

Marine Life Protection Act Initiative



SAT Evaluations of Draft MPA Proposals North Central Coast Study Region

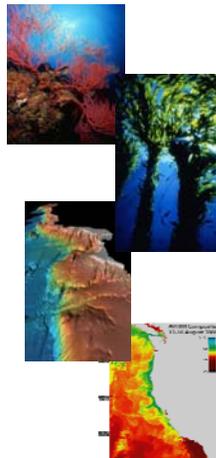
Presentation to the MLPA North Central Coast Regional Stakeholder Group
February 21, 2008 • San Rafael, CA
Presented by Dr. Mark Carr

Master Plan Science Advisory Team

-  MLPA Goals
-  Habitat Representation
-  Habitat Replication
-  Birds and Mammals
-  Size and Spacing (+ models)

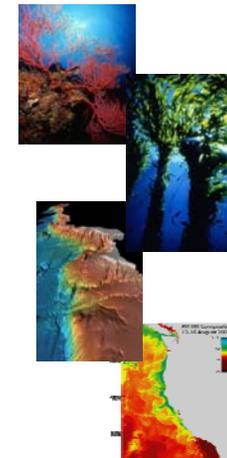
MLPA Goals

1. To protect the natural diversity and function of **marine ecosystems**.
2. To help sustain and restore **marine life populations**.
3. To improve **recreational, educational, and study opportunities** in areas with minimal human disturbance.
4. To protect representative and unique **marine life habitats**.
5. Clear objectives, effective management, adequate enforcement, sound science.
6. To ensure that MPAs are designed and managed as a **network**.



MLPA Goals: Habitats

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Evaluation: Habitats

Key Questions for Each Proposal

1. How well are key habitat types represented in proposed MPA proposals?
2. What are the proposed levels of protection for these habitat types?
3. How well are habitats and levels of protection distributed across the study region?

SAT Guidelines: Levels of Protection

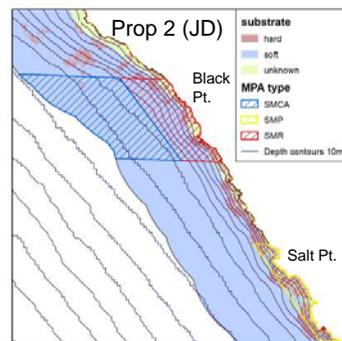
	Level of Protection	MPA Types	Activities Associated with this Protection Level
	Very high	SMR	No take
	High	SMCA	salmon (troll H&L in water greater than 50m depth), sardine, anchovy, and herring (pelagic seine)
	Mod-high	SMCA	salmon (troll H&L in water less than 50m depth)*, Dungeness crab (traps/pots), squid (pelagic seine)
	Moderate	SMCA SMP	salmon (non-troll H&L), abalone (diving), halibut, white seabass, striped bass, shore-based finfish and flatfishes (H&L), clams (hand harvest), giant kelp (hand harvest)
	Low-mod	SMCA SMP	Urchin (diving), lingcod, cabezon, greenling, rockfish, and other reef fish (H&L), surfperches (H&L), mariculture
	Low	SMCA SMP	bull kelp and mussels (any method), all trawling, giant kelp (mechanical harvest)

* Note the BRTF voted to keep this mod-high LOP on Feb 14, 2008

Results: Habitat Representation

Similarities between proposals

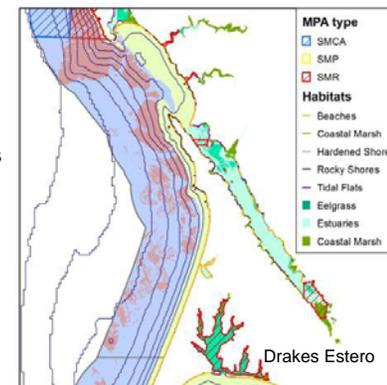
- similarities in number and location of MPAs as well as the habitats they include
- size of MPAs varies
- clusters of MPAs with an inshore SMR and offshore SMCA that allows various fishing activities
- shoreline and shallow habitats are generally well represented in very high protection MPAs

