



Marine Life Protection Act Initiative



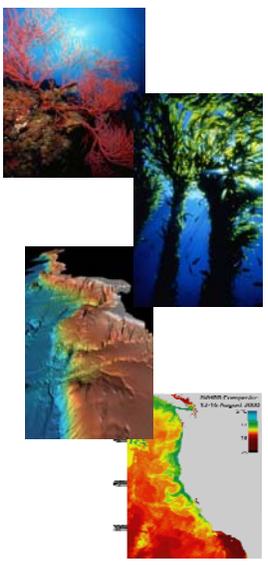
Preliminary Size & Spacing Evaluations North Central Coast Proposals

Presentation to the North Central Coast Regional Stakeholder Group
 November 28, 2007 • San Rafael, CA
 Prepared by Dr. Steven Gaines, Master Plan Science Advisory Team



MLPA Goals - Habitats

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**.





Master Plan Guidelines

- Size Guideline #1
 - “For an objective of protecting adult populations, based on adult neighborhood sizes and movement patterns, MPAs should have an **alongshore span of 5-10 km** (3-6 m or 2.5- 5.4 nm) of coastline, and **preferably 10-20 km** (6-12.5 m or 5.4-11 nm). Larger MPAs would be required to fully protect marine birds, mammals, and migratory fish.”
 - From adult fish movement ranges



Master Plan Guidelines

- Size Guideline #2
 - “For an objective of protecting the diversity of species that live at different depths and to accommodate the movement of individuals to and from shallow nursery or spawning grounds to adult habitats offshore, MPAs should **extend from the intertidal zone to deep waters offshore.**”

