Marine Life Protection Act Initiative

Preliminary Size & Spacing Evaluations
North Central Coast Proposals

**Presentation to the North Central Coast Regional Stakeholder Group**

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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**.
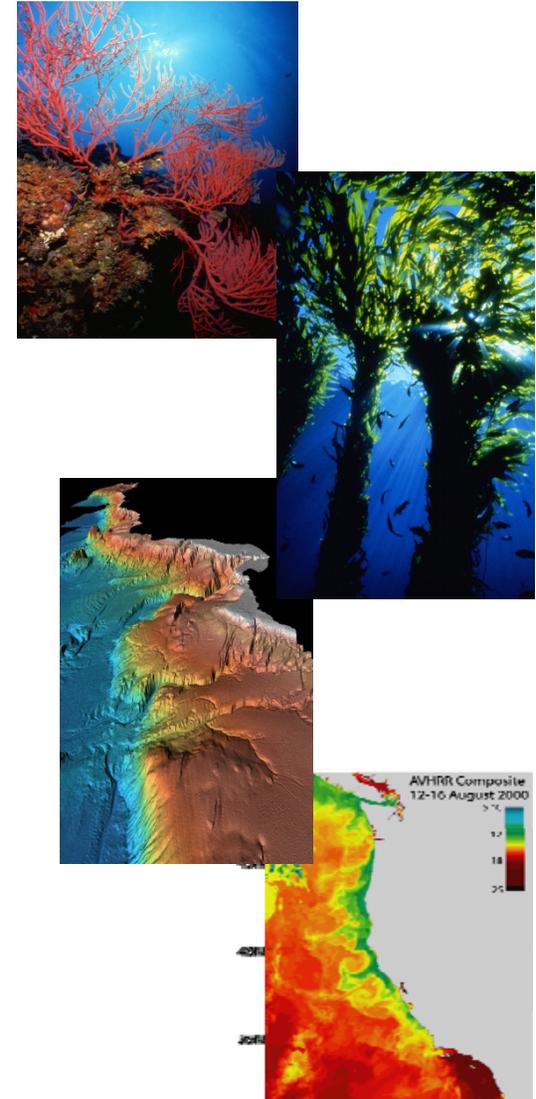
Master Plan Guidelines

- 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**."
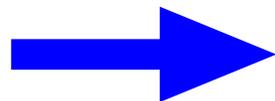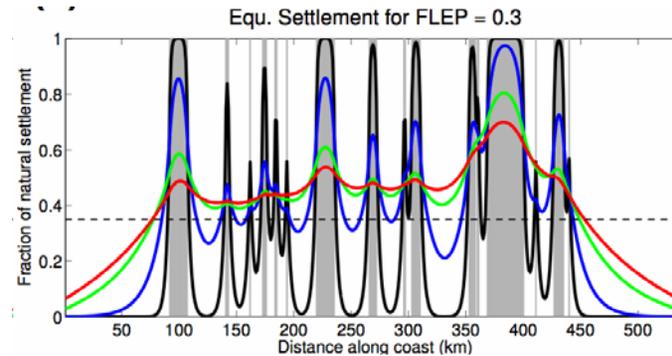
  → 3 miles offshore

Size Analysis Methods

- Measure individual MPA lengths and area

- Combine contiguous MPAs into single MPA complexes

- Consider level of protection

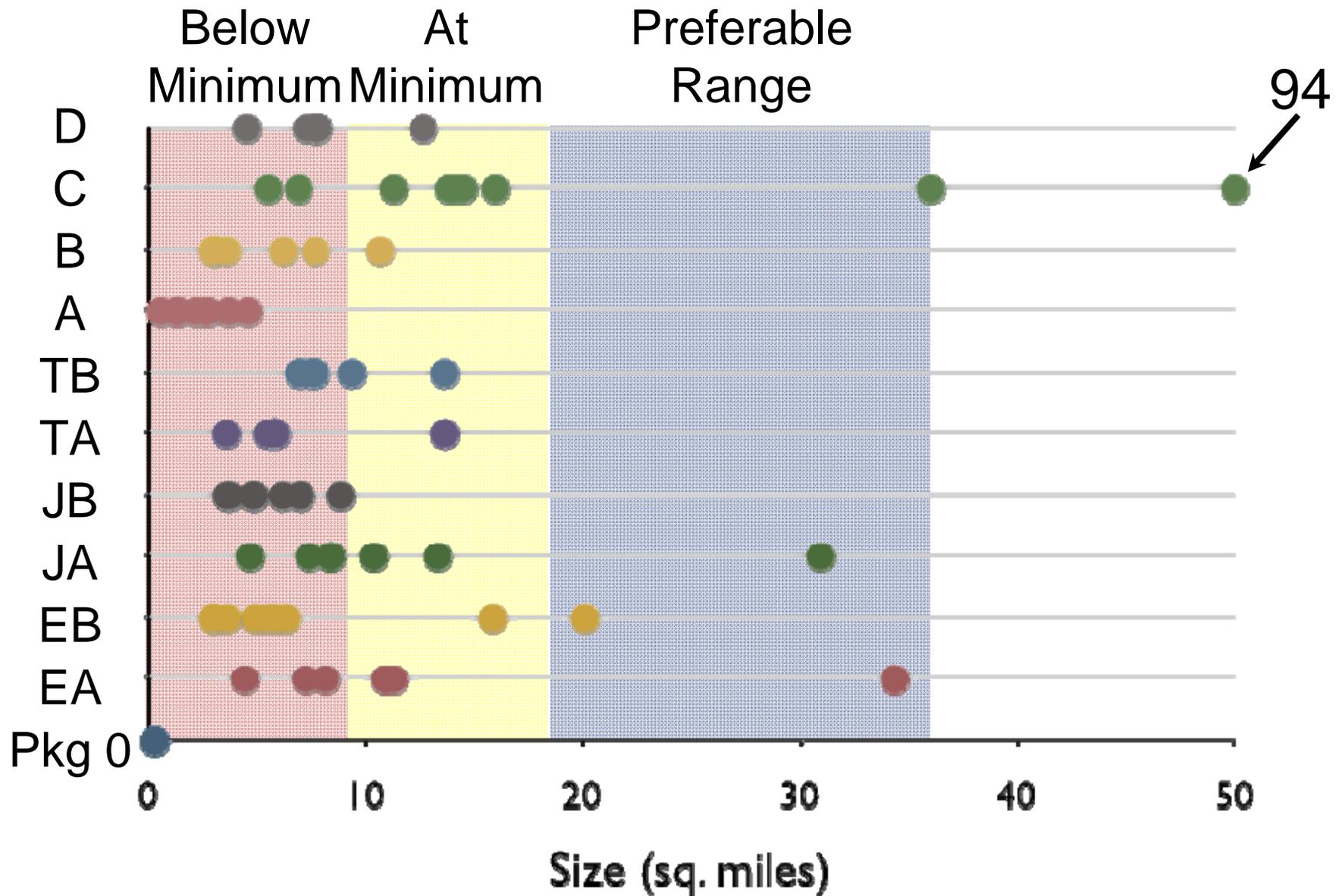- Tabulate MPA lengths and areas relative to minimum & preferred guidelines

