

Marine Life Protection Act Initiative



Size and Spacing Evaluations of the Round 1 External Proposed MPA Arrays for the MLPA North Coast Study Region

Presentation to the MLPA North Coast Regional Stakeholder Group
March 24, 2010 • Crescent City, CA

Dr. Mark Carr, Member • MLPA Master Plan Science Advisory Team

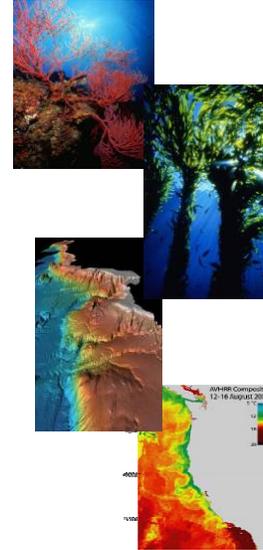
Notes on Round 1 Evaluations



- Most External MPA Arrays proposed tribal uses in many MPAs, including otherwise “no-take” areas, but did not specify the types of uses
- The SAT **did not have sufficient information in round 1 to integrate tribal uses in evaluations** (i.e. proposed tribal uses were not considered in assigning levels of protection), **but this will likely change in round 2**
- For the sake of consistency, **SMCAs in ExC** that proposed tribal uses only were **evaluated as SMRs**
- For the purpose of evaluation, **mobile MPAs in ExA were treated as static**, and stewardship zones were not evaluated

MLPA Goals*: Populations

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**.

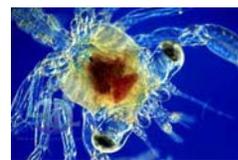


** Note that this language represents a summary of the MLPA goals*

Protecting Populations (Goals 2 & 6)

Size and Spacing

-  MPAs should be large enough that adults do not move out of them too frequently and become vulnerable to fishing
-  MPAs should be close enough together that sufficient larvae can move from one to the next





Size Guidelines

- 
MPAs should have an alongshore span of 5-10 kilometers (3-6 miles) of coastline, and preferably 10-20 kilometers (6-12.5 miles) to protect adult populations, based on adult neighborhood sizes and movement patterns. Larger MPAs should be required to fully protect marine birds, mammals, and migratory fish.
- 
MPAs should extend from the intertidal zone to deep waters offshore to protect the diversity of species that live at different depths and to accommodate the ontogenetic movement of individuals to and from nursery or spawning grounds to adult habitats.
- 
 Combined and simplified, these two guidelines yield:
 - Minimum range of 9-18 square miles**
 - Preferred range of 18-36 square miles**

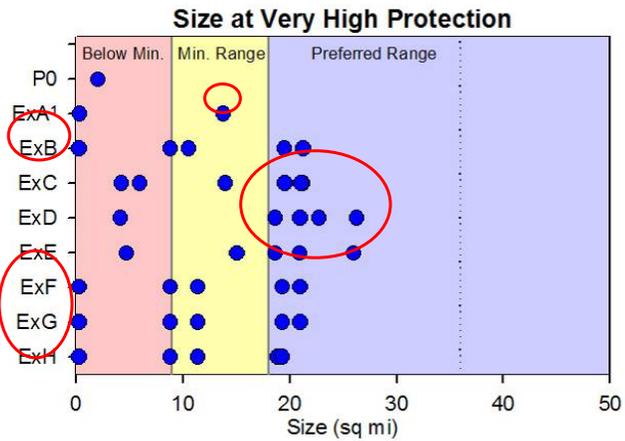


Size Analysis Methods

- 
 Measure individual MPA areas
- 
 Combine contiguous MPAs into MPA "clusters"
- 
 Consider level of protection
- 
 Tabulate MPA cluster areas relative to minimum and preferred guidelines
- 
 Estuarine MPAs are not included in size evaluation



