

Marine Life Protection Act Initiative



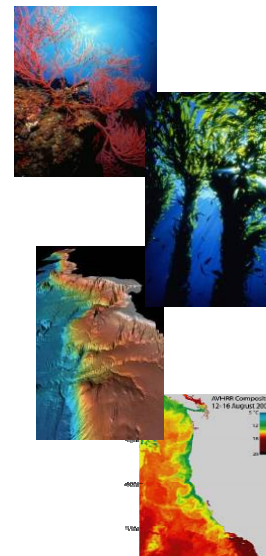
MPA Size and Spacing Guidelines and Evaluations for the MLPA North Coast Study Region

Presentation to the MLPA Master Plan Science Advisory Team
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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



MPA Size Guidelines

- **Marine protected areas (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**



MPA Size Evaluation Methods

- Measure individual MPA areas
- Consider level of protection (LOP; at moderate-high, high and very high levels)
- Combine contiguous MPAs of moderate-high LOP or above into “MPA clusters”
- Tabulate MPA cluster areas relative to minimum and preferred guidelines
- Estuarine MPAs are not included in size evaluation



MPA Spacing Guidelines

- **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**



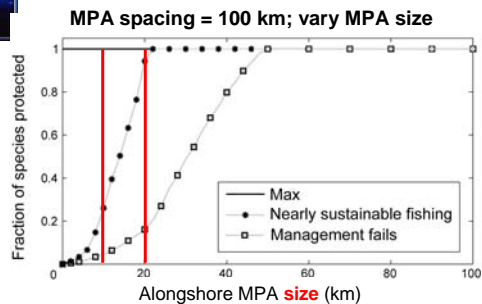
MPA Spacing Evaluation Methods

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

Consequences of MPA Size & Spacing

- How well do different combinations of size and spacing protect a range of species?
- What are the relative benefits of increasing size versus decreasing spacing?
- Population models run for range of combinations of MPA size and spacing, and fishery management:
 - Linear coastline with homogenous habitat
 - Diffusive larval dispersal, adults move in home ranges
 - Just like conceptual model used to develop MPA size and spacing guidelines
- Can a population of model species X persist or not?
 - Each model 'species' has a different combination of larval dispersal distance (0 - 100 km) and home range size (0 - 40 km)
 - Realistic range of movement patterns for nearshore species
 - **Result:** Fraction of model species that persist

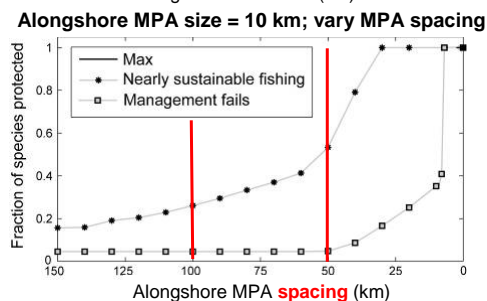
Consequences of MPA Size & Spacing



Population models run for range of combinations of size, spacing, and fishery management

Size guidelines:

- Steady increase in fraction of species protected as MPA size increases

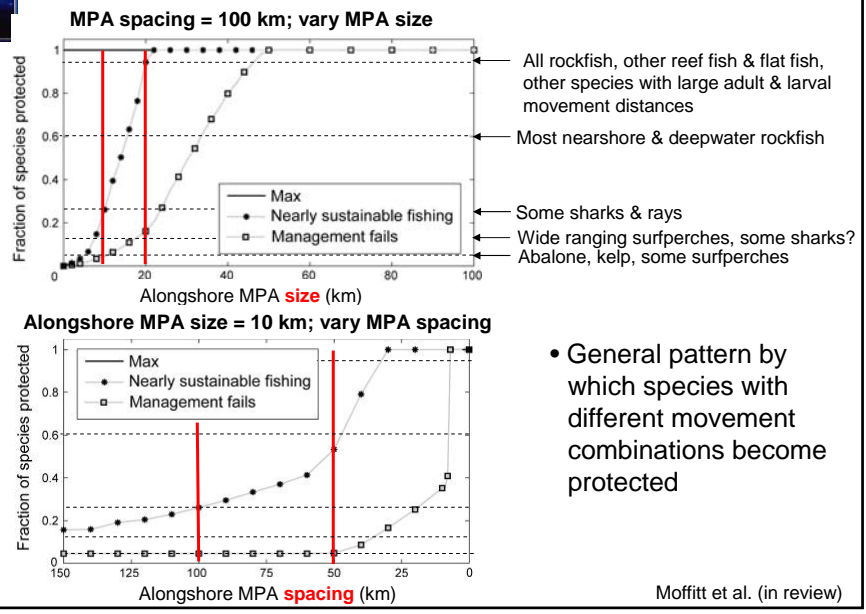


Spacing guidelines:

- Beyond spacing guidelines (>100 km), no benefits of decreased spacing
- Sharp increase in benefits at closer spacing



Consequences of MPA Size & Spacing



Consequences of MPA Size & Spacing