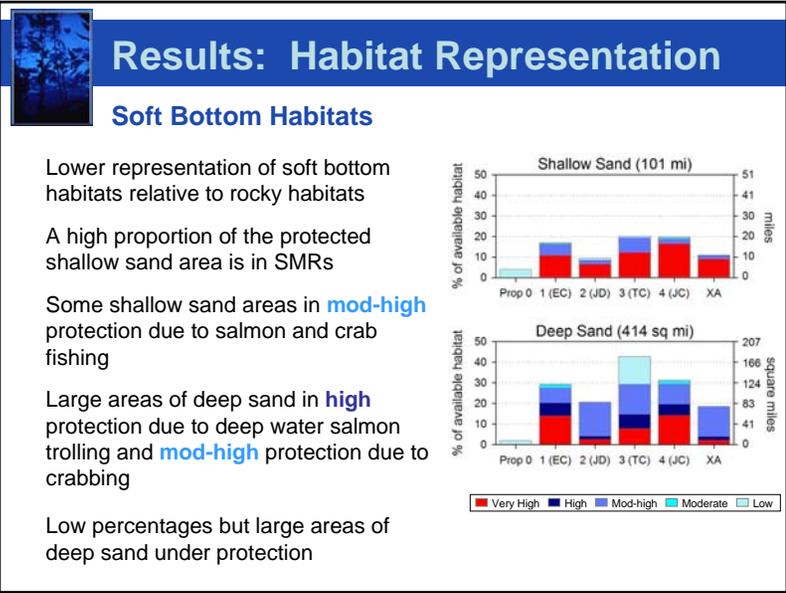
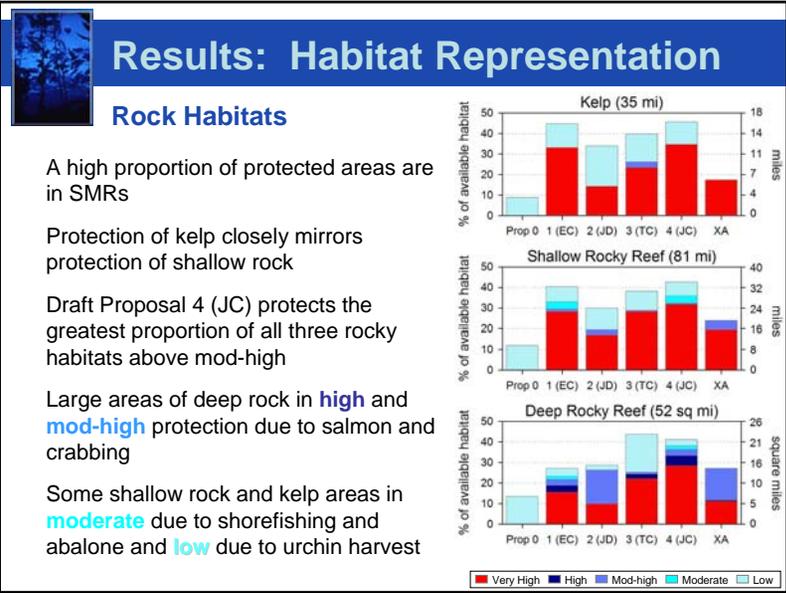
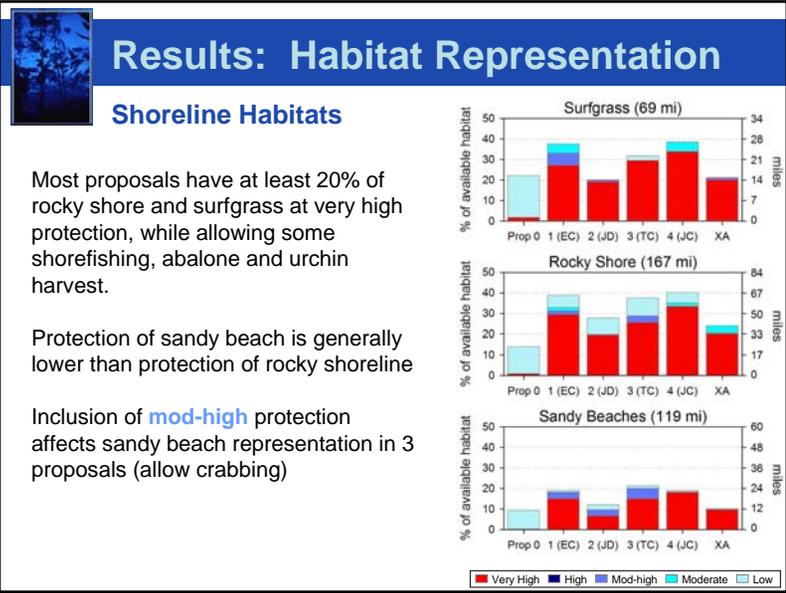
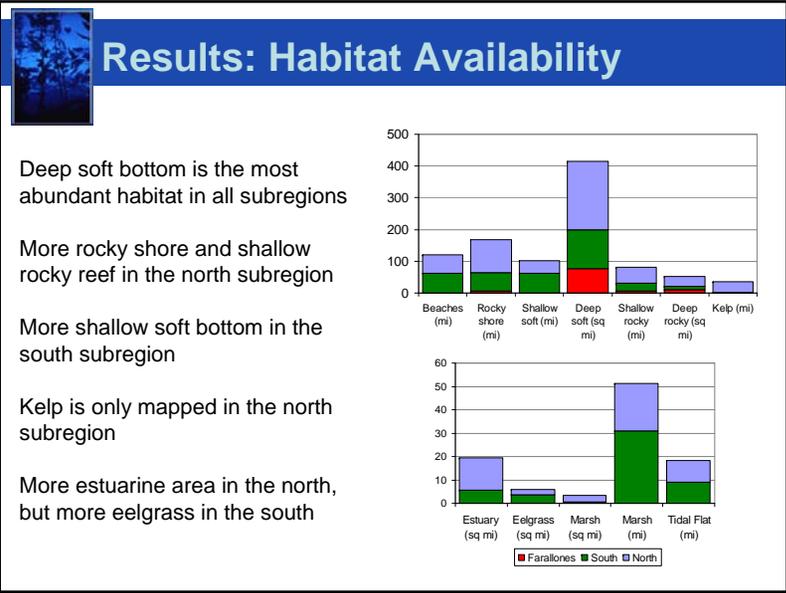


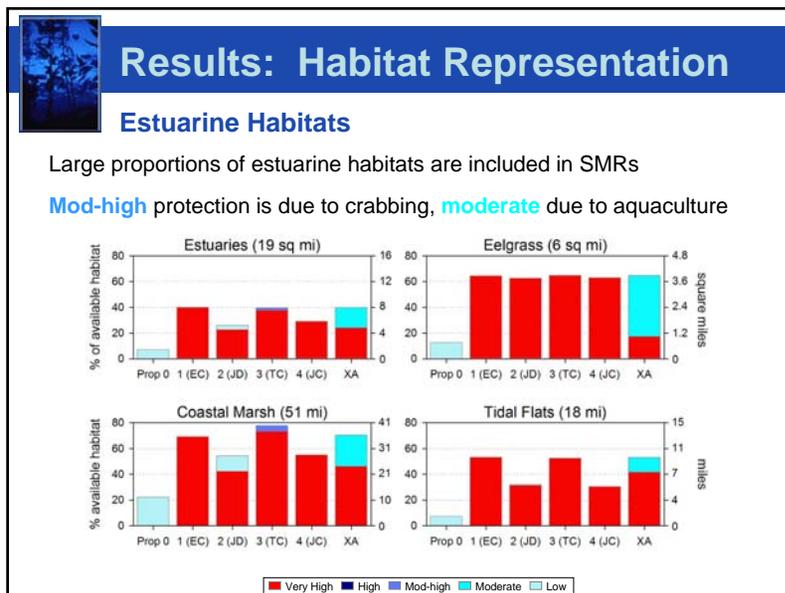
Results: Habitat Representation

Similarities between proposals

- estuarine habitats are generally well represented in very high protection MPAs
- most proposals still protect a greater portion of these habitats in the south subregion (Drakes Estero)
- In contrast to the last round, most proposals target small estuaries in both north and south