Cluster Sizes: Very High Protection

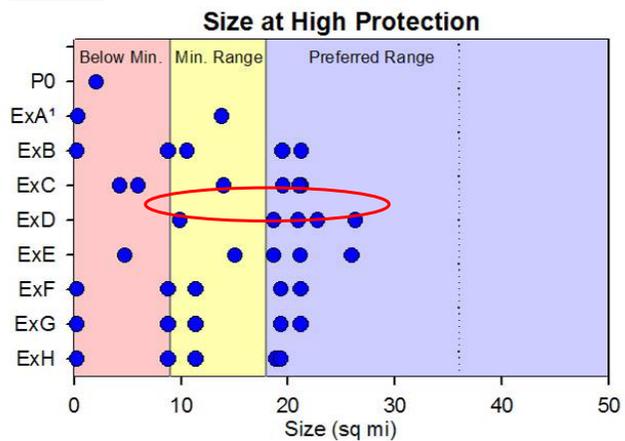


Proposal	Below Min. Size	Min. Size Range	Preferred Size Range	Total # Clusters
P0	1	0	0	1
ExA ¹	1	1	0	2
ExB	2	1	2	5
ExC	2	1	3	6
ExD	1	0	4	5
ExE	1	1	3	5
ExF	2	1	2	5
ExG	2	1	2	5
ExH	2	1	2	5

- ExD includes the most preferred size clusters (4), followed by ExC and ExD with 3
- ExB, ExF, ExG and ExH have similar configurations
- ExA includes 1 minimum size cluster and no preferred size clusters



Cluster Sizes: High Protection*

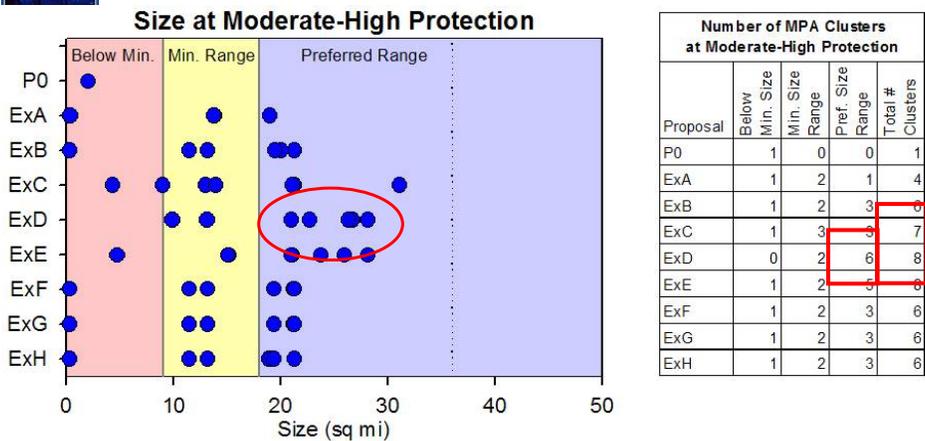


Proposal	Below Min. Size	Min. Size Range	Preferred Size Range	Total # Clusters
P0	1	0	0	1
ExA ¹	1	1	0	2
ExB	2	1	2	5
ExC	2	1	3	6
ExD	0	1	4	5
ExE	1	1	3	5
ExF	2	1	2	5
ExG	2	1	2	5
ExH	2	1	2	5

- All open coast clusters in ExD meet the size guidelines
- ExC, ExD and ExE include the most preferred size clusters

* Evaluated for all open coast MPAs at or above high protection

Cluster Sizes: Mod-high Protection*



- Across all proposals, most clusters meet size guidelines
- ExD and ExE include the most preferred size clusters
- ExC, ExD and ExE include largest number of clusters and most that meet size guidelines

* Evaluated for all open coast MPAs at or above moderate-high protection

Size: Conclusions

- 🔥 ExD has the largest number of MPA clusters that meet preferred size guidelines, followed closely by ExE
- 🔥 ExB, ExF, ExG and ExH have similar configurations
- 🔥 ExA has the fewest MPA clusters that meet minimum or preferred size guidelines at high and mod-high protection
- 🔥 Ranking of arrays for median cluster size at moderate-high protection:
 $ExD > ExE > ExC > [ExB, ExF, ExG \& ExH] > ExA$
- 🔥 All arrays have some MPAs that do not meet minimum size guidelines at very high protection



Protecting Populations

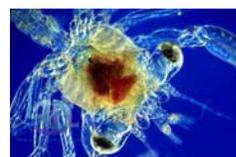
Size and Spacing



MPAs should be large enough that adults do not move out of them too frequently and become vulnerable to fishing



MPAs should be close enough together that sufficient larvae can move from one to the next



Design Guidelines: Goals 2 and 6



MPAs should be placed within 50-100 kilometers (31-62 miles) of each other to facilitate dispersal and connectedness of important bottom-dwelling fish and invertebrate groups among MPAs