Models Quantify Benefits & Costs

- Better assessment of the value of different sizes and spacing

Equ. Settlement for FLEP = 0.3

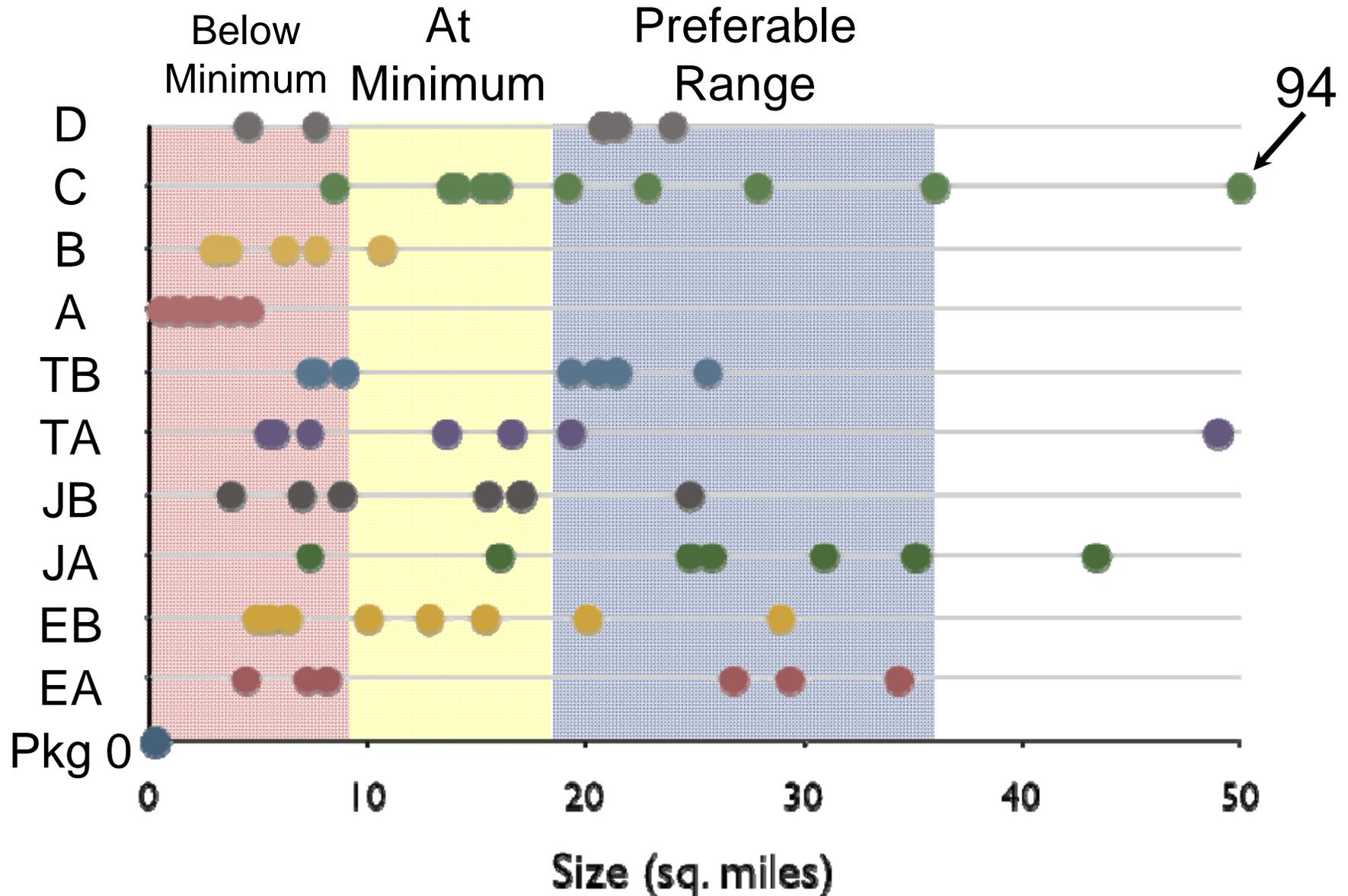| Spacing (km)	Size (km)	Coastline in reserves (%)	Coastline persistent at peak (%)	Maximum larval dispersal that leads to persistence (with no adult movement) (km)
100	5	4.8	6.5	6
100	10	9.1	12.7	12
100	20	16.7	23.5	28
50	5	9.1	12.4	6
50	10	16.7	23.3	14
50	20	28.6	100	∞

MPA Cluster Sizes
(Very High Protection)