 3 miles offshore



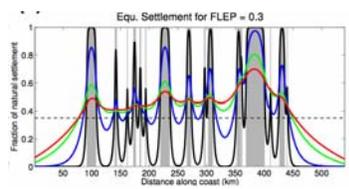
Size Analysis Methods

- 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

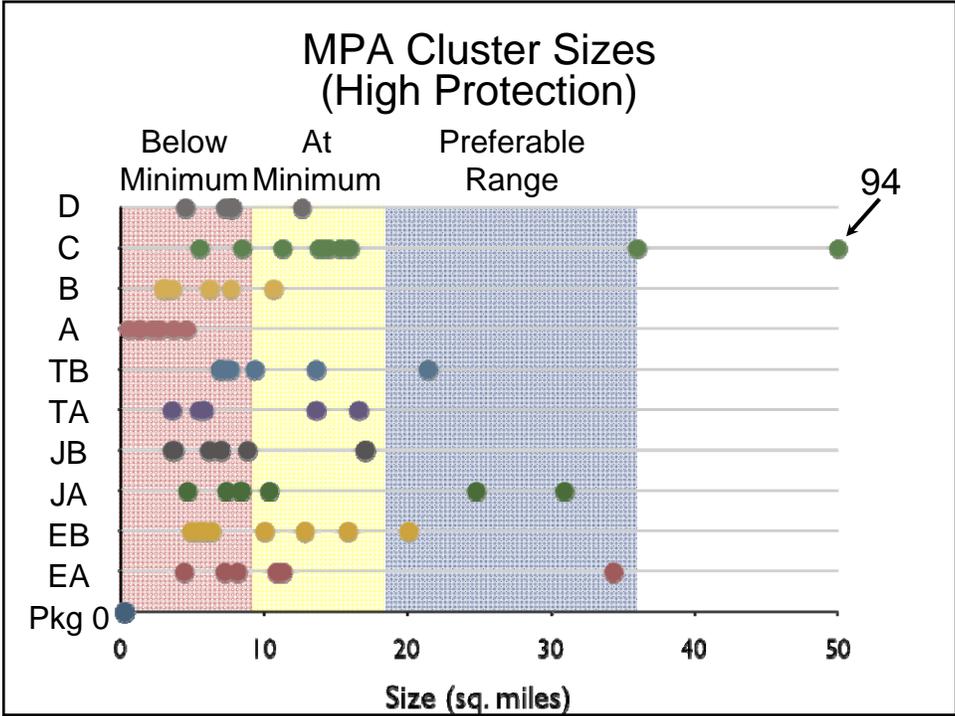
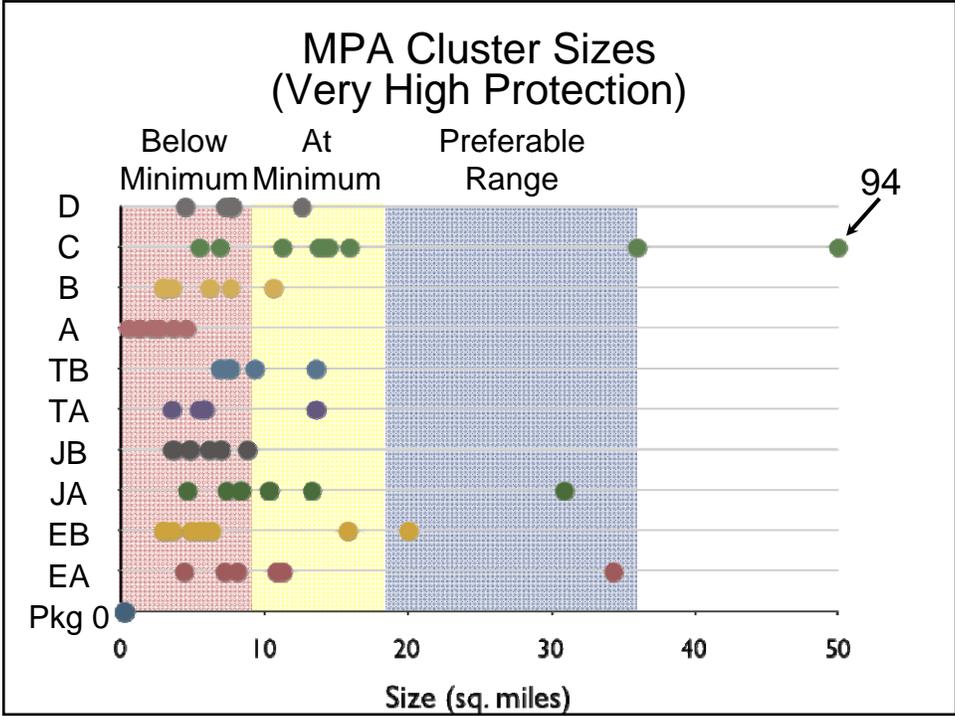