Because many populations are habitat-specific, spacing is evaluated for each habitat



Spacing Analysis Methods

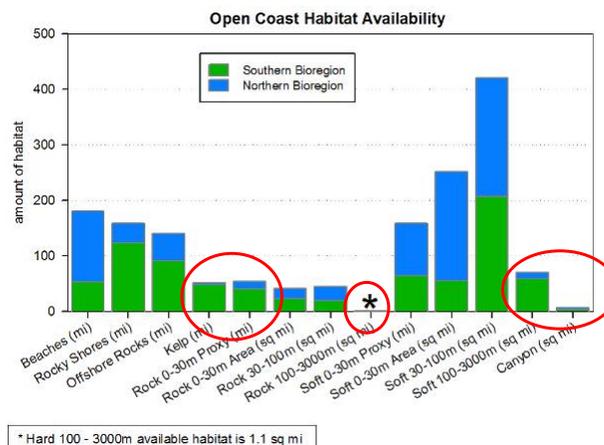
-  MPAs or clusters must meet minimum size guidelines (9 square miles) to be included in spacing analysis
-  Identify the habitats included in sufficient amounts to count as a “replicate” within each MPA cluster
-  Measure gaps between adjacent MPA clusters that contain a given habitat (edge to edge)



Habitat Availability and Spacing

Habitat availability and distribution limits spacing:

- Kelp and 0-30 meter (m) rock rare in the northern bioregion
- >100m depth habitats are relatively rare across the region, occurring mostly in canyons and the southern bioregion

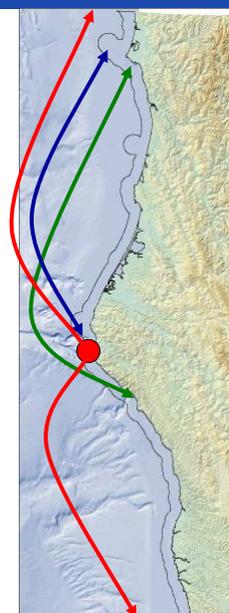


Note: some substrate mapping and 0-30m proxy line were not available when external MPA arrays were designed

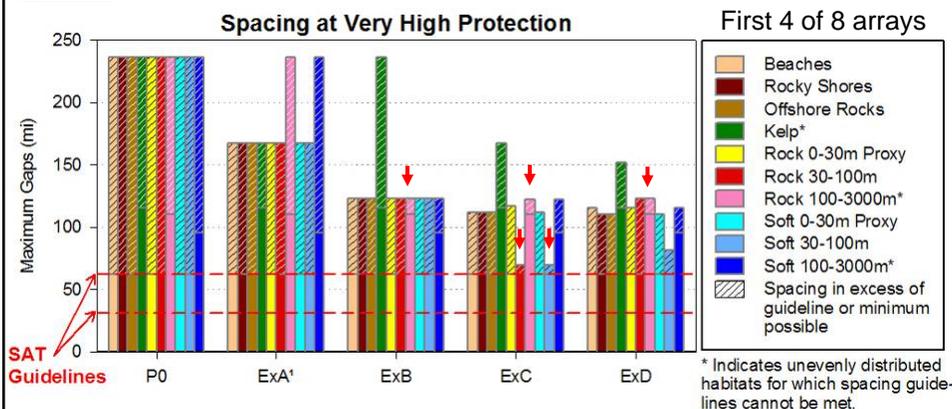


Spacing: Unevenly Distributed Habitats

- For some unevenly distributed habitats, spacing guidelines are impossible to meet
- Minimum possible spacing for these habitats:
 - Kelp: 115 miles (mi)**
 - Deep soft bottom (100-3000m): 95 mi**
 - Deep rock (100-3000m): 110 mi** only available in one area in the NCSR