MPA Cluster Sizes
(High Protection)
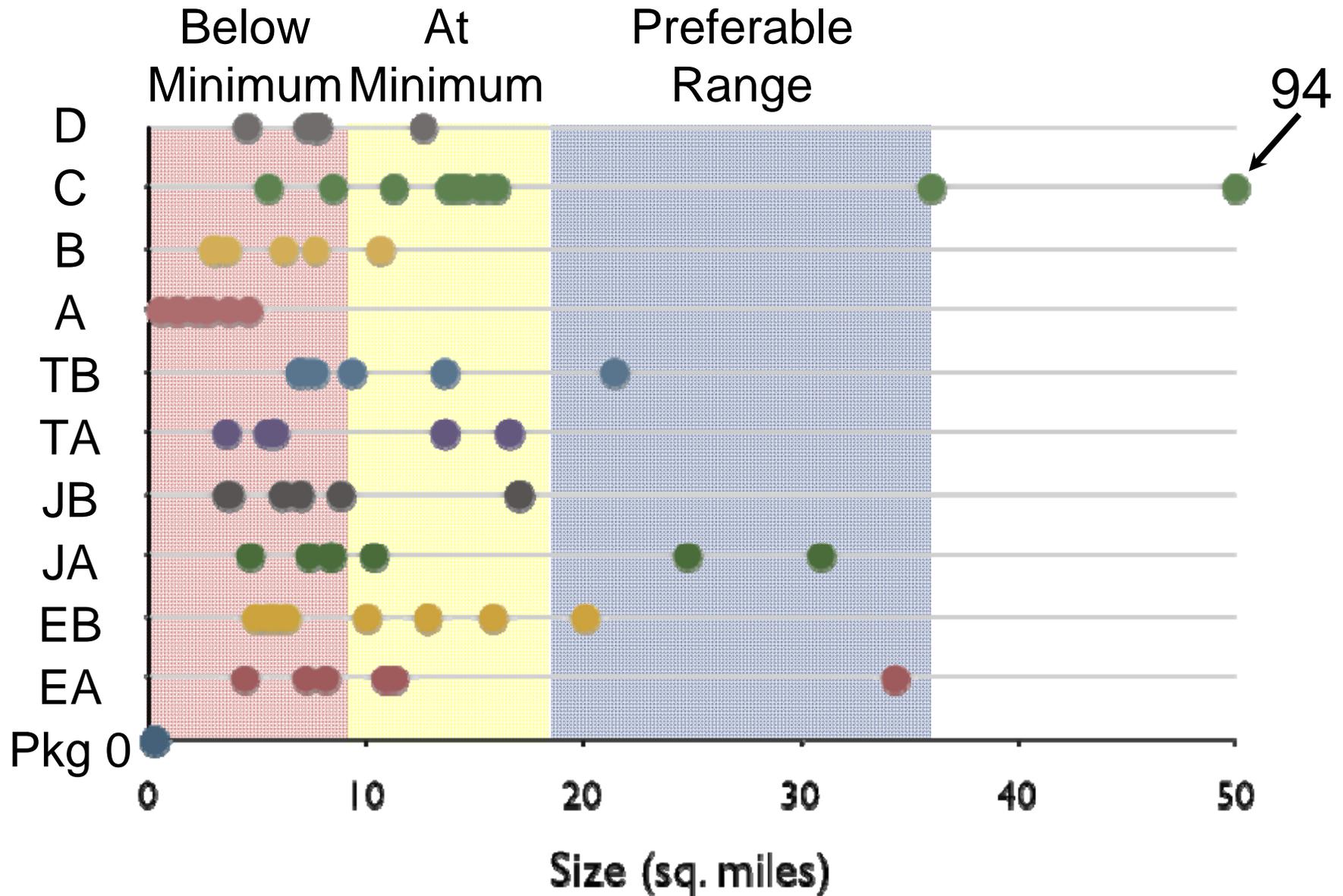
MPA Cluster Sizes
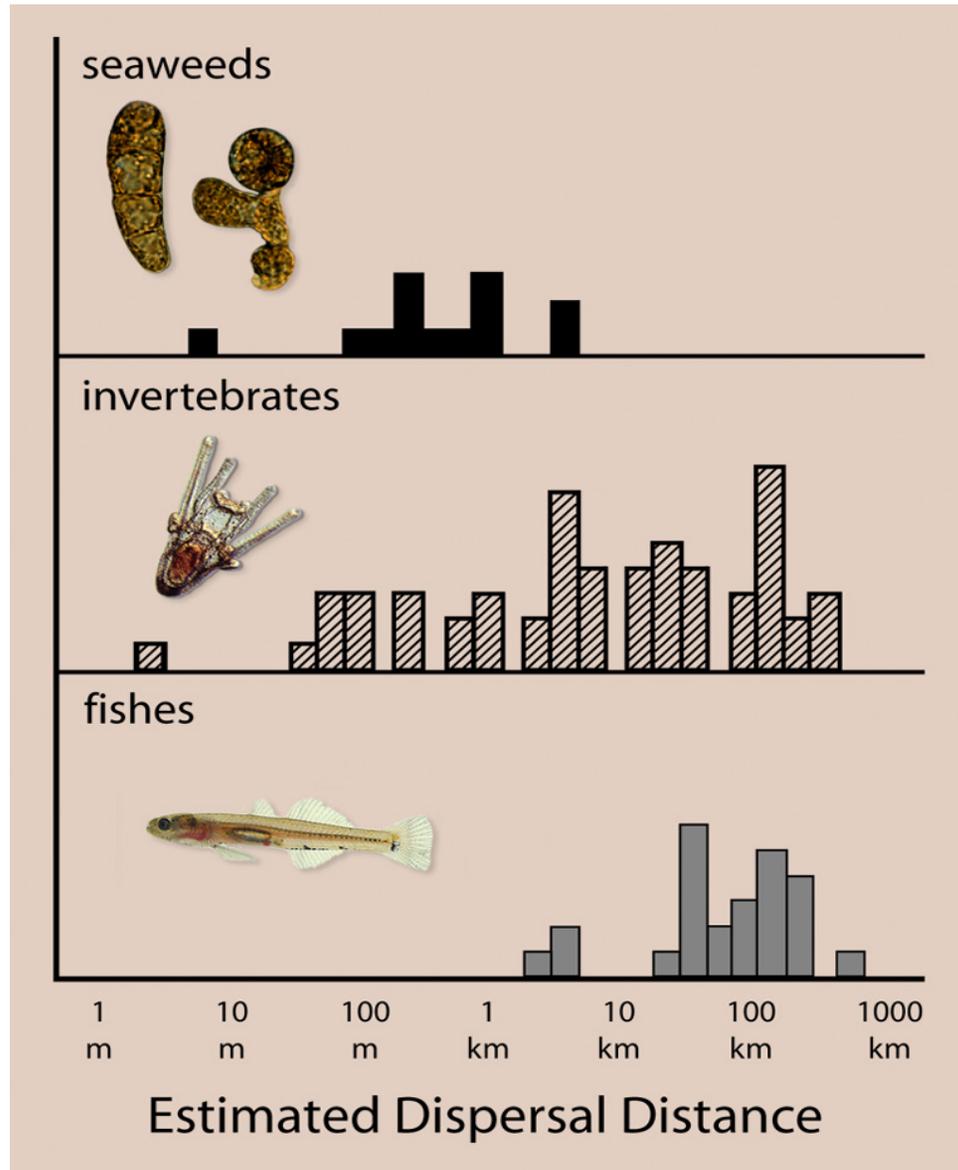(Moderately-High Protection)

