California Marine Life Protection Act (MLPA) Initiative
Supporting Figures for Habitat Representation, Habitat Replication, MPA Size and MPA Spacing Analyses
June 17, 2009

The MLPA Master Plan Science Advisory Team (SAT) evaluates marine protected area (MPA) proposals in relation to the goals of the MLPA. SAT evaluations of habitat representation and habitat replication primarily address goals 1 and 4 of the MLPA, which focus on ecosystems and habitats. SAT evaluations of MPA size and spacing between MPAs primarily address goals 2 and 6 of the MLPA, which focus on marine life populations and connectivity. The figures below compare six MPA proposals developed during round 2 of the MLPA south coast process for each of the four evaluations listed above.

Habitat Representation

The results of the habitat representation analysis results are displayed in figures 1.1 to 1.3 and table 1 below. For the key habitats present in the study region, these figures display the percentage of that habitat included in MPAs in each of the round 2 proposals. Results are grouped by SAT-assigned level of protection (LOP). For rare and unique habitats (table 1) a table is used to summarize the number of MPAs in each of the round 2 proposals that include each habitat. The rare and unique habitats evaluation is conducted only for MPAs that achieve a LOP at or above moderate-high.

Habitat Replication

The results of the habitat replication analysis are displayed in figures 2.1 to 2.6 below. In figures 2.1 and 2.2, the number of MPAs that contain a significant amount of each habitat is shown for each MPA proposal. MPAs must be at least 9 square miles and contain enough of a particular habitat to capture 90% of its biodiversity to count in this analysis. This analysis is shown at different LOPs. Figure 2.3 contains similar information to 2.1 and 2.2, but is conducted only for depth ranges. This information helps to deal with limited data available for deeper habitats. Figure 2.4 is similar to those described above, but simply for estuaries. Figures 2.5 and 2.6 show, for each proposal, the number of bioregions where a habitat replicate is proposed in an MPA. This analysis is conducted at different levels of protection. Grey boxes denote bioregions where a proposal does not have a replicate for that habitat.

MPA Size

Figure 3.1 displays results of the MPA size analysis. Each proposal is displayed on a separate line in this analysis and each circle indicates the size of an MPA "cluster", with bigger MPA clusters further to the right and smaller MPA clusters further to the left. An MPA cluster may be a single MPA, or several MPAs that are adjacent to one another. The pink area to the far left of the figure indicates MPA clusters that fall below the minimum MPA size recommended by the SAT (9 square miles). The yellow area in the middle of the figure indicates MPA clusters that are bigger than the minimum size guideline, but smaller than the preferred size recommended by the SAT (18 square miles). The blue area to the right of the figure indicates MPA clusters that fall within the preferred size range recommended by the SAT (18 – 36 square miles). These results are also tabulated on the right hand size of the figure. This analysis is conducted at different levels of protection. Since MPAs within the Channel Islands National Marine Sanctuary

(CINMS) are included in all proposals, the sizes for these MPAs are provided separately from the proposals for ease of display.

MPA Spacing

Figures 4.1 and 4.2 display the results of the MPA spacing analysis. The height of each bar indicates the maximum distance between two patches of "protected" habitat in a given proposal. In order to count as a protected habitat, sufficient area to encompass 90% of biodiversity for a given habitat must exist in an MPA cluster of at least minimum SAT size. These maximum distances, or gaps, for each habitat may be compared to the spacing guidelines of spacing protected areas 30 to 60 miles apart, indicated by the horizontal dashed red lines. This evaluation is conducted at different levels of protection.