Results: Habitat Representation

Summary

- Some convergence among proposals in second round
- With the exception of estuarine habitats, proposals differed consistently across habitats in area protected (especially with high protection)
 $4 > 1, 3 > 2, XA > 0$
- Many habitats are well represented in high levels of protection
- Habitats varied markedly in allowed uses and the relative representation of levels of protection
- Soft habitats still not as well represented as rock habitats

- ## MLPA Goals: Populations
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Results: Marine Birds

- Breeding colonies by subregion**
North: Draft Proposal 3 covers most species/gross numbers
South: Draft proposals 1 and 4 include most seabirds
Farallon Is: Draft proposals 1, 3 and 4 include most seabirds
- Seabird roosts by subregion**
North: Draft Proposal 3 includes most roosts
South: Draft Proposal 1 includes most roosts
Farallon Is: Draft proposals 1, 3, 4 and external A include most roosts
- Seabird foraging areas by subregion**
 Draft Proposal 3 rated highest and Draft Proposal 2 lowest

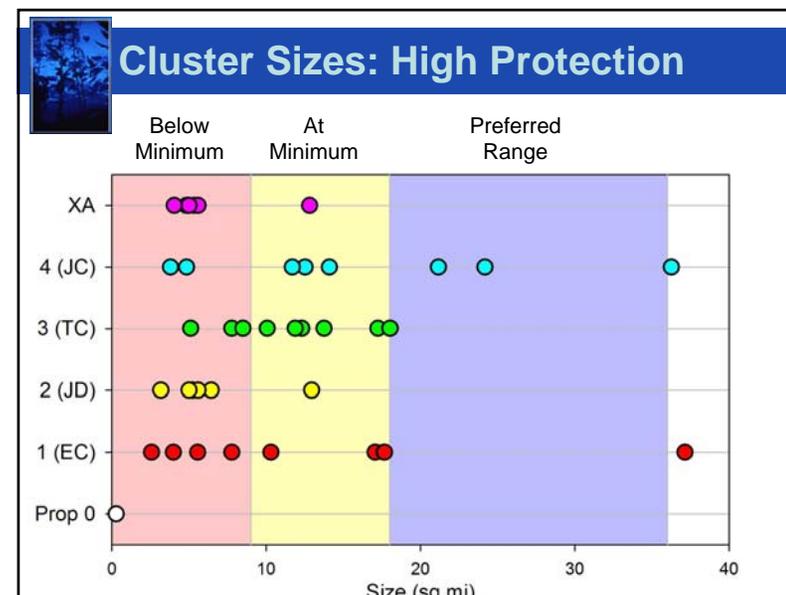
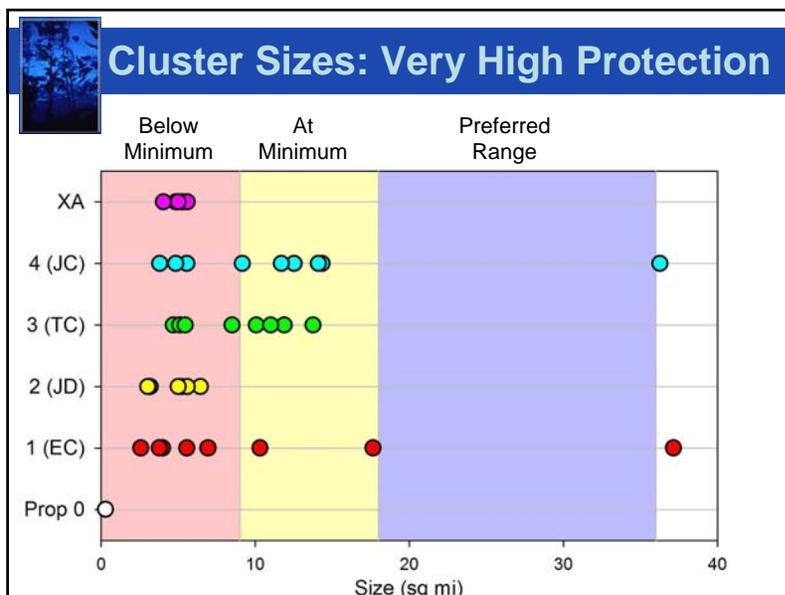
Results: Marine Mammals

 **Marine mammal rookeries by subregion**
North : All draft proposals include 22-24% of pinnipeds, except Draft Proposal 3 (10%)
South: Draft proposals 1 and 3 include >90%
Farallon Is: Draft proposals 1, 3 and 4 include all (4 species) breeding pinnipeds (Draft Proposal 2 includes zero species and Draft External Proposal A includes two species).

 **Marine mammal haul-outs by subregion**
North: Ranges from 8% (Draft Proposal 3) to 19% (Draft Proposal 1) of population in proposed MPAs
South: Draft proposals 1, 3 and 4 include >80% of pinnipeds
Farallon Is: All draft proposals include >96% of pinnipeds. All pinnipeds at haul-outs included except 50% of Steller sealion population in Draft Proposal 2 and Draft External Proposal A

Size Analysis Methods

-  Measure individual MPA lengths and area
-  Combine contiguous MPAs into single MPA complexes
-  Consider level of protection
-  Tabulate MPA lengths and areas relative to minimum & preferred guidelines





MPA Size Conclusions

With **Very High Protection:**

- Draft proposal 4 (67%) is the most consistent with the size guidelines. 4 has one reserve in the preferred size range.
- Draft proposals 3 (50%) and 1 (38%) have an intermediate fraction of reserves that meet the minimum size guidelines.
- Draft proposals 2 and external A have no marine reserves that meet the size guidelines.

With **High Protection:**

- All proposals increase the fraction of reserves that meet at least minimum guidelines.
- The ordering of proposals remains the same.