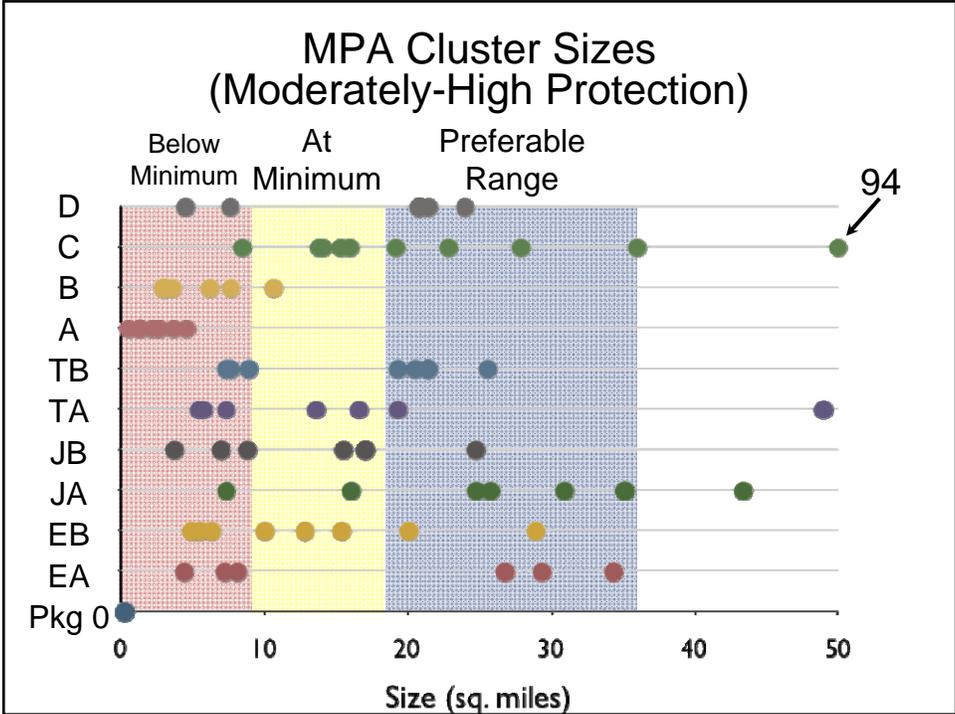
Models Quantify Benefits & Costs

- Better assessment of the value of different sizes and spacing



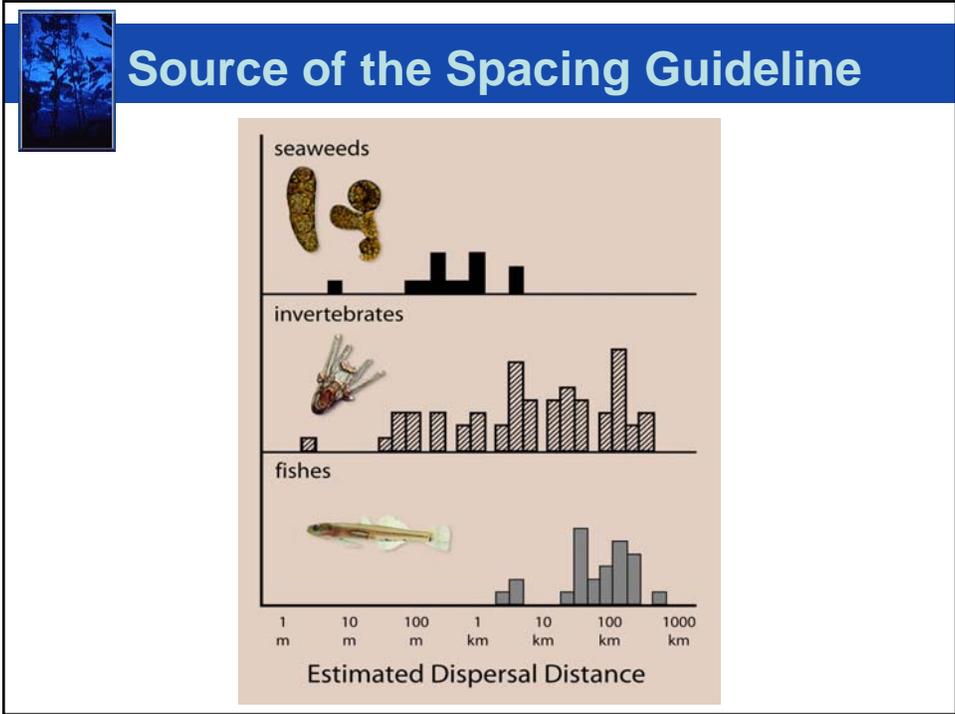
Spacing (km)	Size (km)	Coastline in reserves (%)	Coastline persistent at peak (%)	Maximum larval dispersal that leads to persistence (with no adult movement) (km)
100	5	4.8	6.5	6
100	10	9.1	12.7	12
100	20	18.7	23.5	28
50	5	9.1	12.4	6
50	10	16.7	23.3	14
50	20	28.6	100	∞