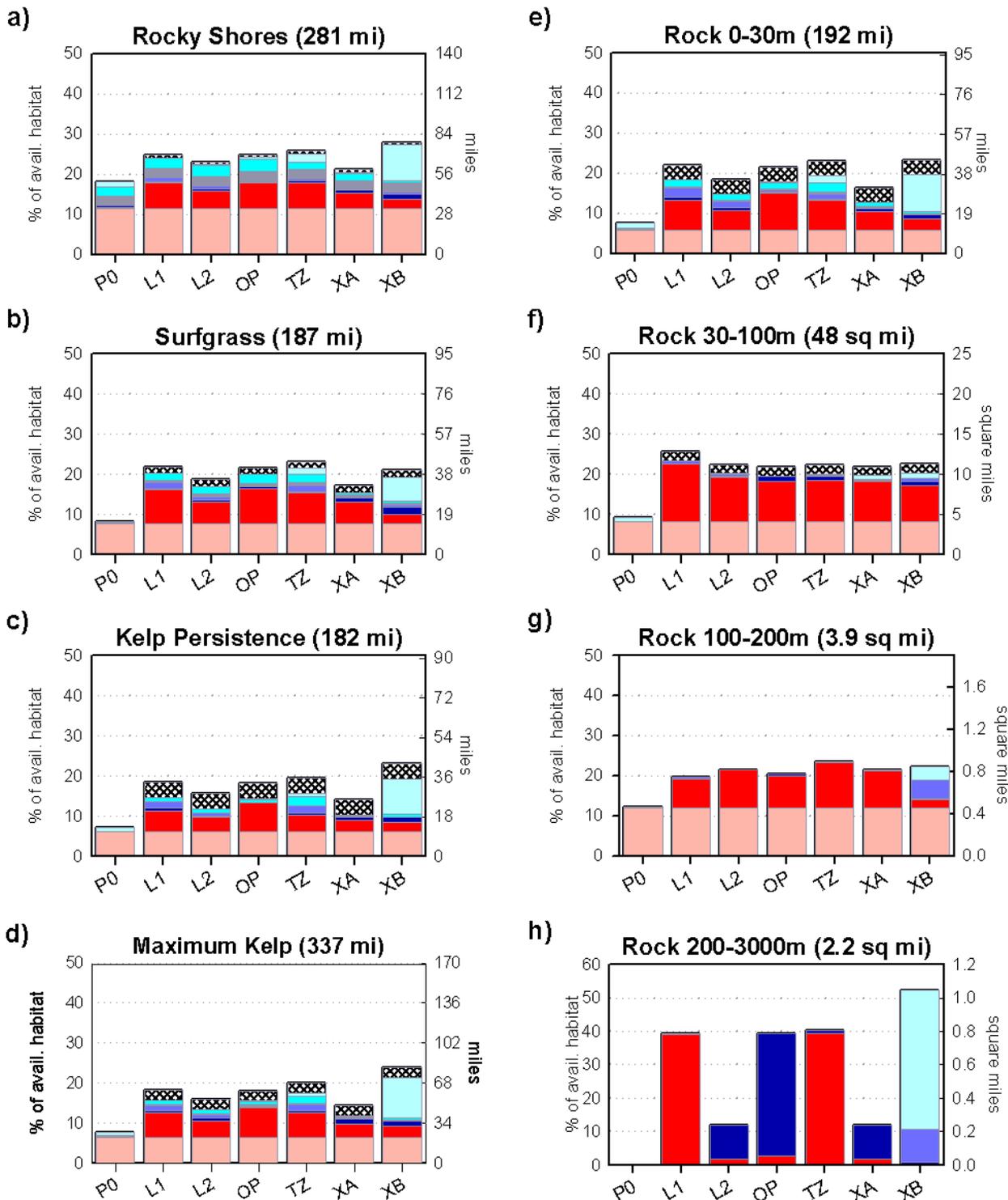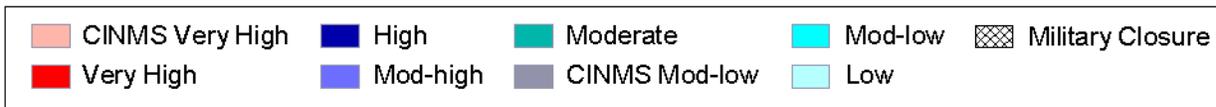## Figure 1.1: Habitat Representation - Rocky Habitats

Figure 1.2: Habitat Representation - Soft Bottom Habitats
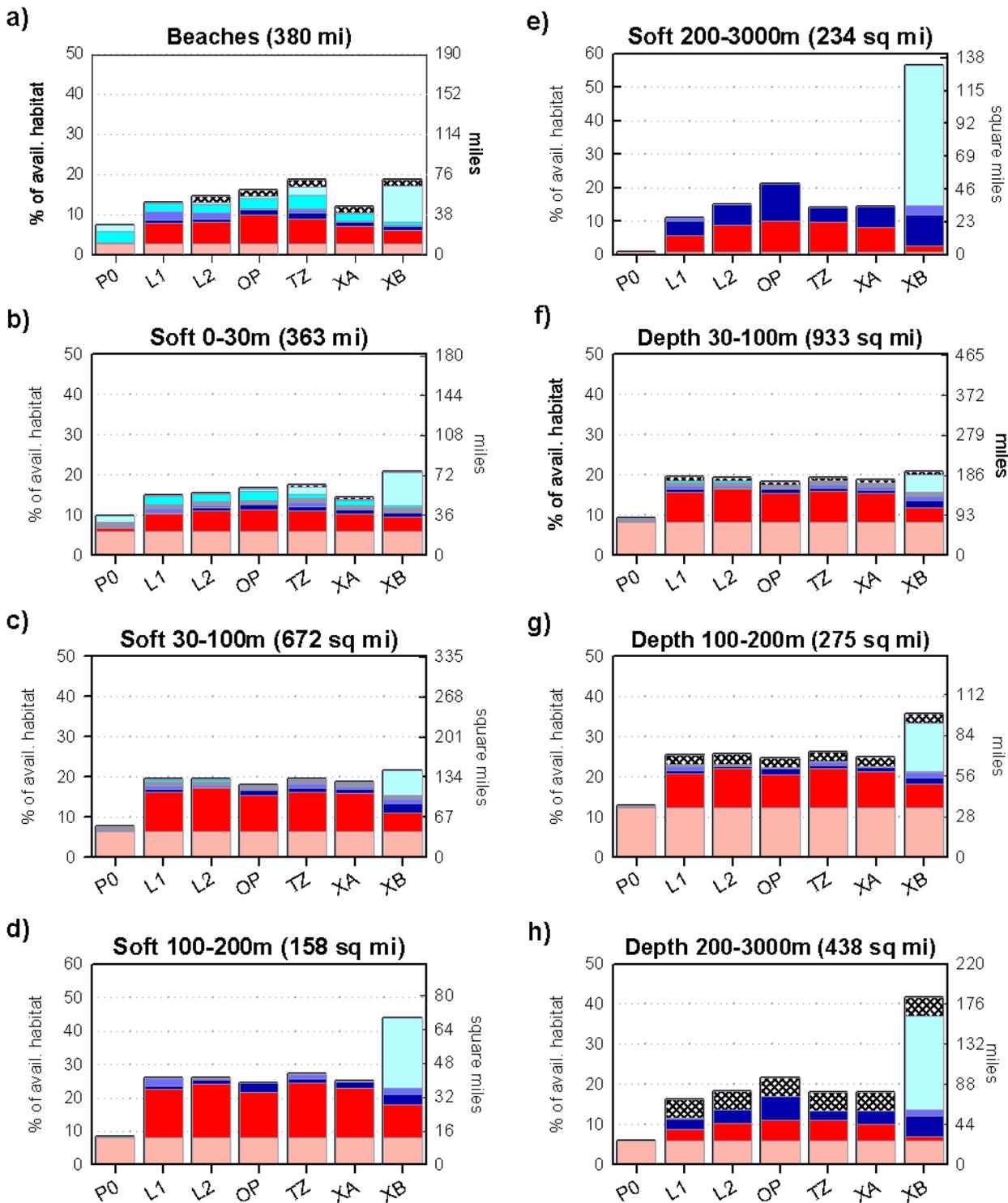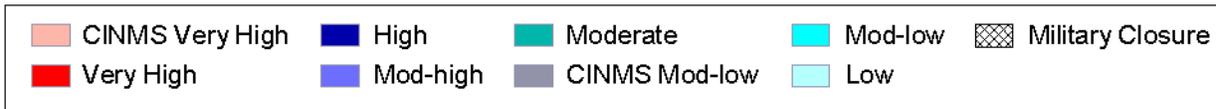
Figure 1.3: Habitat Representation - Estuarine Habitats