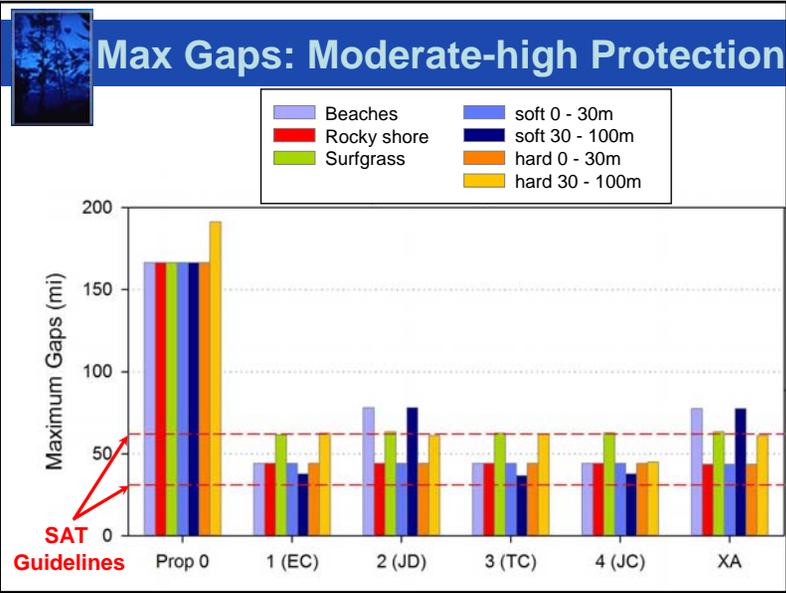
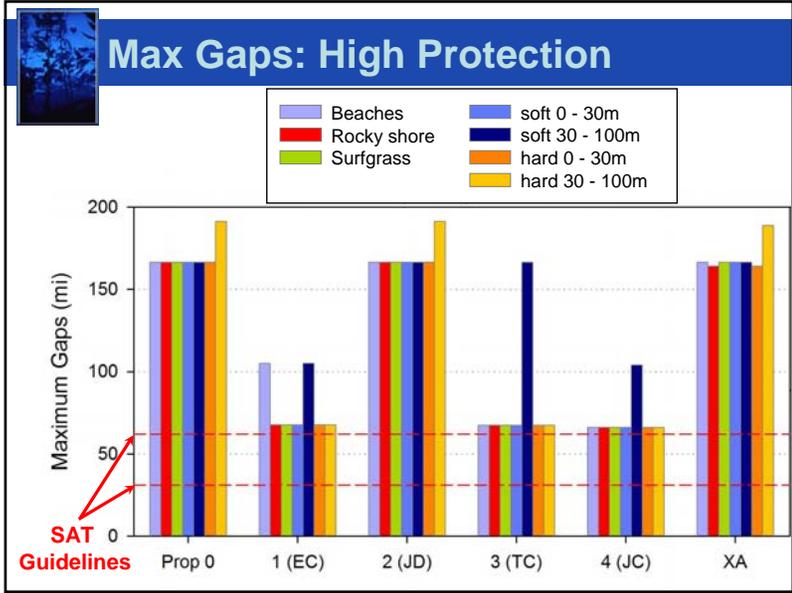
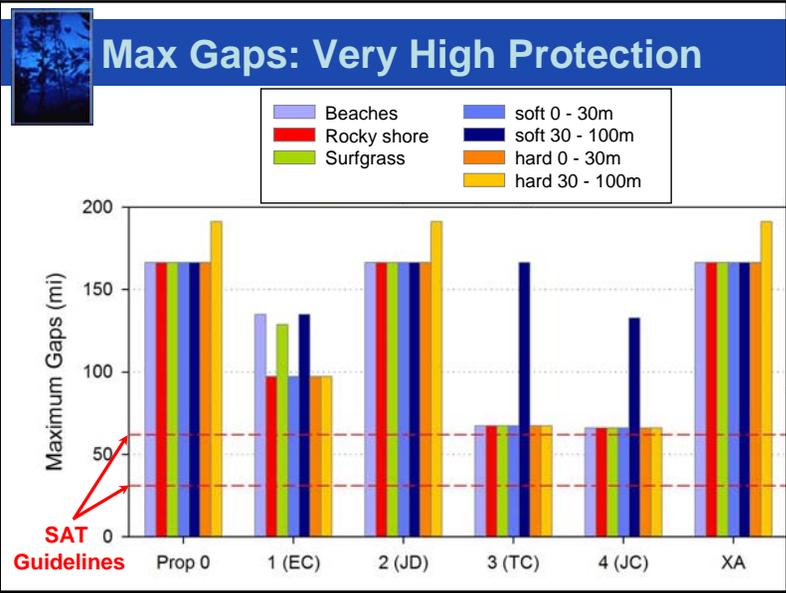
MPA Size Conclusions

With **Moderate High Levels of Protection:**

- Nearly all MPA clusters in all proposals meet at least the minimum size guidelines.
- Draft Proposals 4 and 3 have the most MPA clusters in the preferred size range.

Spacing Analysis Methods

-  MPAs must meet the minimum size guidelines (9 square miles) to count for spacing
-  Characterize each MPA by the habitats included
-  For each habitat, measure the gaps between adjacent MPAs



MPA Spacing Conclusions

With Very High Protection:

- Draft proposals 4 and 3 were close to meeting the spacing guidelines for all habitats except deep sand.
- Draft proposals 1, 2 and external A greatly exceeded the spacing guidelines for all habitats. In this group, the maximum gaps for Draft Proposal 1 were consistently smaller than those for 2 and external A

With High Protection:

- All patterns remain unchanged *except*: Draft Proposal 1 now meets the spacing guidelines for all habitats except sandy beach and deep sand.