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."
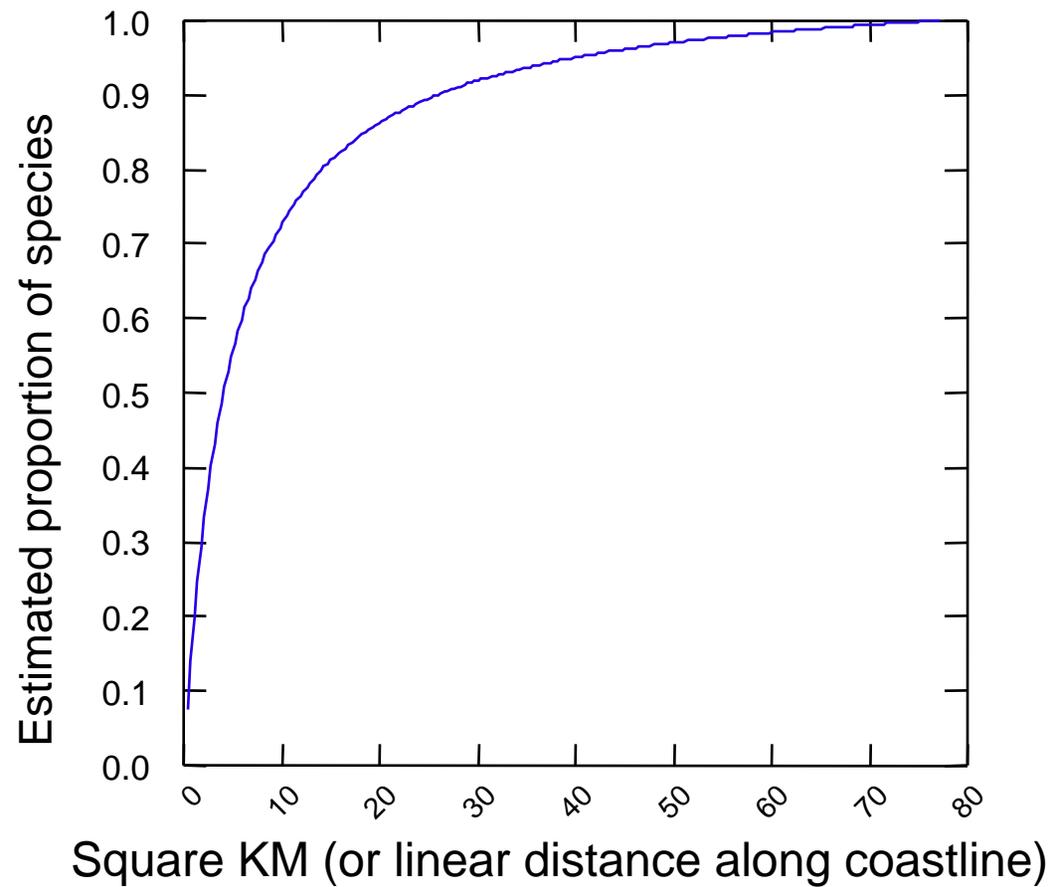
Source of the Spacing Guideline