Master Plan Guidelines

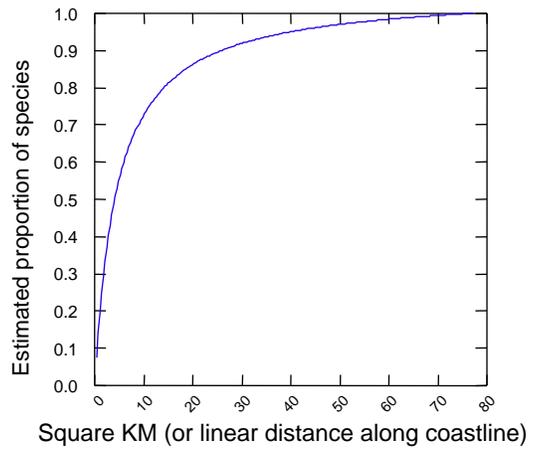
- Spacing Guideline
 - “For an objective of facilitating dispersal of important bottom-dwelling fish and invertebrate groups among MPAs, based on currently known scales of larval dispersal, **MPAs should be placed within 50-100 km (31-62 m or 27-54 nm) of each other.**”



- ### Spacing Analysis Methods
- Characterize each MPA by the habitats included
 - For each habitat, measure the gaps between adjacent, high protection MPAs

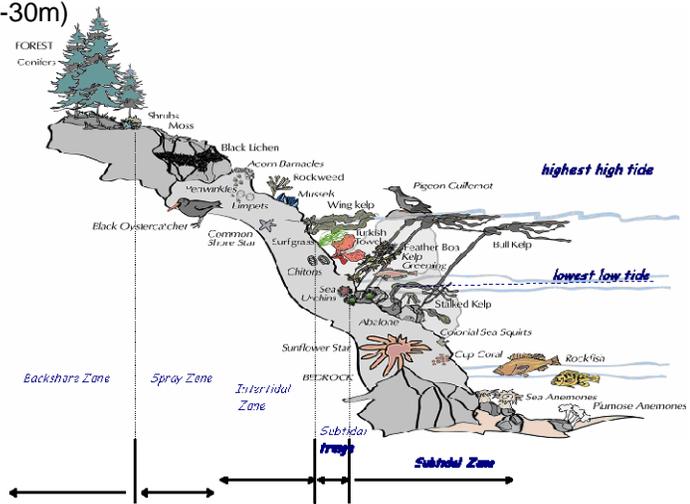


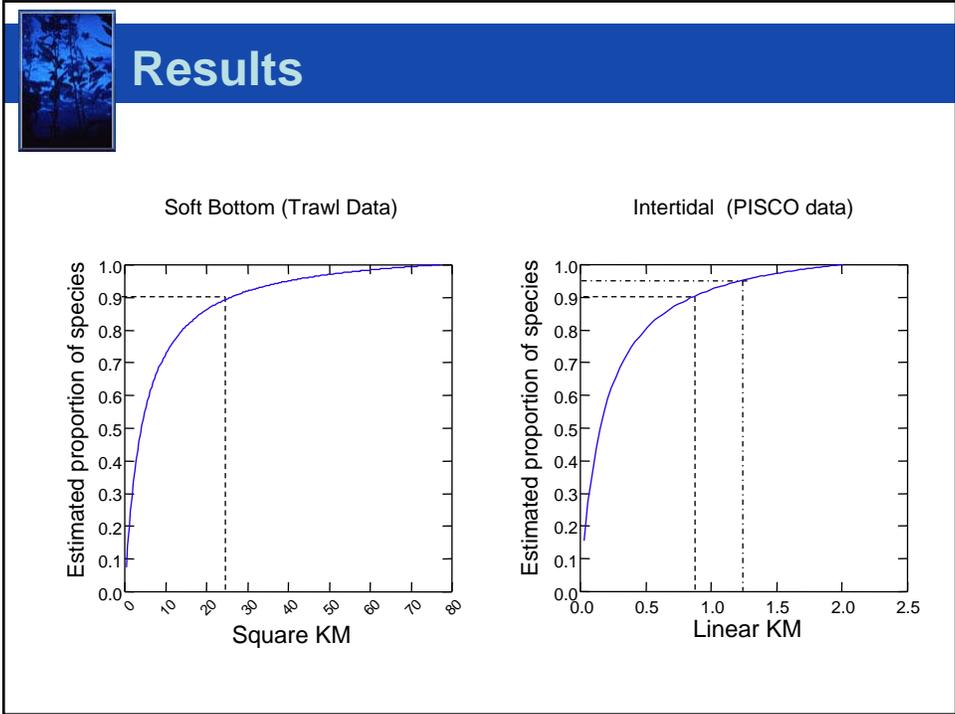
How Much Habitat is Needed?