MPA Spacing Conclusions

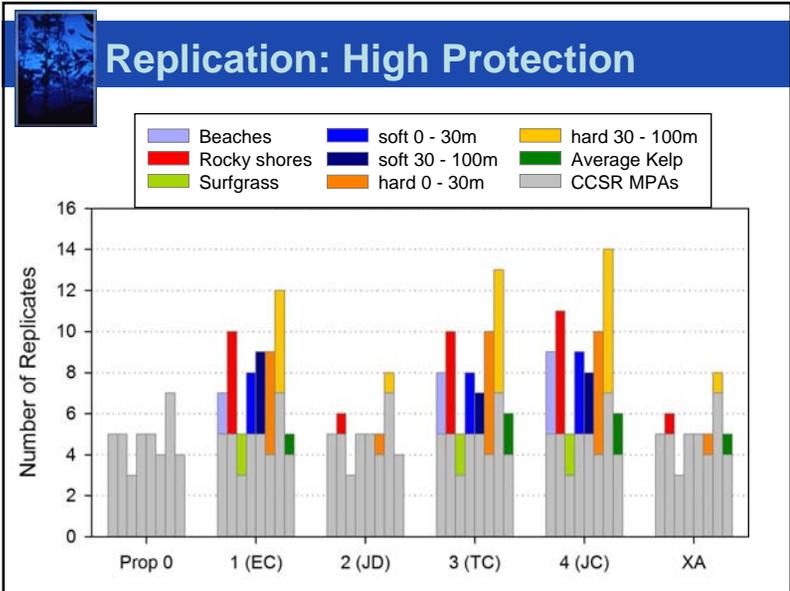
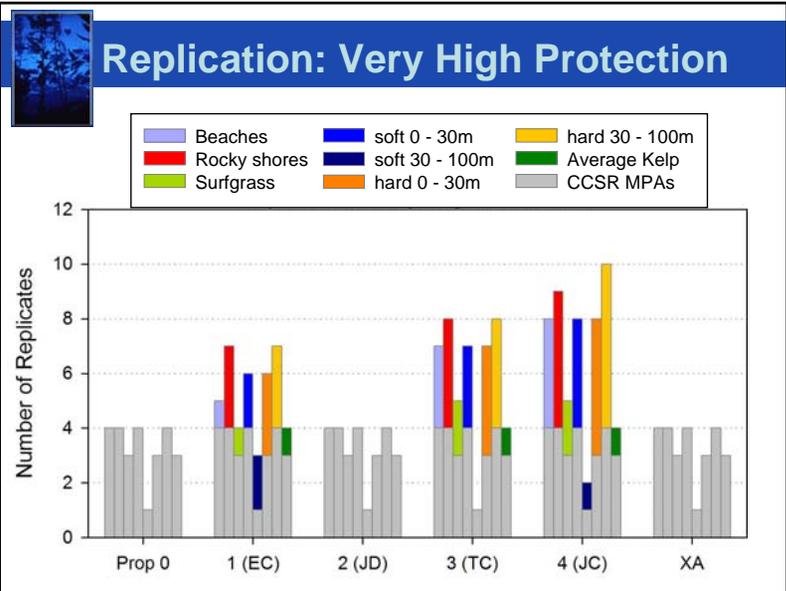
With **Moderate High Levels of Protection:**

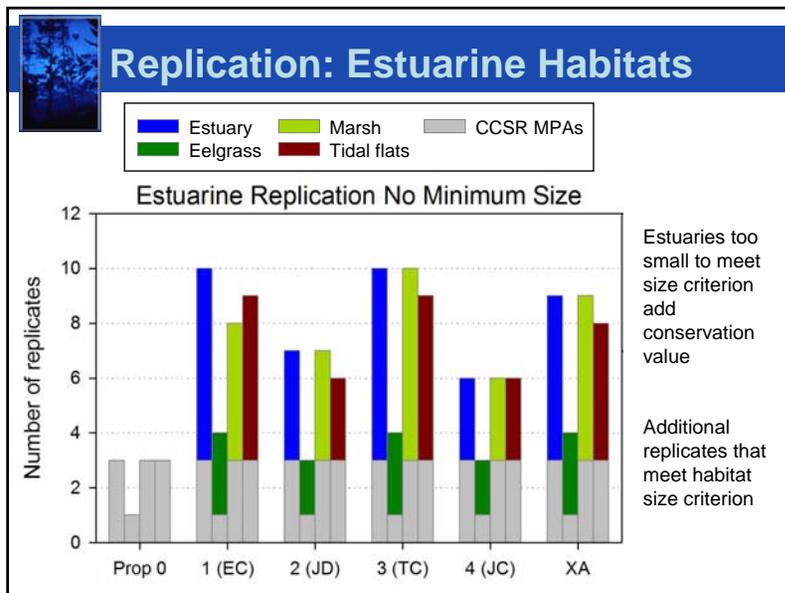
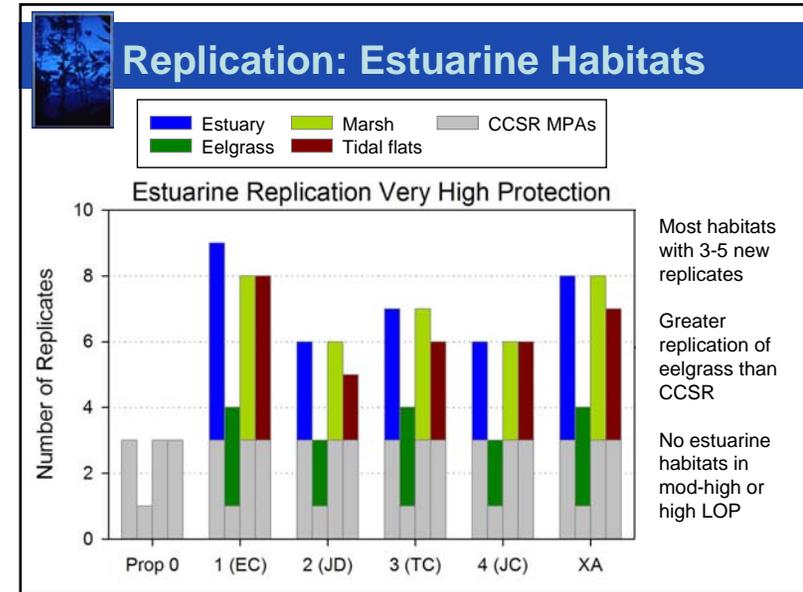
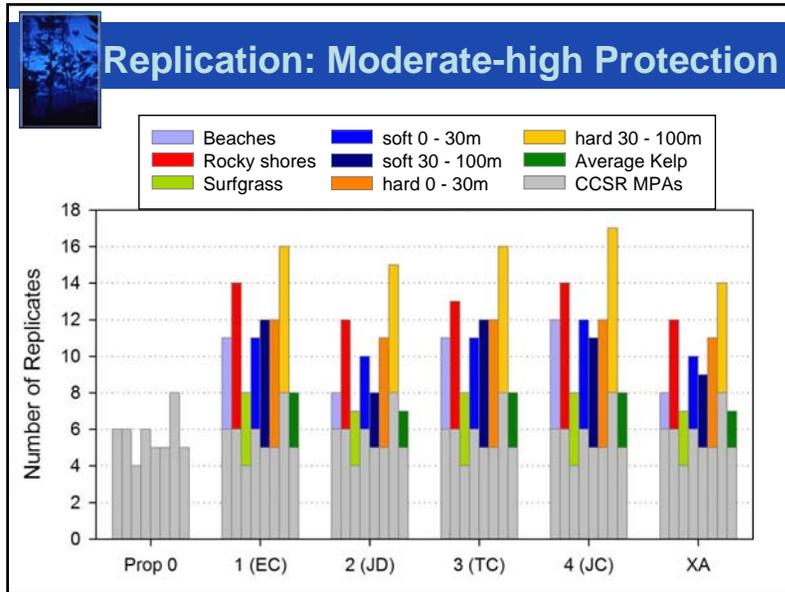
- Draft proposals 4, 3 and 1 meet the spacing guidelines for all habitats. Maximum gaps are in the middle of the recommended range for most habitats.
- Draft proposals 2 and external A meet the spacing guidelines for all habitats except two: sandy beaches and deep sand.