Spacing Analysis Methods

- Characterize each MPA by the habitats included

- For each habitat, measure the gaps between adjacent, high protection MPAs
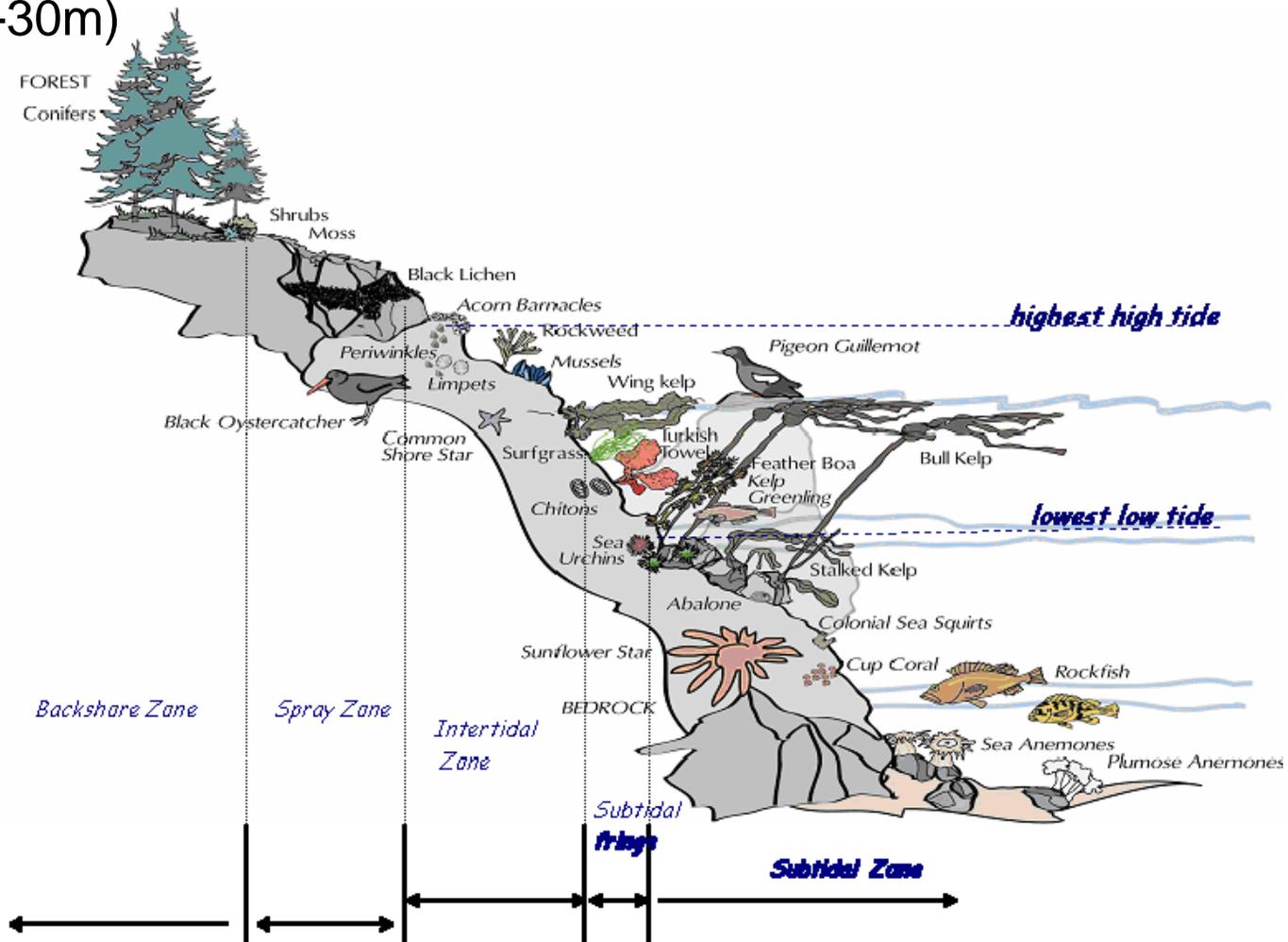
How Much Habitat is Needed?
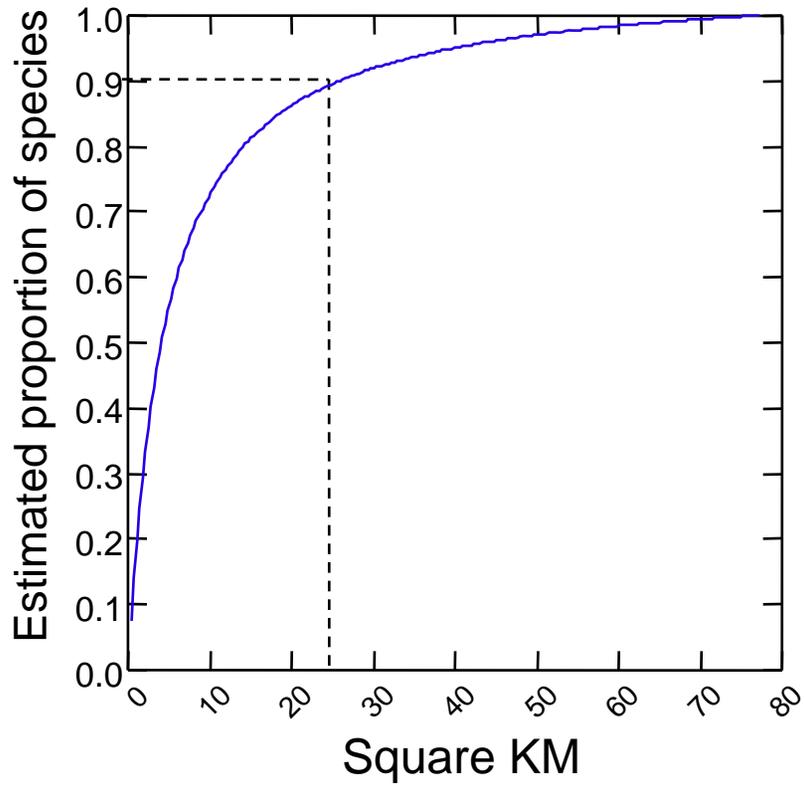
Capturing Depth Gradient is Important

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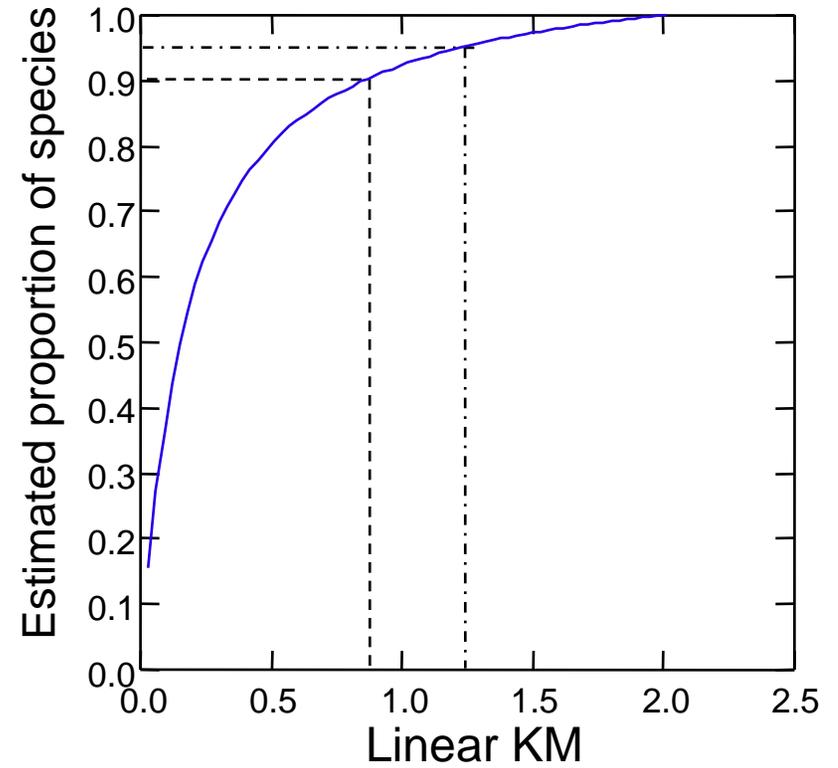
Results