Legend:
- CINMS Very High
- Very High
- High
- Mod-high
- Moderate
- CINMS Mod-low
- Mod-low
- Low
- Military Closure

a) Estuary (43 sq mi)

b) Coastal Marsh (6.1 sq mi)

c) Eelgrass (4.7 sq mi)

d) Tidal Flats (29 mi)
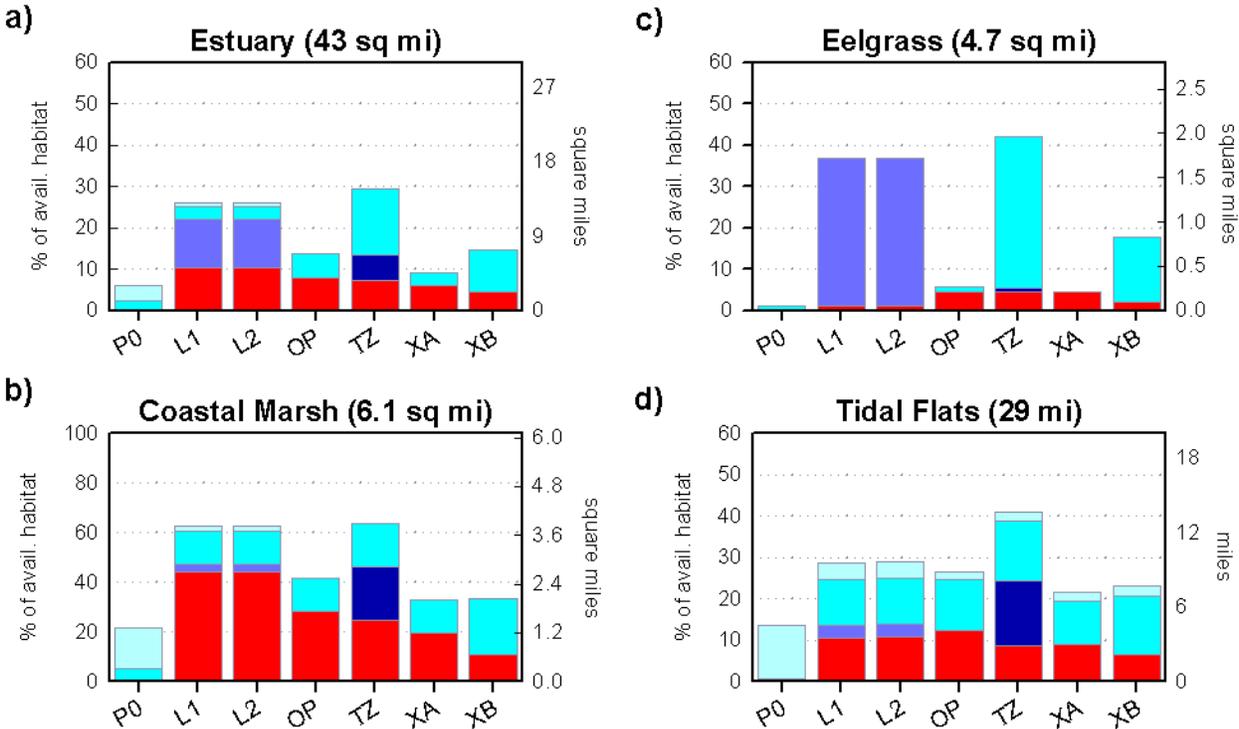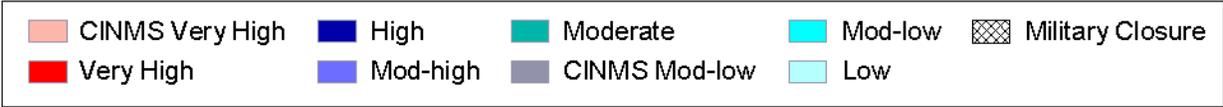
Table 1. Number of MPAs at or above Moderate-High protection (including proposed military closures) that key habitats are included in each proposal[1].

Proposal	Open coast eelgrass	Elk kelp	Oil seeps	Sulfide vents[2]	Canyons
CINMS	4	0	1	0	1
Proposal 0	2	1	0	0	1
Lapis 1	5(1)	2(1)	2	0	3
Lapis 2	5(1)	1(1)	2	0	1
Opal	6(1)	2(1)	2	0	2
Topaz	5(1)	2(1)	2	0	3
External A	5(1)	1(1)	2	0	1
External B	3(1)	1(1)	0	0	2

[1] () indicates military closures

[2] Only one sulfide vent location is currently mapped in the study region at Palos Verdes.