Capturing Depth Gradient is Important

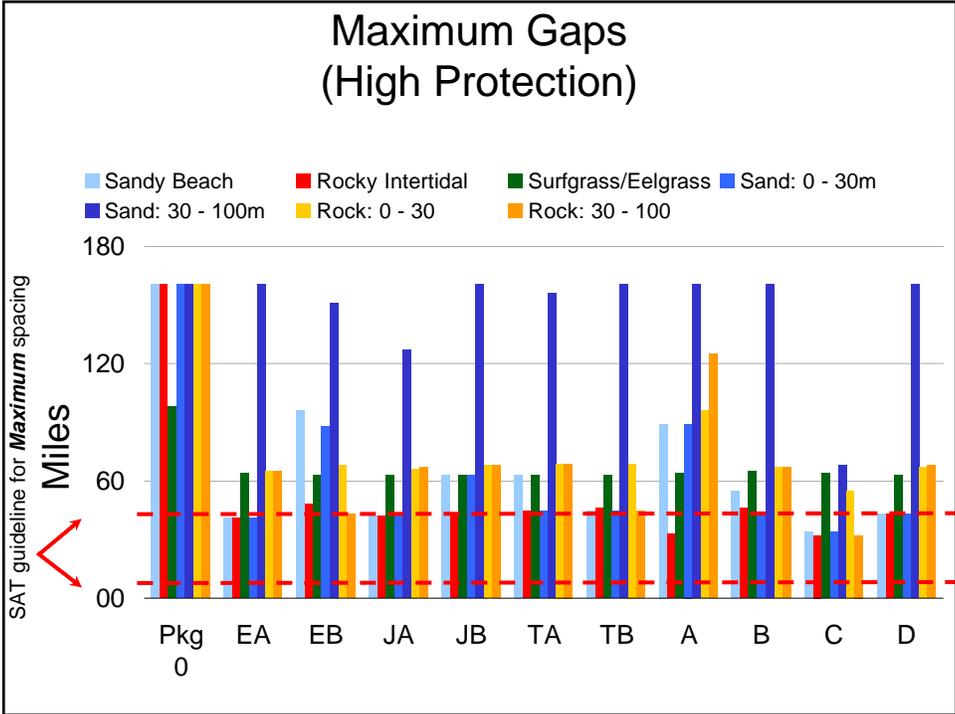
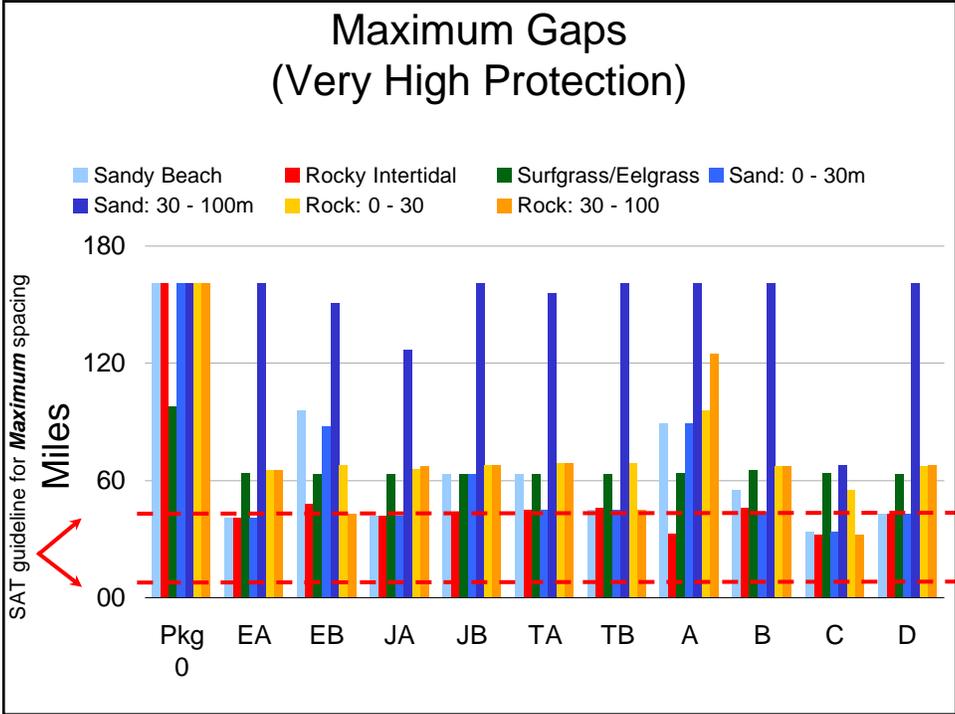
This is why linear distances are useful for shoreline and nearshore habitats – only if entire depth gradient is included (0-30m)