Soft Bottom (Trawl Data)
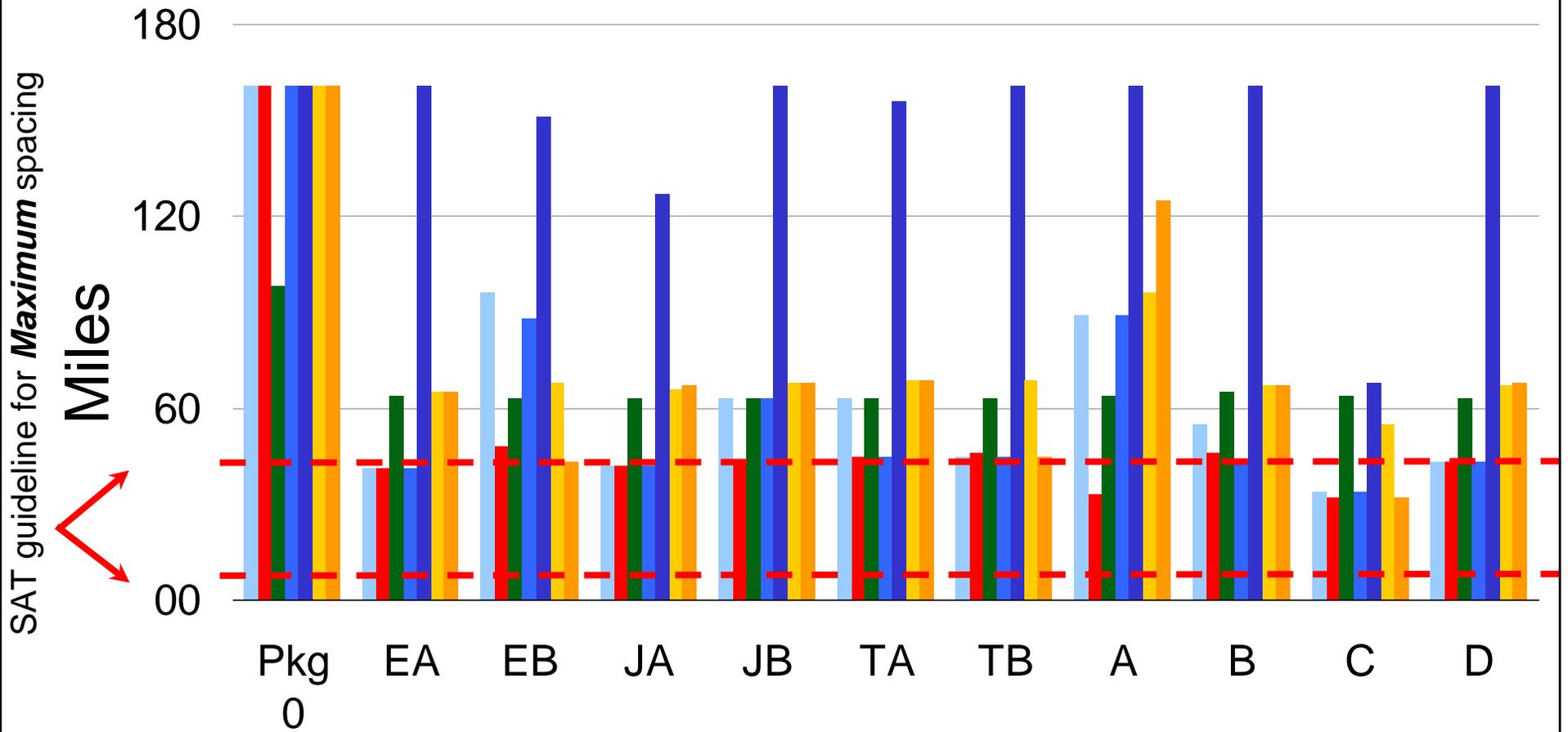
Intertidal (PISCO data)