Figure 2.1: Habitat Replication by Study Region - Open Coast (Lapis & Opal)
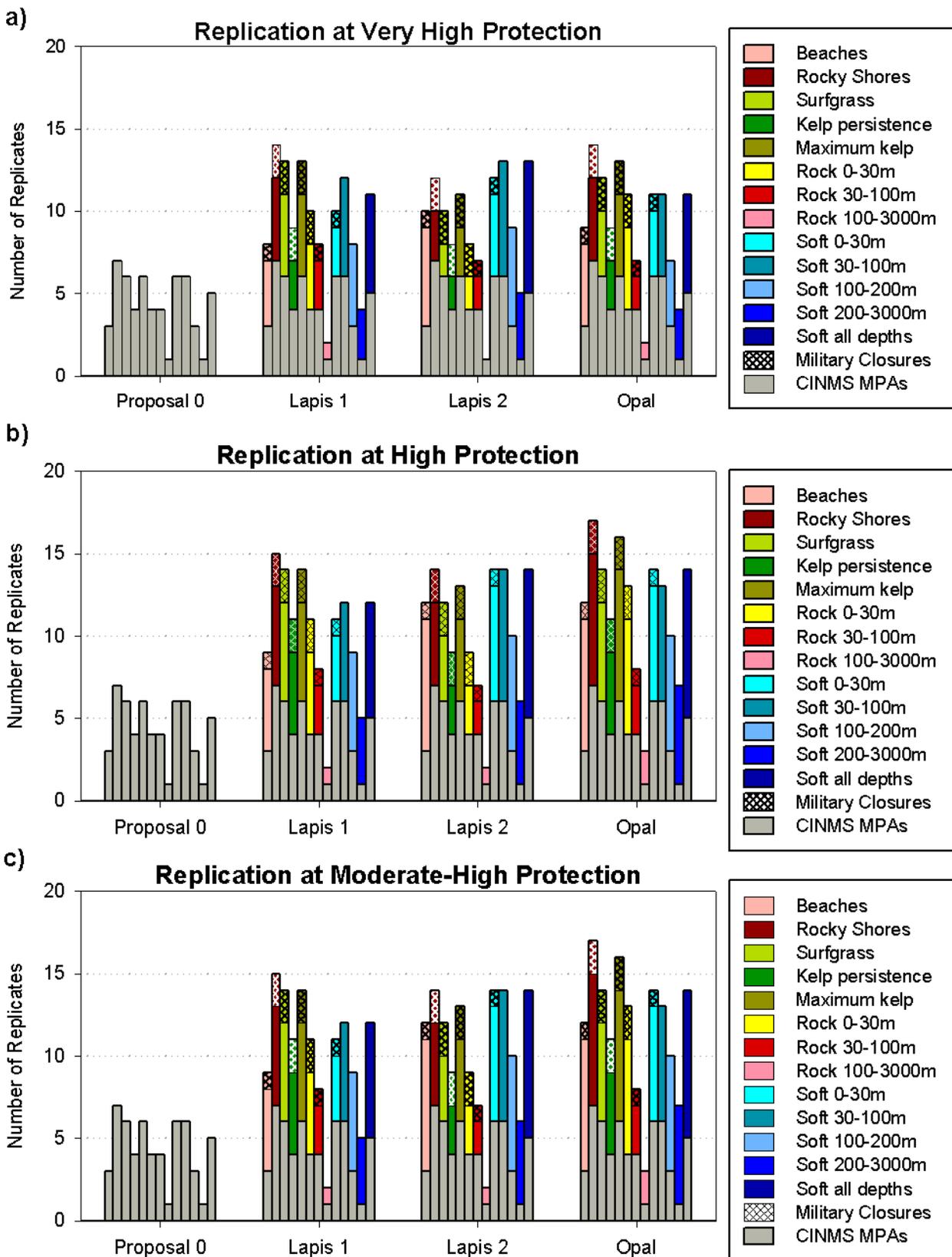
Figure 2.2: Habitat Replication by Study Region - Open Coast (Topaz & External)

a)

Replication at Very High Protection

b)

Replication at High Protection

c)

Replication at Moderate-High Protection

Figure 2.3: Habitat Replication by Study Region - Depth Zones

Figure 2.4: Habitat Replication by Study Region - Estuarine Habitats

a)

b)