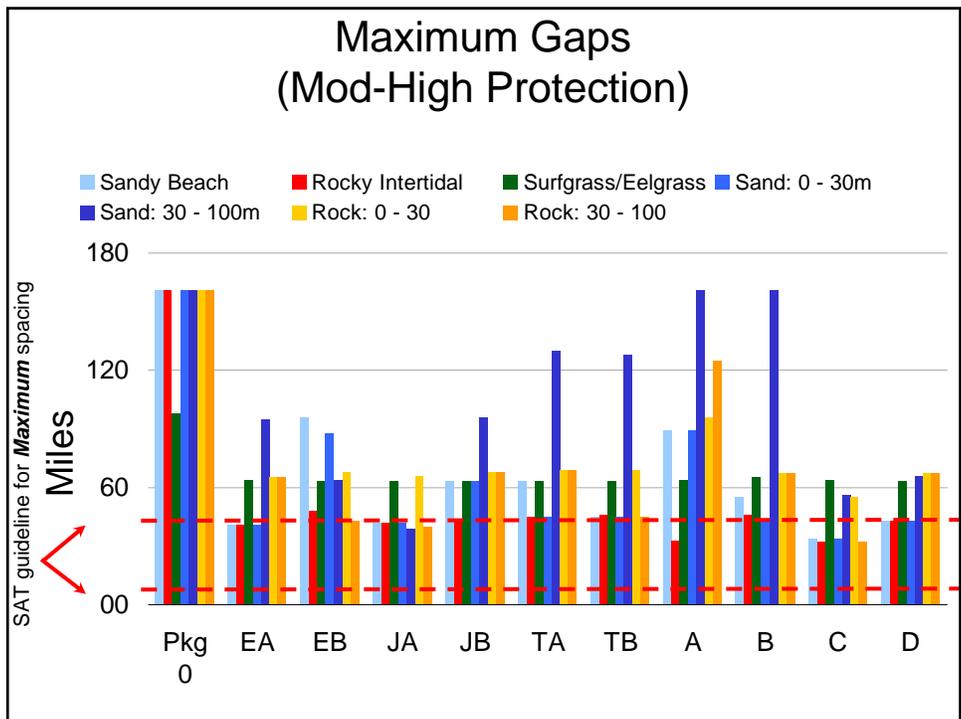




Habitat representation

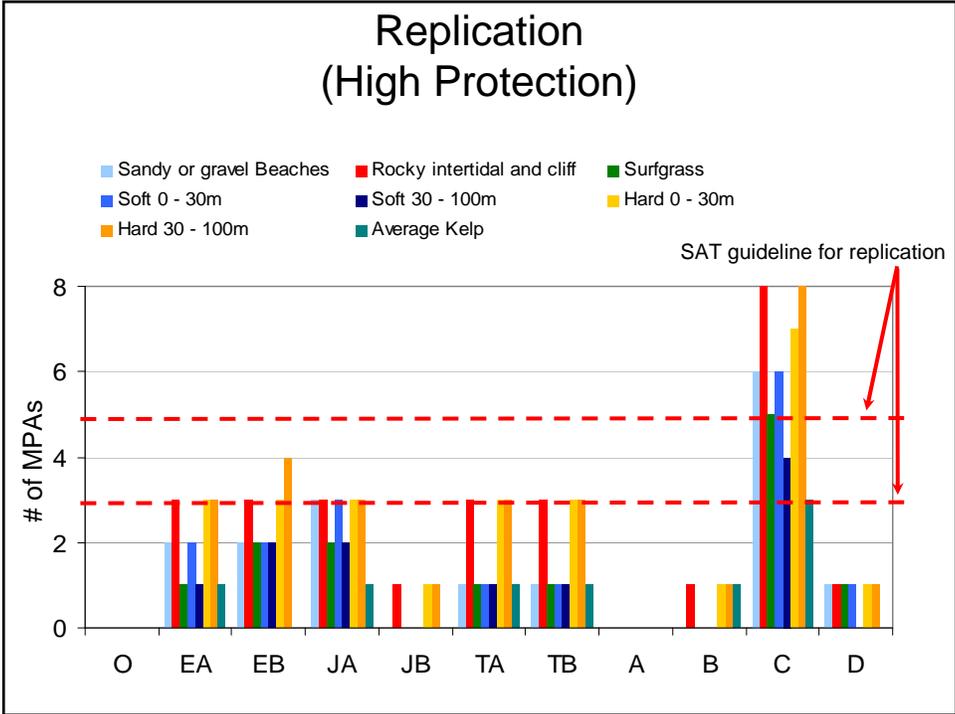
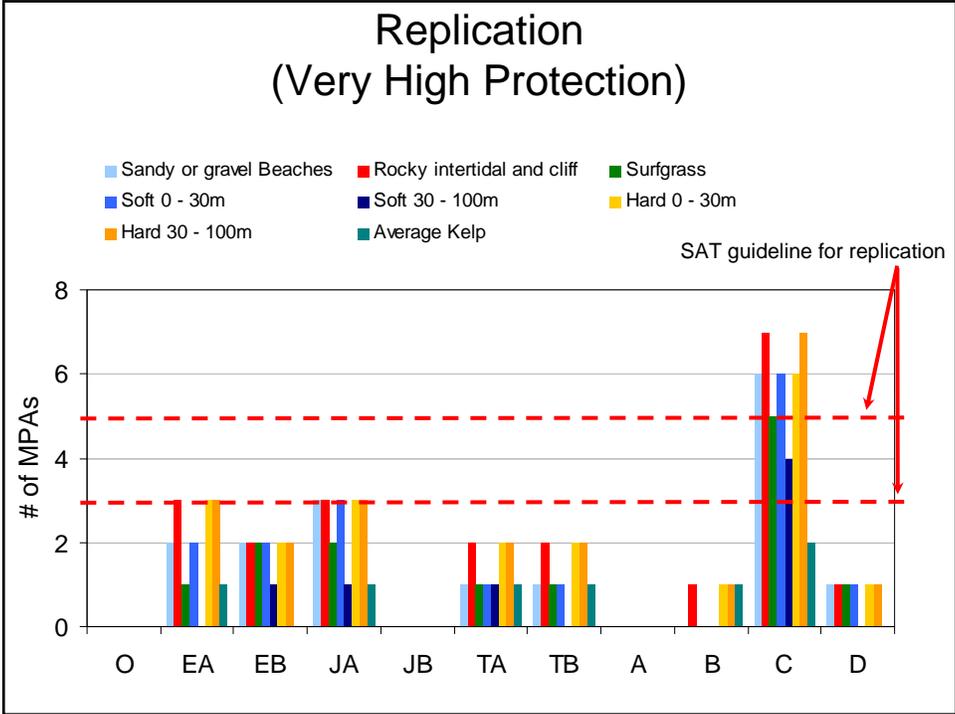
Habitat	Representation needed to encompass 90% of biodiversity	Data Source
Rocky Intertidal	~0.6 linear miles	PISCO Biodiversity
Shallow Rocky Reefs/Kelp Forests (0-30 M)	~1.1 linear miles	PISCO Subtidal
Deep Rocky Reefs (30-100 M)	~0.2 square miles	Starr surveys
Sandy Habitat (30-100 M)	~10 square miles	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	