Habitat representation

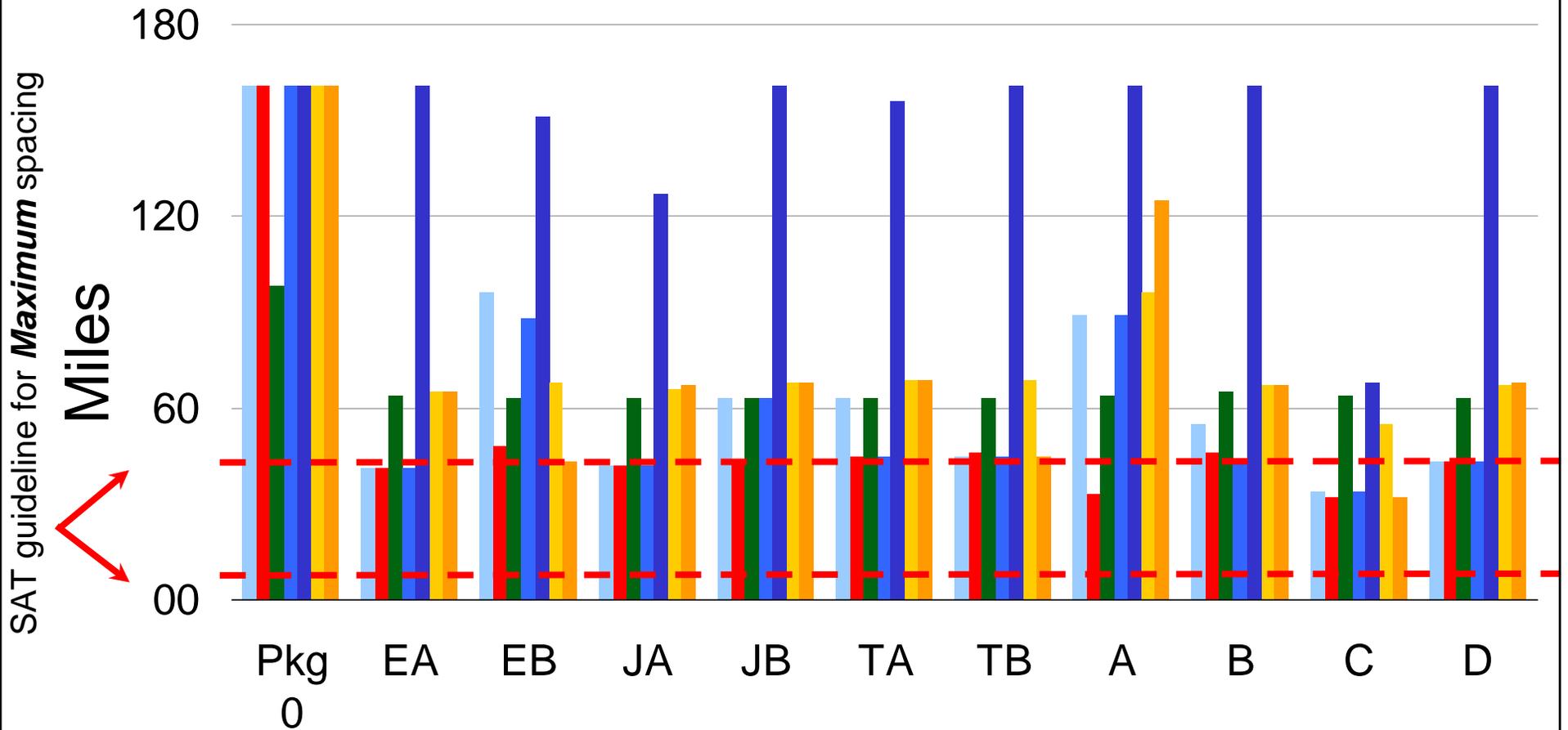| Habitat	Representation needed to encompass 90% of biodiversity	Data Source
Rocky Intertidal	~0.6 linear miles	PISCO Biodiversity
Shallow Rocky Reefs/Kelp Forests (0-30 M)	~1.1 linear miles	PISCO Subtidal
Deep Rocky Reefs (30-100 M)	~0.2 square miles	Starr surveys
Sandy Habitat (30-100 M)	~10 square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

Maximum Gaps
(Very High Protection)

Legend:
- Sandy Beach
- Rocky Intertidal
- Surfgrass/Eelgrass
- Sand: 0 - 30m
- Sand: 30 - 100m
- Rock: 0 - 30
- Rock: 30 - 100

Y-axis: Miles (00, 60, 120, 180)

SAT guideline for *Maximum* spacing
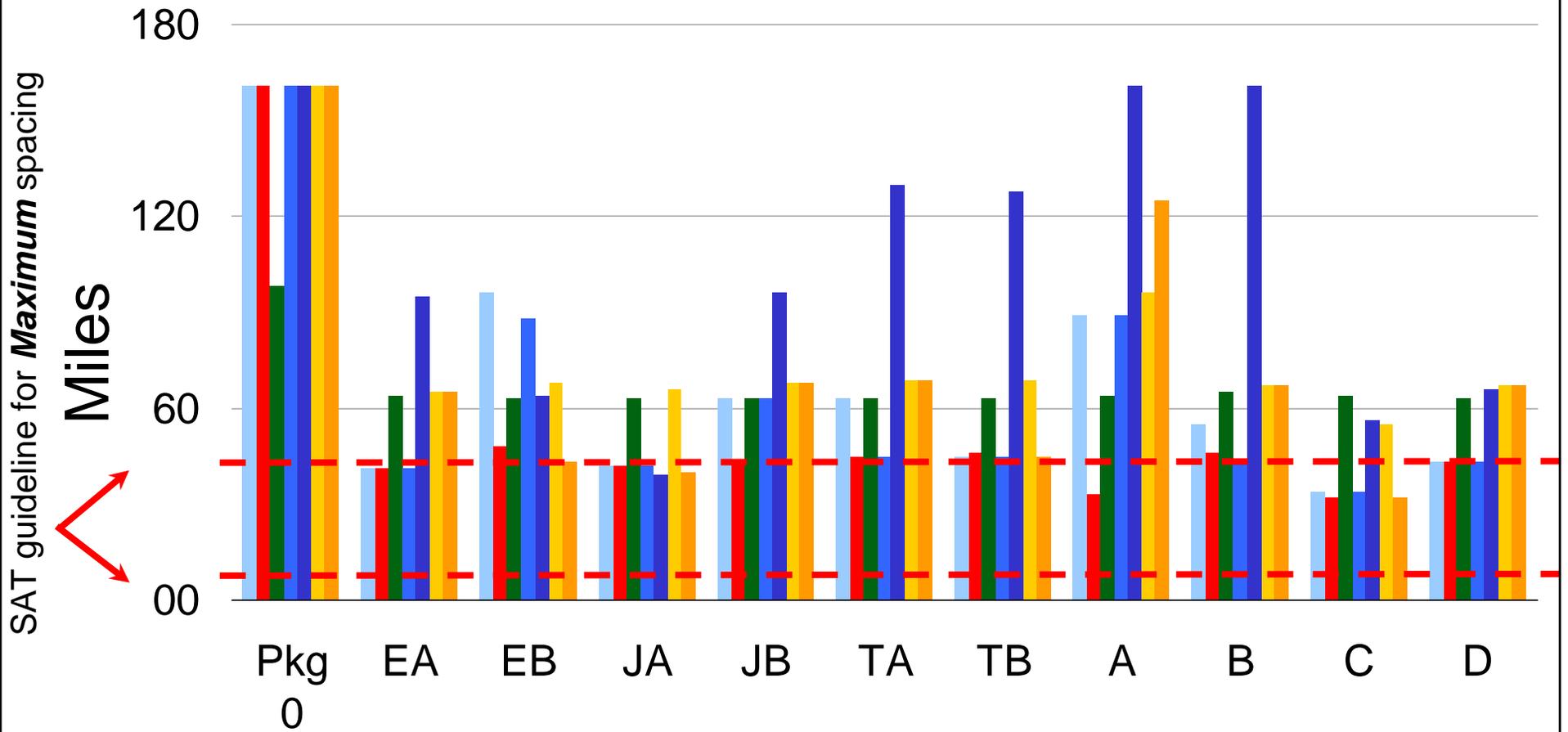
X-axis: Pkg 0, EA, EB, JA, JB, TA, TB, A, B, C, D