Methods: Habitat Replication

Guidelines for replication:

- 🌊 MPA or cluster must meet the minimum size guidelines (9 square miles)
- 🌊 Habitat must meet the threshold identified to encompass 90% of biodiversity in that habitat type
- 🌊 Estuarine MPAs do not have to meet size guidelines but must contain at least 0.12 mi² of estuarine habitat
- 🌊 Some small estuaries (Gualala and Garcia rivers, Pescadero Creek) contain less than the minimum 0.12 mi², but protection of these habitats still has conservation value





Results: Habitat Replication

Summary

- Marked differences among proposals
- Generally less replication than MLPA Central Coast Study Region (CCSR) at highest levels of protection
- At the highest levels of protection, 4 > 1, 3 > 2, XA > 0
- Fewer differences among proposals and more similar to CCSR at moderate-high levels of protection
- Estuarine habitats well replicated.

Evaluations with Models

-  Two models
EDOM
UCD
-  Equilibrium models predict the effects of MPAs into the future
-  Models look at individual species and do not consider complex ecosystem interactions
-  Levels of protection are not used in the models – instead protection is species by species

Model Designs

Both Models Assess

- Conservation value (abundance, sustainability)
- Economic return (yield, profit)
- Responses for multiple representative species
- Responses with different management actions
- Responses with different fishing behavior but currently fishing concentrates where fish are

Example Species Considered

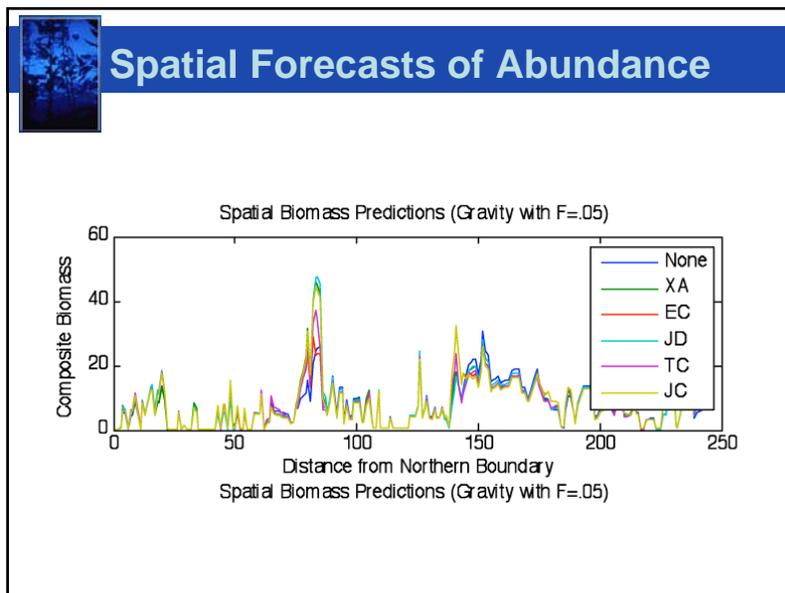
Species	Average larval dispersal distance (km)	Average home range diameter (km)
Abalone	1	1
Black Rockfish	40	6
Cabezon	100	1
Lingcod	35	15
Canary Rockfish	40	40
California Halibut	45	30
Dungeness Crab	75	14
Red Sea Urchin	50	1