c)
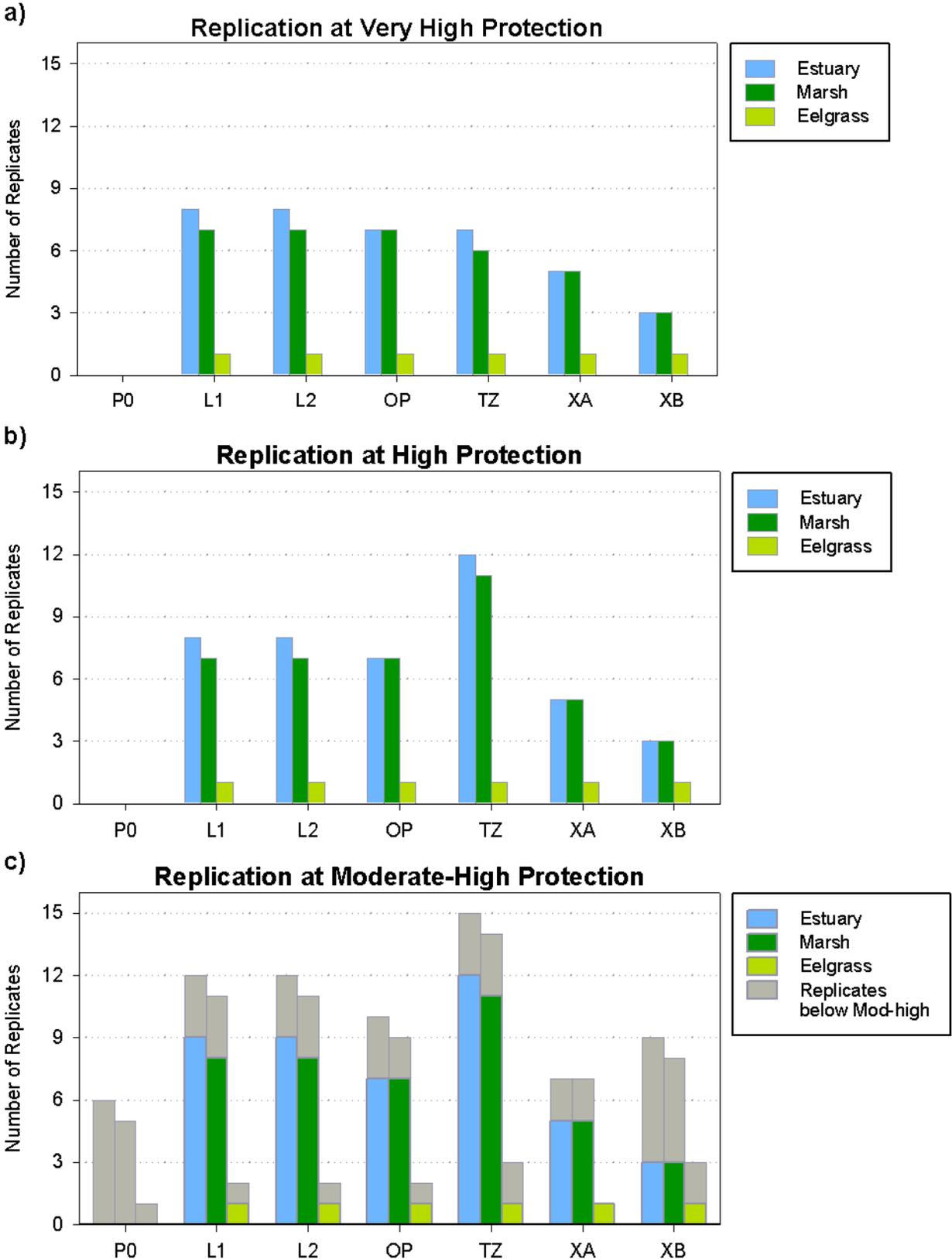
Figure 2.5: Habitat Replication by Bioregion - Rocky and Soft Bottom Habitats