Maximum Gaps
(High Protection)

Legend: Sandy Beach, Rocky Intertidal, Surfgrass/Eelgrass, Sand: 0 - 30m, Sand: 30 - 100m, Rock: 0 - 30, Rock: 30 - 100

Miles

SAT guideline for *Maximum* spacing

Categories: Pkg 0, EA, EB, JA, JB, TA, TB, A, B, C, D

Maximum Gaps
(Mod-High Protection)

Legend:
- Sandy Beach (light blue)
- Rocky Intertidal (red)
- Surfgrass/Eelgrass (green)
- Sand: 0 – 30m (blue)
- Sand: 30 – 100m (dark blue)
- Rock: 0 – 30 (yellow)
- Rock: 30 – 100 (orange)

Y-axis: Miles (00, 60, 120, 180)

SAT guideline for Maximum spacing

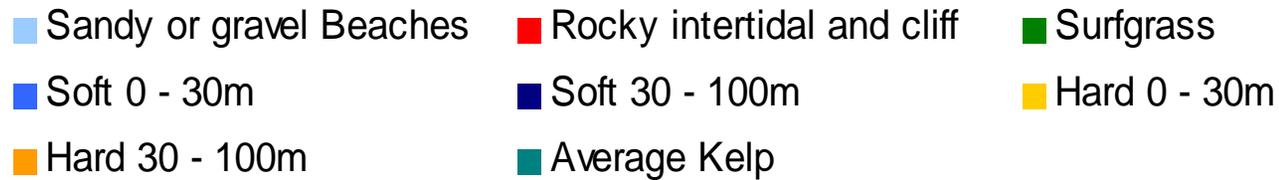**X-axis categories:** Pkg 0, EA, EB, JA, JB, TA, TB, A, B, C, D
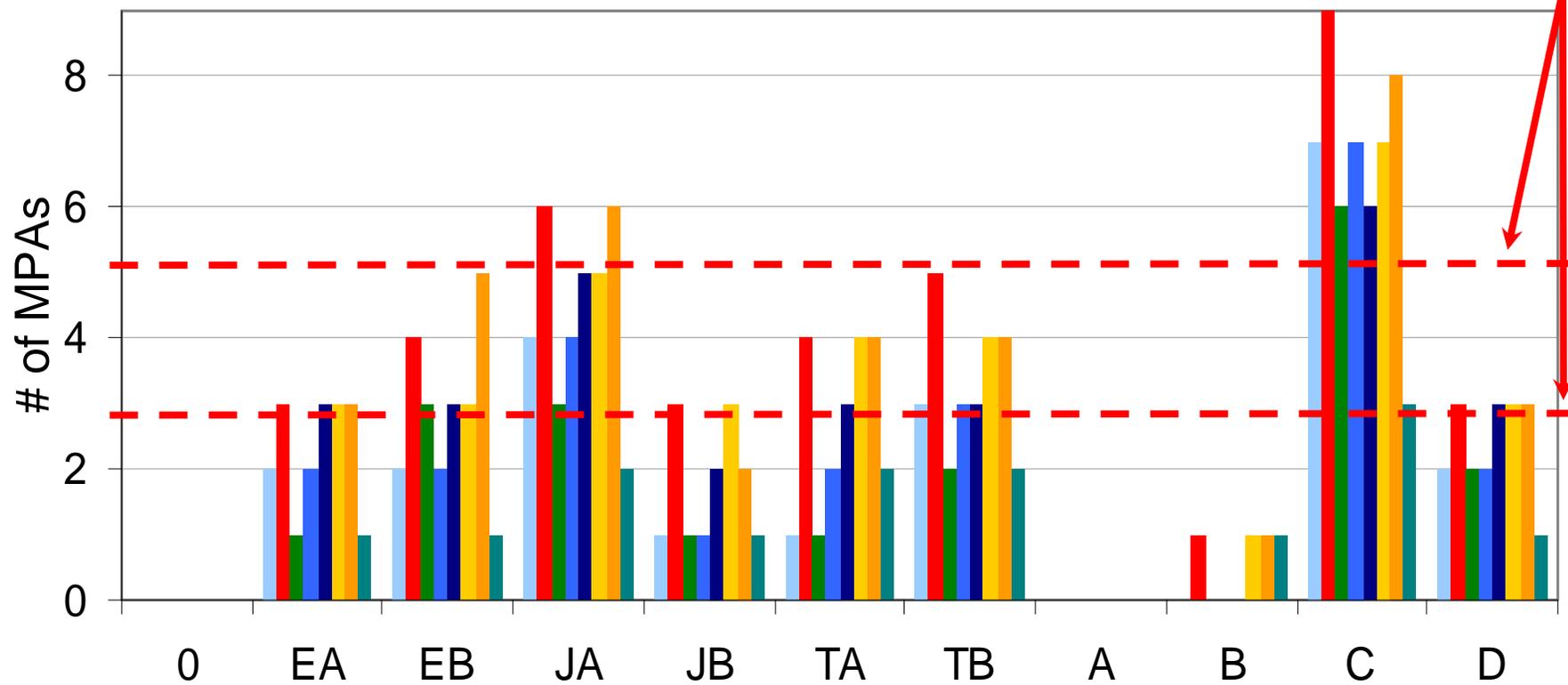
MPA Replication Guidelines

- **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."

Replication
(Very High Protection)

Replication
(High Protection)

Replication
(Moderately High Protection)

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