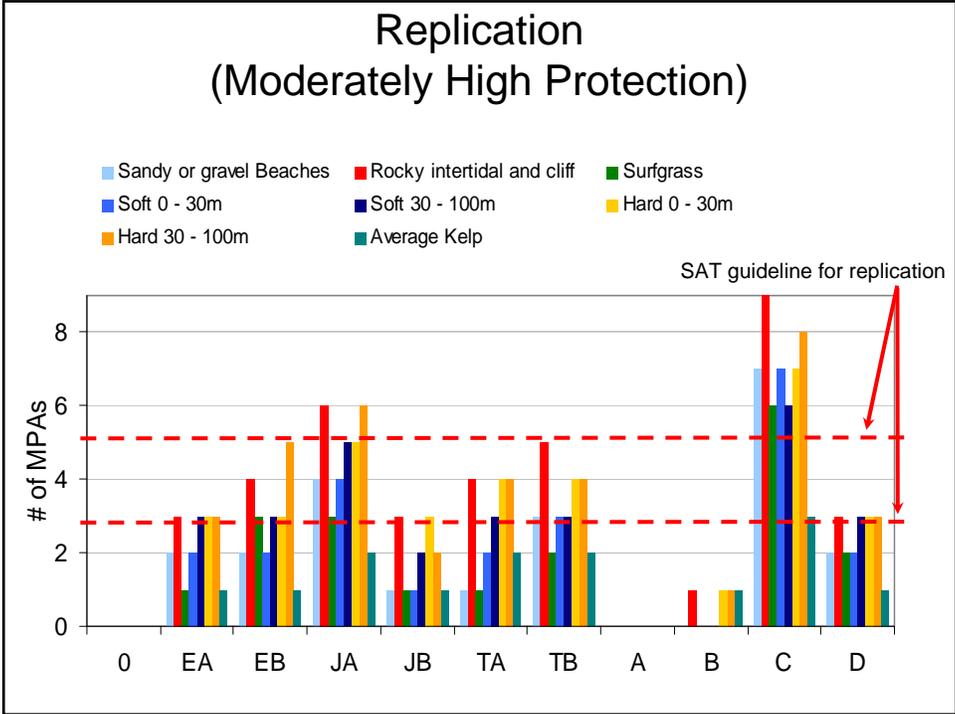




MPA Replication Guidelines

- **Replication Guideline**
 - “‘Key’ marine habitats should be replicated in multiple MPAs across large environmental and geographic gradients to protect the greater diversity of species and communities that occur across such gradients, and to protect species from local year-to-year fluctuations in larval production and recruitment.”
 - “For an objective of providing analytical power for management comparisons and to buffer against catastrophic loss of an MPA, at least **three to five replicate MPAs** should be designed for each habitat type within a biogeographical region.”





Size, Spacing, and Replication Evaluation Summary

Few of the proposals meet size, spacing, or replication guidelines at the very high and high levels of protection

Many more proposals meet size, spacing and replication guidelines at the moderately-high level of protection

Unclear whether authors of proposals realized that habitats, not MPAs, are evaluated for spacing and replication

Modifications that meet size guidelines can increase the number of habitats meeting spacing and replication guidelines