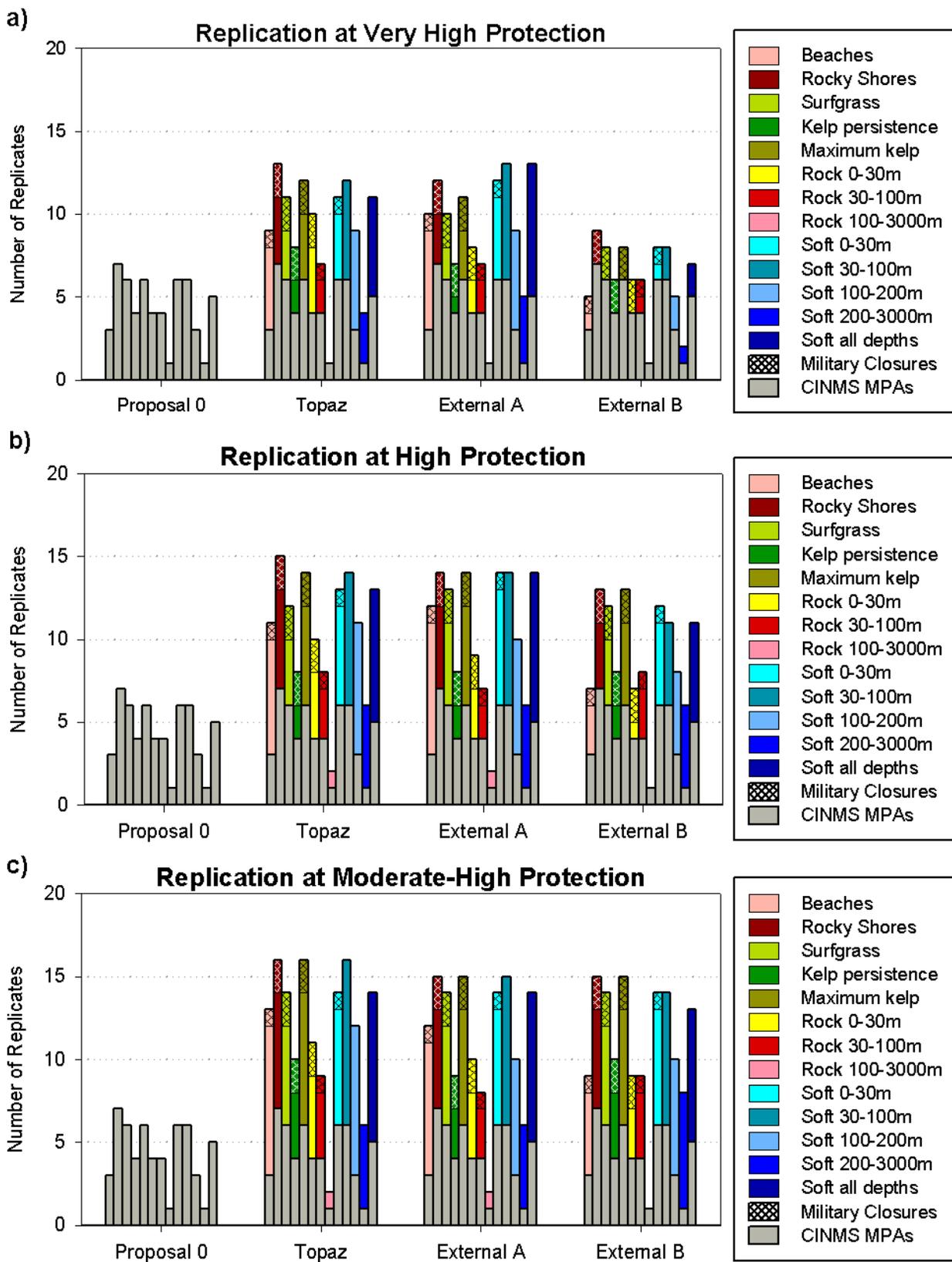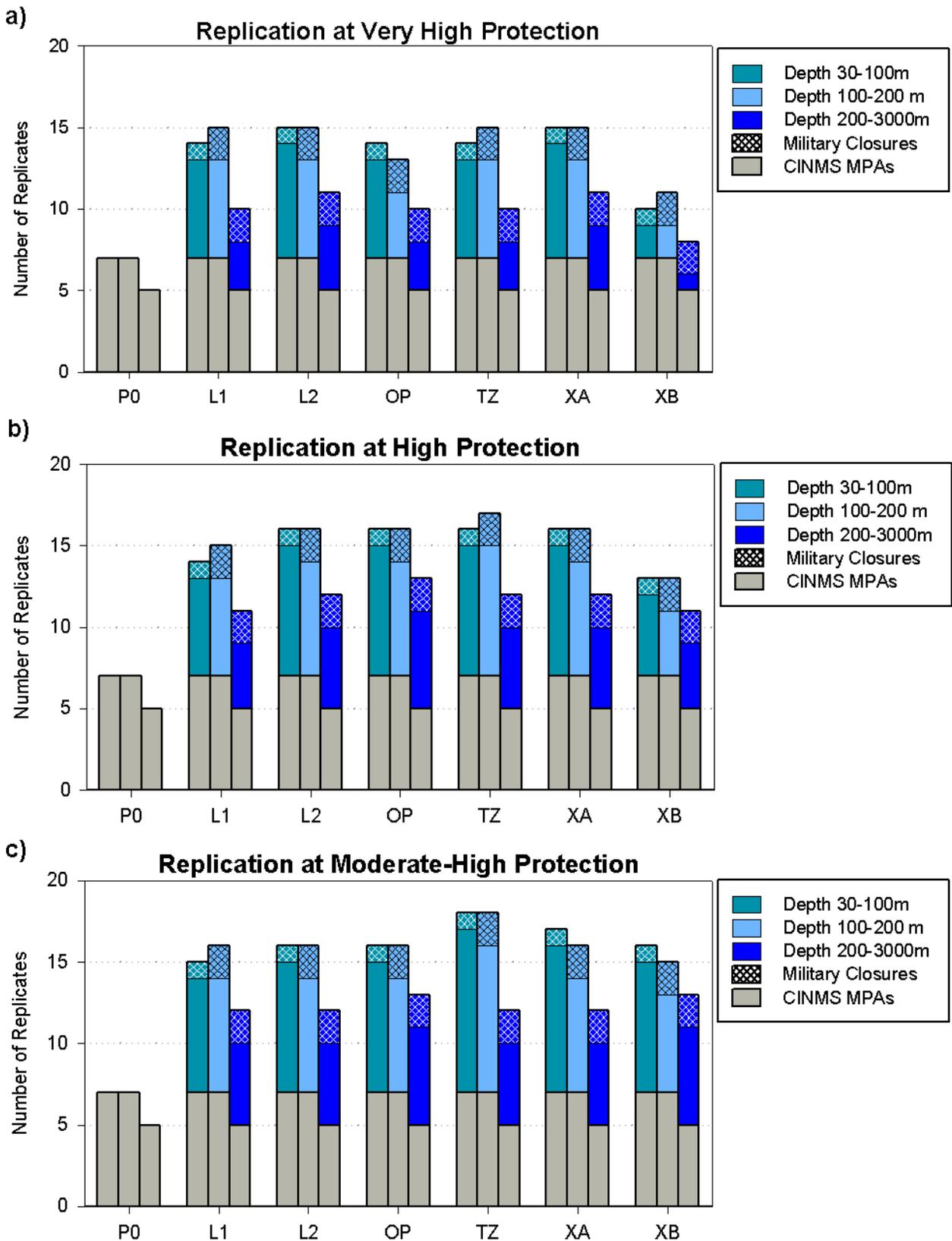| a	Rocky Shores (5)			Surfgrass (5)			Kelp persist. (5)			Maximum kelp (5)			Rock 0-30m (5)			Rock 30-100m (5)			Rock 100-3000m (3)		
	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH
Proposal 0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
Lapis 1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	2	2
Lapis 2	5	5	5	4	5	5	4	4	4	5	5	5	4	5	5	4	4	4	1	2	2
Opal	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	2	3	3
Topaz	5	5	5	5	5	5	4	4	5	5	5	5	5	5	5	4	4	5	1	2	2
External A	5	5	5	4	5	5	4	4	5	5	5	5	4	5	5	4	4	5	1	2	2
External B	3	5	5	3	4	5	3	4	5	3	5	5	3	4	5	3	3	4	1	1	1

b	Beaches (5)			Soft 0-30m (5)			Soft 30-100m (5)			Soft 100-200m (5)			Soft 200-3000m (4)			Soft all depths (5)		
	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH
Proposal 0	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2
Lapis 1	5	5	5	5	5	5	4	4	4	4	4	4	3	4	4	4	5	5
Lapis 2	5	5	5	5	5	5	4	4	4	4	4	4	3	4	4	4	5	5
Opal	5	5	5	5	5	5	4	5	5	4	5	5	2	4	4	4	5	5
Topaz	5	5	5	5	5	5	4	5	5	4	5	5	2	4	4	4	5	5
External A	5	5	5	5	5	5	4	4	4	4	4	4	3	4	4	4	5	5
External B	4	5	5	4	5	5	3	5	5	3	5	5	2	4	4	3	5	5