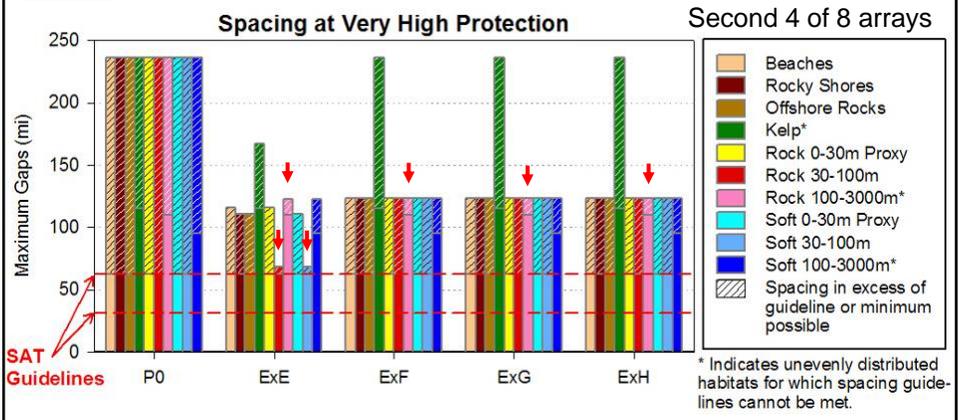
Max Gaps: Very High Protection



- Not possible to meet spacing guidelines for kelp, rock 100-3000m, or soft bottom 100-3000m
- ExB, ExC and ExD approach minimum possible spacing for deep rock (100-3000m)
- ExC approaches spacing guideline for 30-100m rock and soft bottom



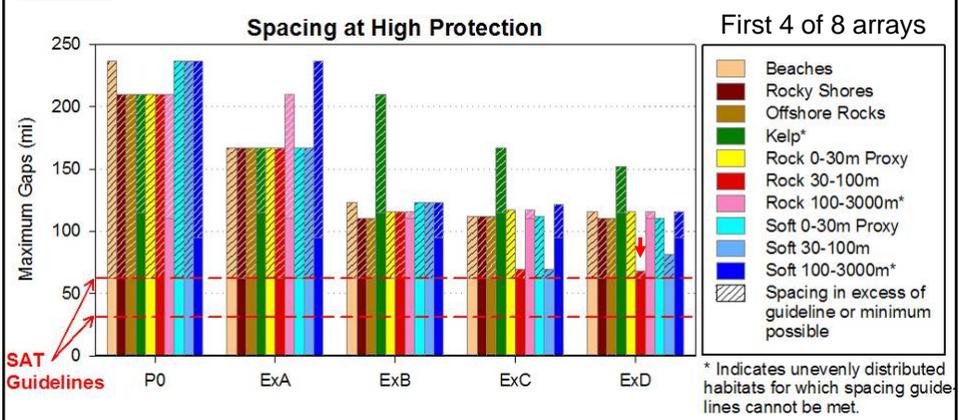
Max Gaps: Very High Protection



- Not possible to meet spacing guidelines for kelp, rock 100-3000m, or soft bottom 100-3000m
- ExE, ExF, ExG and ExH approach minimum possible spacing for deep rock (100-3000m)
- ExE approaches spacing guideline for 30-100m rock and soft bottom



Max Gaps: High Protection*

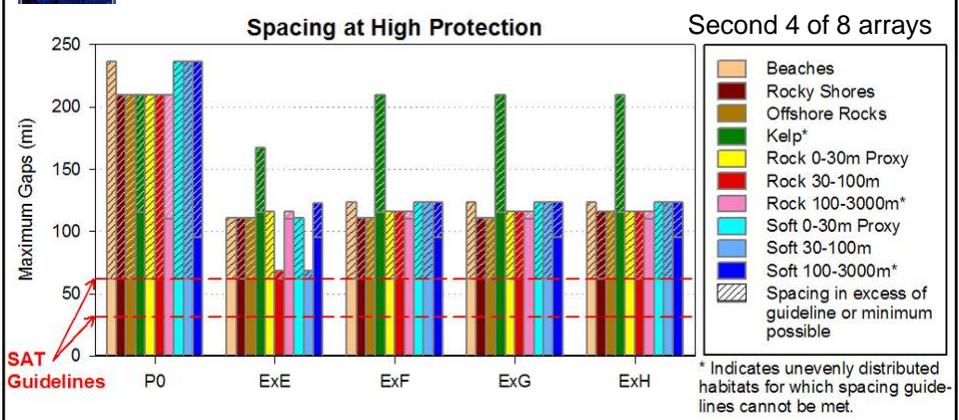


- Changes from Very High protection:**
- ExD approaches spacing guideline for 30-100m rock

