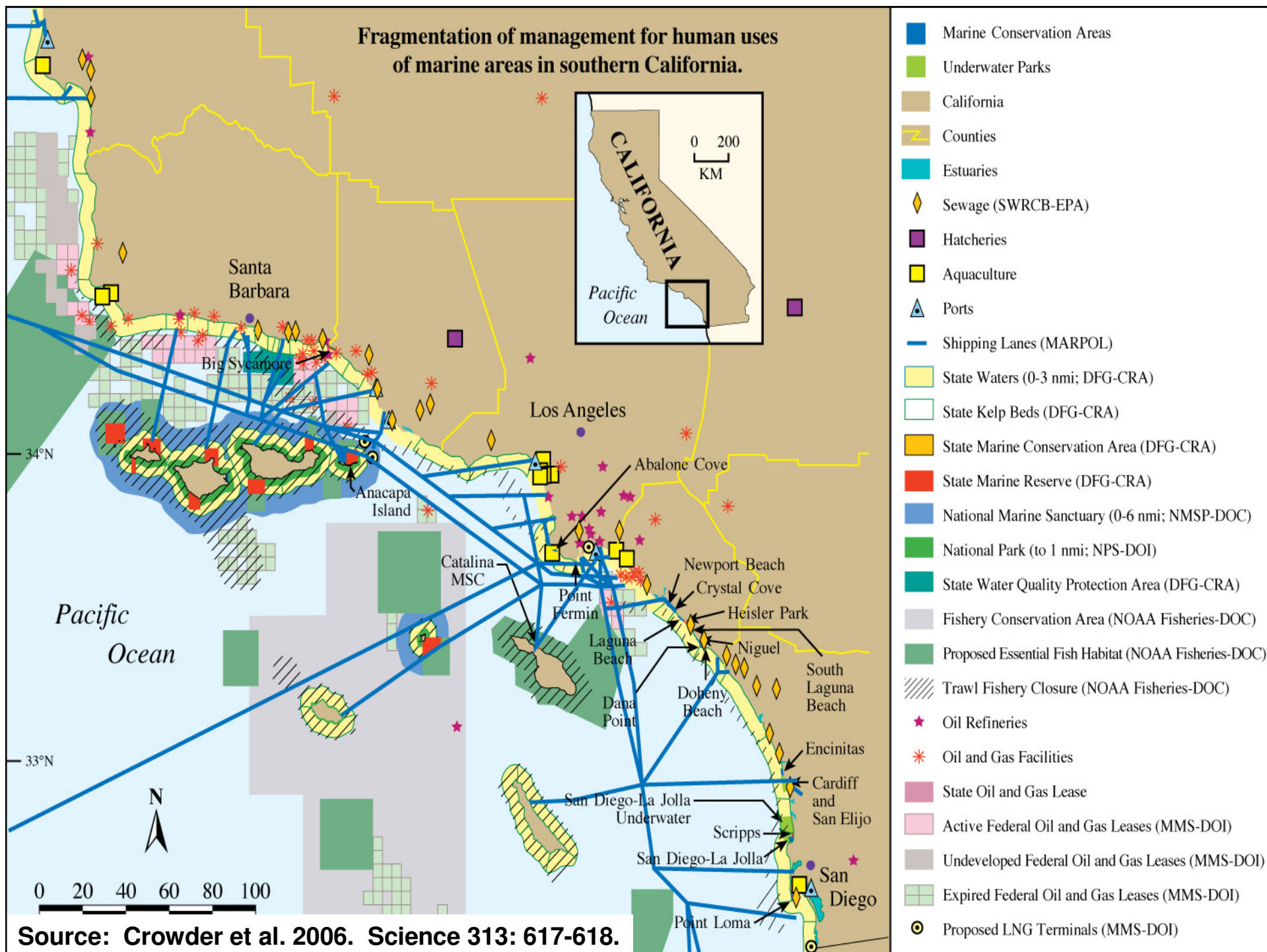


SMCA = state marine conservation area SMP = state marine park
SMR = state marine reserve SMRMA = state marine recreational management area

And What About Southern California?



Fragmentation of management for human uses of marine areas in southern California.



After CINMS

Marine Protected Areas



A satellite map of the Southern California coastline and surrounding waters. The map shows the dark blue ocean on the left, the light brown and tan landmasses of Southern California on the right, and the San Diego Bay area in the center. The text is overlaid on the map in white boxes with blue borders.

Challenges for Implementing the MLPA in Southern California

1. Heterogeneous and Complex Ocean Conditions
(How Many Biogeographic Areas?)
(How Will Connectivity Be Obtained?)

2. Rocky Habitat is Scarce
(Headlands are Prime Candidates for MPAs)
(Scarcity Creates Conflicts for Users)



Challenges for Implementing the MLPA in Southern California

3. Stakeholder Interest Groups are
Fragmented Geographically

4. Many Fishers
Recreational and Commercial

5. Will MPAs Work Given Intense Human Presence?
(How Will Water Quality Affect MPA Performance?)