Figure 2.6: Habitat Replication by Bioregion - Depth Zones and Estuarine Habitats

a	Depth 30-100m (5)			Depth 100-200m (5)			Depth 200-3000m (5)		
	VH	H	MH	VH	H	MH	VH	H	MH
Proposal 0	2	2	2	2	2	2	2	2	2
Lapis 1	5	5	5	5	5	5	5	5	5
Lapis 2	5	5	5	5	5	5	5	5	5
Opal	5	5	5	5	5	5	4	5	5
Topaz	5	5	5	5	5	5	4	5	5
External A	5	5	5	5	5	5	5	5	5
External B	4	5	5	4	5	5	4	5	5

b	Estuary (2)			Marsh (2)			Eelgrass (1)			Tidal Flats (0)		
	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH
Proposal 0	0	0	0	0	0	0	0	0	0	0	0	0
Lapis 1	2	2	2	2	2	2	1	1	1	0	0	0
Lapis 2	2	2	2	2	2	2	1	1	1	0	0	0
Opal	2	2	2	2	2	2	1	1	1	0	0	0
Topaz	2	2	2	2	2	2	1	1	1	0	0	0
External A	2	2	2	2	2	2	1	1	1	0	0	0
External B	2	2	2	2	2	2	1	1	1	0	0	0

Figure 3.1: Size

a)

Size at Very High Protection

Number of MPA Clusters* at Very High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
CINMS MPAs	3	5	3	11
Proposal 0	3	0	0	3
Lapis 1	7	4(1)	2(1)	11(2)
Lapis 2	6	6(1)	2(1)	12(2)
Opal	9	5(1)	2(1)	14(2)
Topaz	9	4(1)	2(1)	13(2)
External A	5	6(1)	2(1)	11(2)
External B	5	1(1)	2(1)	6(2)

* Clusters tabulated above do not include CINMS MPAs in proposals, () indicates military closures

b)

Size at High Protection

Number of MPA Clusters* at High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
CINMS MPAs	3	5	3	11
Proposal 0	4	0	0	4
Lapis 1	6	4(1)	3(1)	11(2)
Lapis 2	5	6(1)	3(1)	12(2)
Opal	6	6(1)	4(1)	14(2)
Topaz	8	6(1)	2(1)	14(2)
External A	4	5(1)	4(1)	11(2)
External B	3	3(1)	3(1)	7(2)

* Clusters tabulated above do not include CINMS MPAs in proposals, () indicates military closures

c)

Size at Moderate-High Protection

Number of MPA Clusters* at Moderate-High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
CINMS MPAs	3	5	3	11
Proposal 0	4	0	0	4
Lapis 1	8	5(1)	3(1)	14(2)
Lapis 2	7	6(1)	3(1)	14(2)
Opal	6	6(1)	4(1)	14(2)
Topaz	9	8(1)	2(1)	17(2)
External A	4	6(1)	4(1)	12(2)
External B	1	6(1)	3(1)	8(2)