* Evaluated for all open coast MPAs at or above high protection



Max Gaps: High Protection*



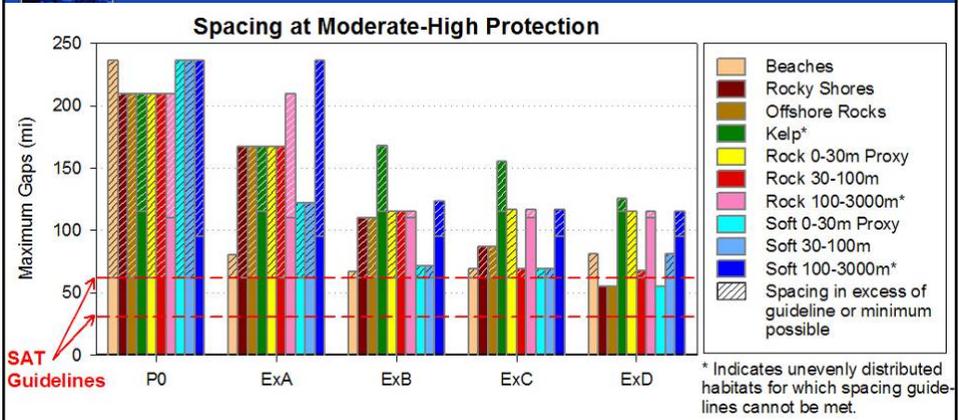
Changes from Very High protection:

- Slight decrease in spacing for some habitats across all arrays

* Evaluated for all open coast MPAs at or above high protection



Max Gaps: Mod-high Protection*



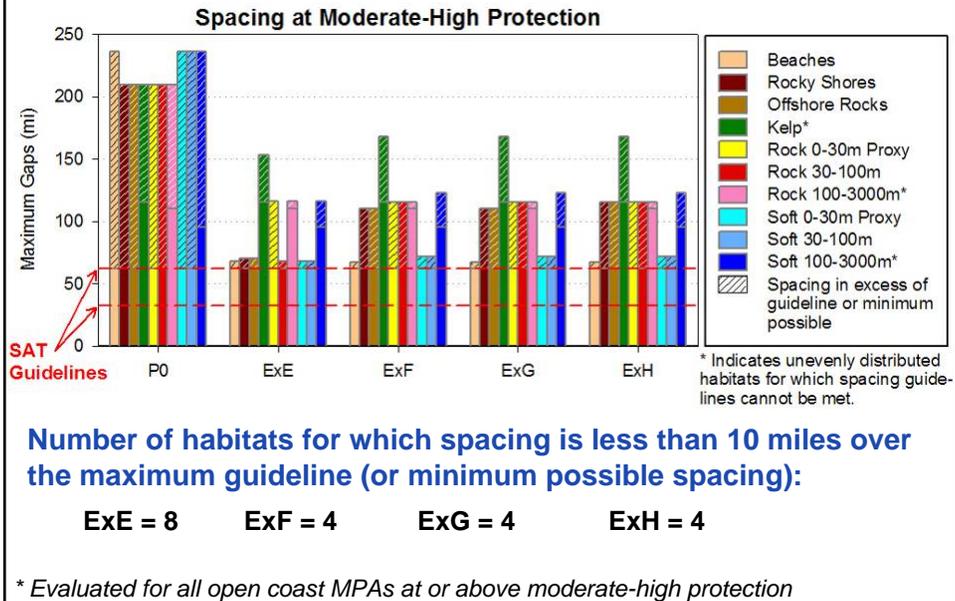
Number of habitats for which spacing is less than 10 miles over the maximum guideline (or minimum possible spacing):

ExA = 0 ExB = 4 ExC = 5 ExD = 5

ExD falls within spacing guidelines for 3 habitats

* Evaluated for all open coast MPAs at or above moderate-high protection

Max Gaps: Mod-high Protection



Spacing: Conclusions

-  ExD achieves spacing guidelines for 3 habitats and, on average, exceeds guidelines or minimum possible spacing by the lowest margin, followed closely by ExE
-  ExE has fewest "large" gaps (>10 miles over the guideline or minimum possible)
-  All arrays have substantial gaps in 0-30m rock as measured by proxy line, possibly because this information was not available when arrays were developed
-  Ranking of arrays based on average gap in excess of the guideline or minimum possible spacing:

$$\text{ExD} < \text{ExE} < \text{ExC} < [\text{ExB}, \text{ExF}, \text{ExG} \ \& \ \text{ExG}] < \text{ExA}$$