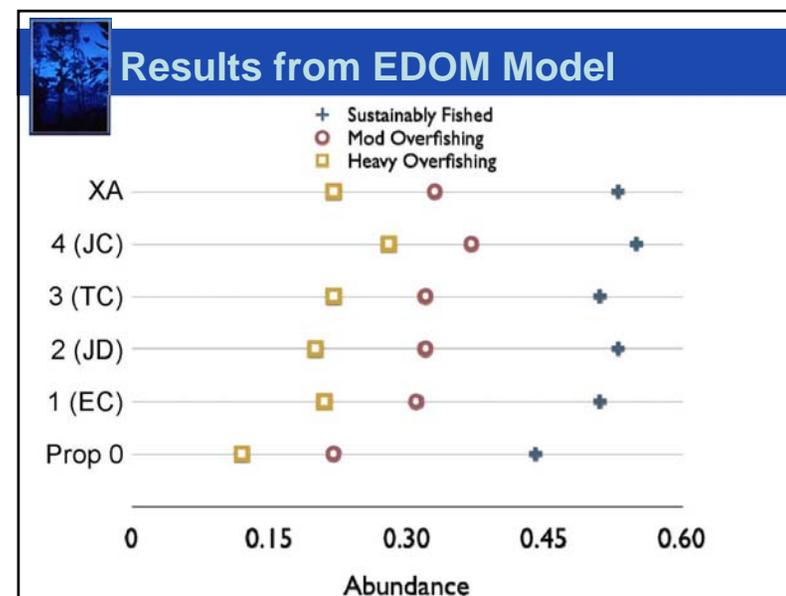
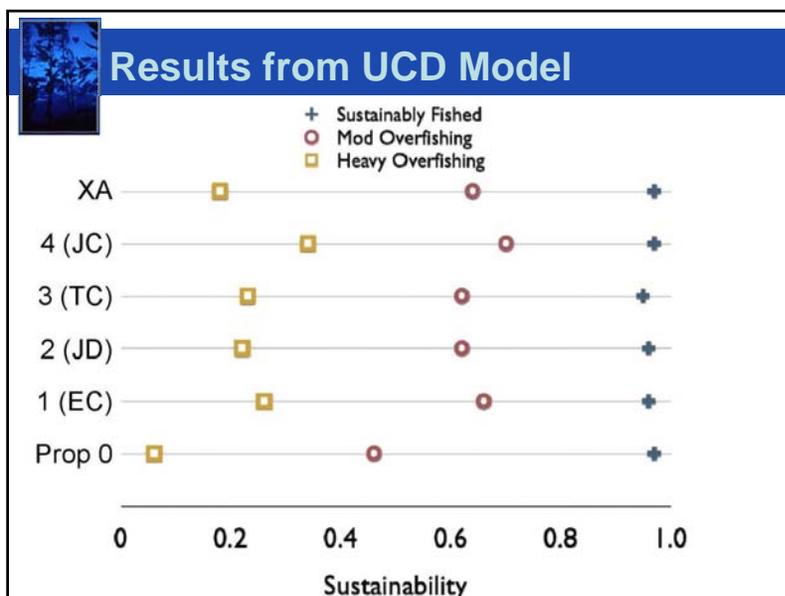
Model Insights

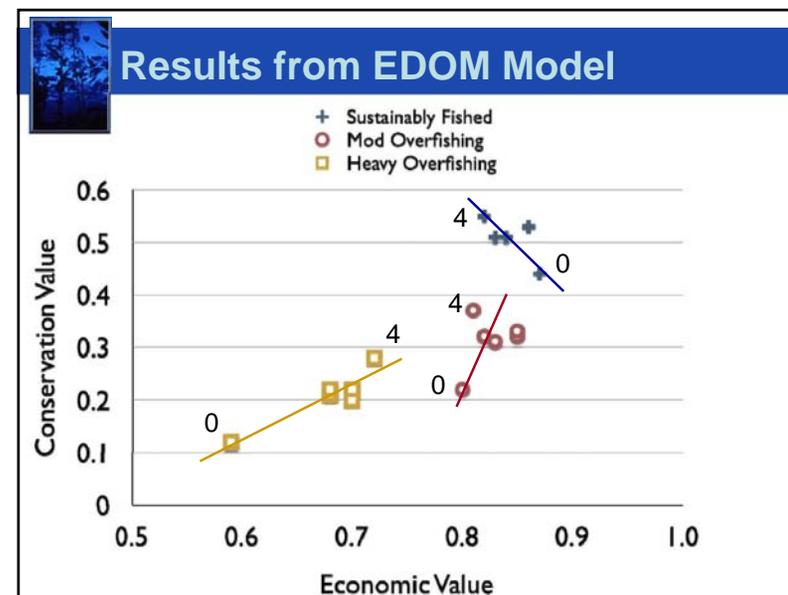
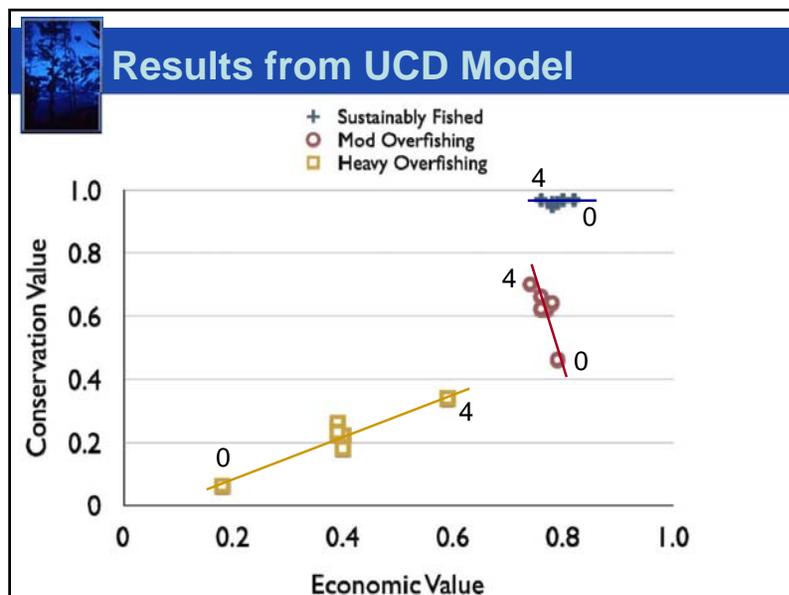
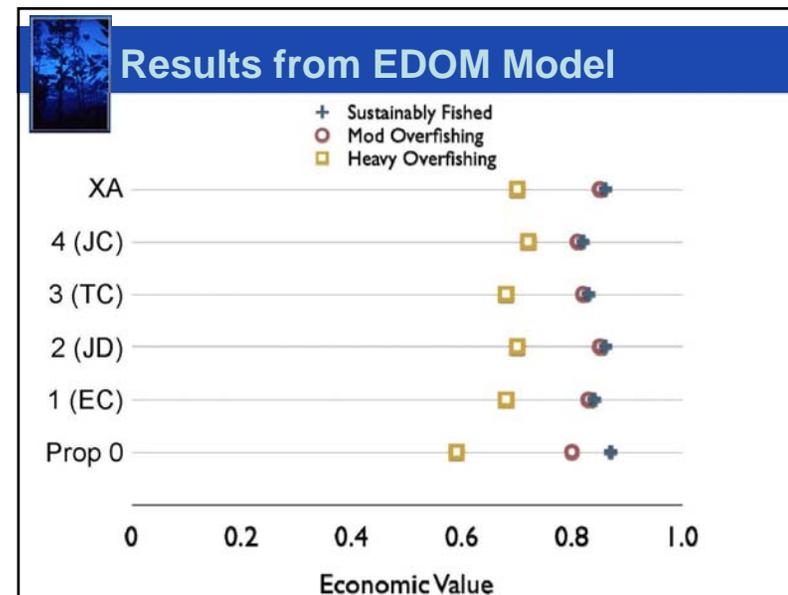
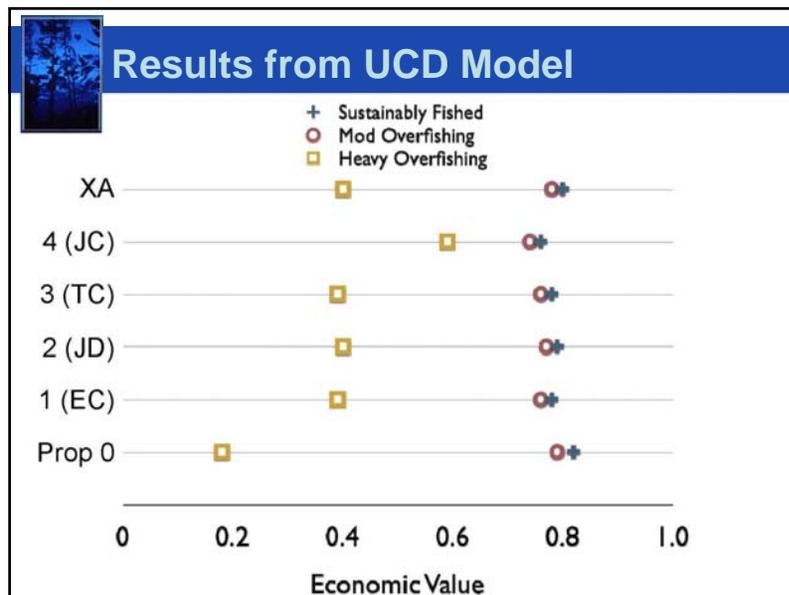
-  Increasing size and decreasing spacing leads to greater conservation value
-  Relationship between conservation value and economic return depends on what happens outside MPAs
 - Unsustainable harvest - MPAs increase both conservation value and economic returns
 - Sustainable harvest - tradeoff between conservation and economic return