* Clusters tabulated above do not include CINMS MPAs in proposals, () indicates military closures
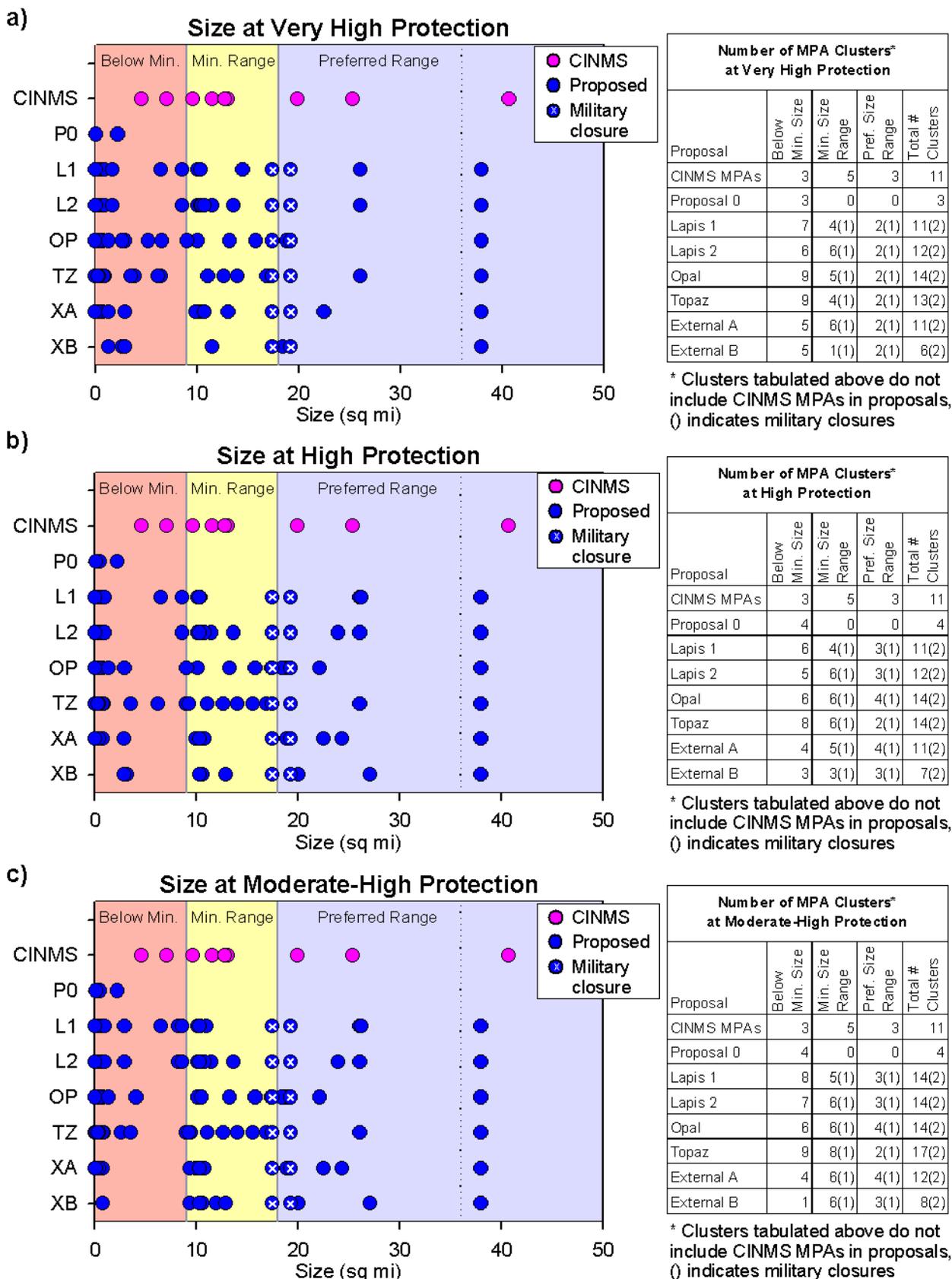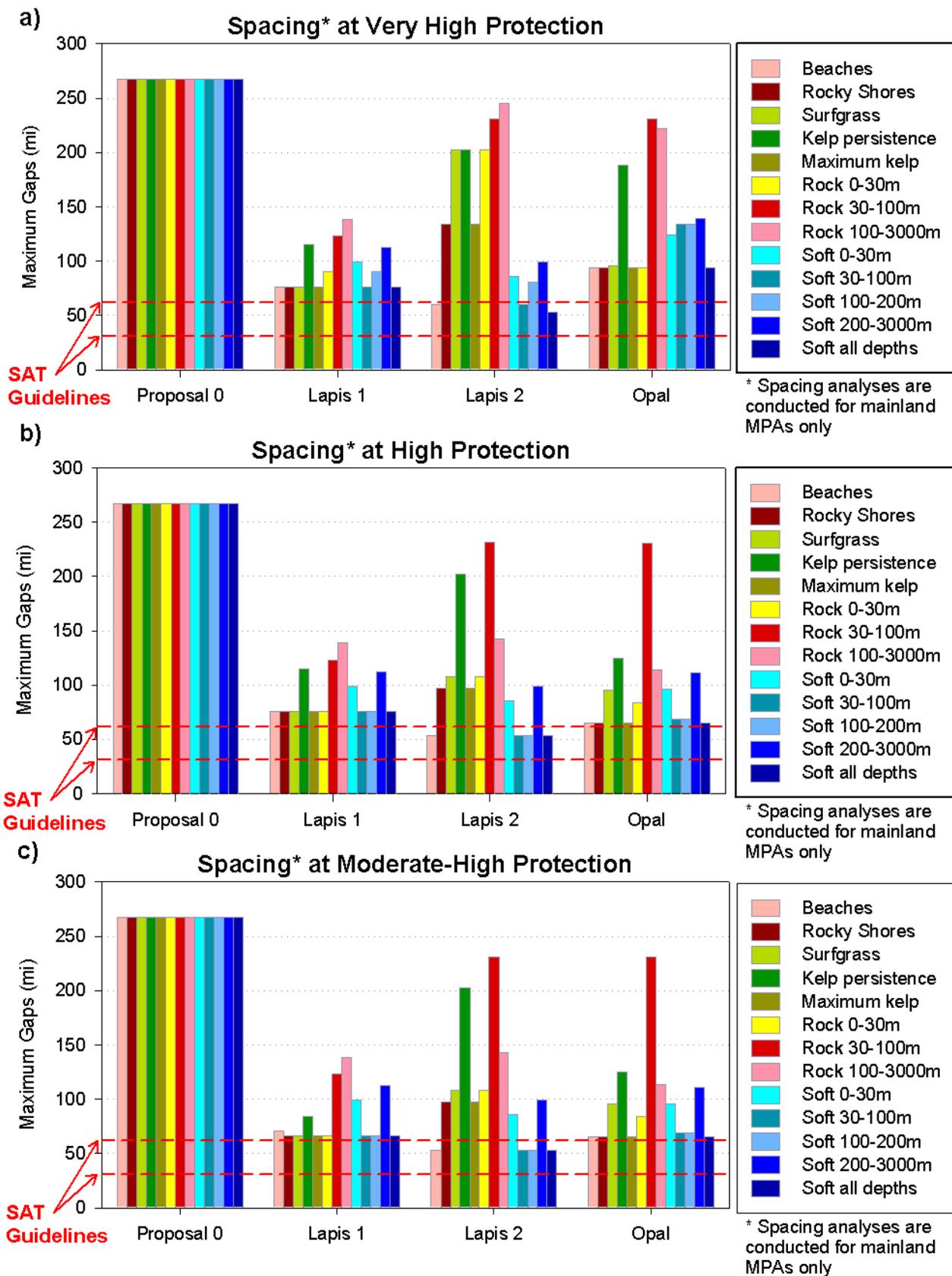
Figure 4.1: Spacing - Lapis & Opal

Figure 4.2: Spacing - Topaz & External

a)

b)

c)