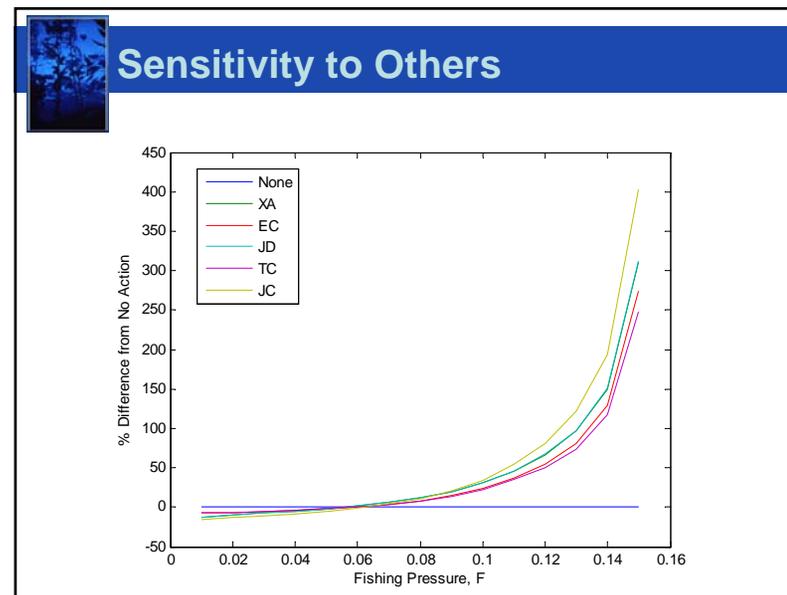
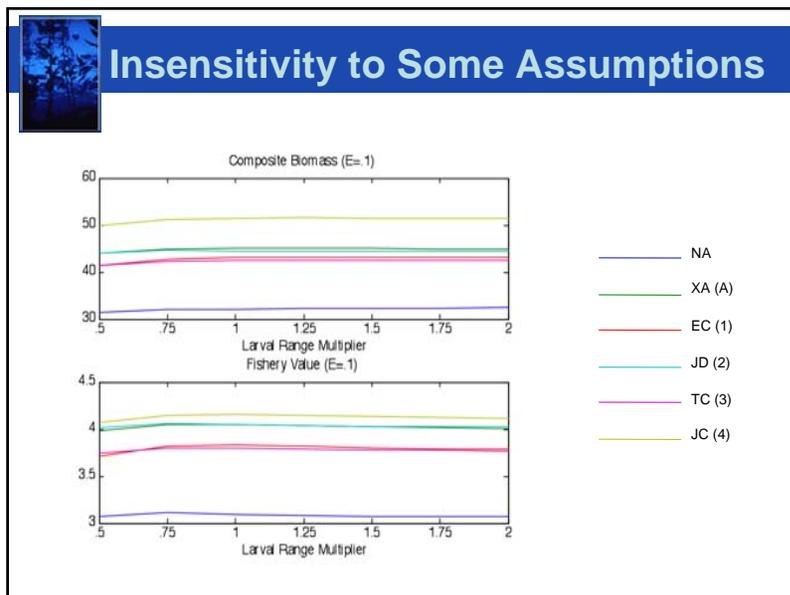


Uses of Spatial Model Predictions

- Forecasts which configurations should lead to higher biomass or more sustainable populations (conservation value) and/or which lead to higher yield (economic return).
- Provide a basis for considering how to adjust MPA proposals to achieve desired conservation or economic results.







General Model Conclusions

-  Rank of proposals in terms of conservation value is relatively insensitive to:
 - Species Differences
 - Management Actions
-  Rank of proposals in terms of economic value strongly depends on management outside
-  System switches from win-win to predictable tradeoff