

California Marine Life Protection Act (MLPA) Initiative

Summary of SAT Habitat Representation, Habitat Replication, and Size and Spacing Analyses of the North Central Coast Study Region MPA Proposals

May 22, 2008

Overview of MPA Proposal Evaluations

Marine protected area (MPA) proposals generated by the MLPA North Central Coast Regional Stakeholder Group (NCCRSG) and the Integrated Preferred Alternative (IPA) generated by the MLPA Blue Ribbon Task Force (BRTF) were evaluated against the goals of the Marine Life Protection Act (MLPA) by the Master Plan Science Advisory Team (SAT). The SAT divided goals 1, 2, 4 and 6 into two categories for evaluation purposes:

- Goals 1 and 4 – These goals focus on ecosystems and habitats and are addressed by habitat representation and replication analyses
- Goals 2 and 6 – These goals focus on populations and connectivity and are addressed by size and spacing analyses

Methods for these analyses, including explanations of levels of protection (LOPs), are described in an associated document: *Methods Used to Evaluate MPA Proposals in the North Central Coast Study Region* ("SAT Evaluation Methods Document"). This summary document compares evaluation results for existing MPAs (proposal 0), and NCCRSG proposals 1-3, 2-XA and 4, relative to habitat representation, replication, and size and spacing of MPAs. Associated figures are included as an appendix.

MPA Proposals Evaluated

The NCCRSG finalized three MPA proposals on March 19, 2008 that were advanced to the BRTF: Proposal 1-3, Proposal 2-XA, and Proposal 4. Subsequently, the BRTF used the NCCRSG proposals to generate the IPA on April 23, 2008. Compared to Proposal 0 (existing MPAs), all four proposals increase the area included within MPAs, with notably larger areas within state marine reserves (SMRs) (Table 1, Figure 1). In all evaluations below, these four proposals fair far better than the existing MPAs with respect to SAT guidelines. Thus, this summary will focus on comparisons among the four proposals described above.

Table 1. Proposal Comparison by Percent Area in MPAs & SMRs

Proposal Name	% Study Region in MPAs	% in SMRs
Proposal 0	3.5%	<0.1%
Proposal 1-3	21.6%	11.4%
Proposal 2-XA	18.0%	8.9%
Proposal 4	26.9%	13.8%
Proposal IPA	20.1%	11.2%

The SAT has assigned levels of protection (LOP) based on allowed uses or activities within MPAs (see SAT Evaluation Methods Document for more details). Proposal 4 covers the most area in MPAs at or above the "very high" and "high" LOP (as well as at the moderate and low LOP); Proposal 2-XA covers the least area; and proposals 1-3 and IPA cover an intermediate amount of area (Figure 2). At or above the "moderate-high" level of protection, Proposal 4

covers the most area, Proposal 1-3 covers the least area, and proposals 2-XA and IPA cover an intermediate amount of area (Figure 2). All proposals cover at least 16.5% of the study region in MPAs that are at or above the "moderate-high" level of protection (Figure 2).

Habitat Representation Analyses (Goals 1 and 4)

The key questions that the habitat representation analysis addresses are:

1. How well are key habitat types represented in MPA proposals?
2. What are the proposed levels of protection for these habitat types?
3. How well are habitats and levels of protection distributed across the study region?

In order to answer these questions, the SAT compared the amount of habitat available within the study region that is included within each of the proposals within various levels of protection (Figures 3a-3h and Figures 4a-4d). Further details on these methods are available in the SAT Evaluation Methods Document.

The abundance of each habitat type varies throughout the study region and thus affects how much habitat the proposals are able to include across the study region. For instance, there is more rocky shoreline and shallow rocky reef habitat in the northern part of the study region than the southern part of the study region. Some habitats, including rocky and sandy habitats deeper than 200 meters, are not present in the study region at all. Other habitats, including kelp, are not well mapped and thus geographic patterns of habitat availability are, in part, an artifact of limited data.

Overall, there is strong convergence among the four proposals at the "very high" level of protection, likely due to similar MPA designs in many locations.

- All four proposals generally include a similar percentage of habitat in the study region within SMRs especially in shoreline habitats (Figure 3a, 3b, and 3c).
- For shallow and deep soft bottom habitats, coverage is similar within SMRs across all proposals (Figure 3d and 3h).
- For shallow and deep rocky habitats, Proposal 4 tends to include the most habitat and Proposal 2-XA tends to include the least (Figure 3e, 3f, and 3g). This pattern (4 > 1-3 > 2-XA in area of habitat protected) is apparent across most habitats when all LOPs (including moderate-low and low) are considered, with the exception of sandy beach and shallow sand.
- In sandy beach and shallow sand habitats, proposals 2-XA and IPA tend to have less coverage than other proposals.

All habitats, with the exception of shallow sand, have at least 10% representation at or above the moderate-high LOP in all four proposals (Figure 3). Highlights from habitat-specific analyses include:

- Shoreline habitats (surfgrass, rocky shore, and sandy beach): All four proposals include roughly 20% of surfgrass and rocky shore habitat at the very high LOP (figures 3a and 3b, respectively). All four proposals include roughly 10% of available sandy beach.

- *Rocky habitats (kelp, shallow rocky reef, and deep rocky reef):* All four proposals include rocky habitats mostly within SMRs, though proposals 1-3, 2-XA, and IPA include a portion of deep rocky habitat within moderate-high LOP MPAs in order to allow take of salmon and crab (figures 3e, 3f, and 3g). Proposal 4 protects the greatest portion of kelp, and shallow and deep rocky habitats within SMRs.
- *Soft bottom habitats (shallow sand and deep sand):* A smaller percentage of available soft bottom habitats are represented in proposals as compared to rocky habitats. It is important to note that deep soft bottom (30-100 meters) habitat is more expansive (414 square miles) than deep rock habitat (53 square miles); therefore while proposals capture a greater percentage of deep rock, there is still a relatively large amount of deep soft bottom area captured in all the proposals (figures 3d and 3h). At a very high LOP, a similar percentage of shallow and deep soft bottom habitats are represented in the four proposals. All four proposals have areas of deep sand included in high and moderate-high level of protection MPAs due to allowances for salmon and crab take.
- *Estuarine habitats:* All four proposals are similar in the location and size of estuarine MPAs (though only Proposal 4 has an MPA in Tomales Bay), and include a similar proportion of available estuarine habitats within very high LOP MPAs (Figure 4). Consideration of existing mariculture leases led to a smaller amount of estuarine habitat within very high protection MPAs as compared to previous evaluation rounds. All four proposals include a large estuarine area in a state marine conservation area that allows mariculture (low LOP), and some proposals would also allow recreational clamming.

The habitat representation analysis results for Proposal IPA are overall similar to the three NCCRSR MPA proposals. For some habitats, including rocky shore, surfgrass, shallow rock, kelp, and deep sand, Proposal IPA is equivalent to or lies between proposals 1-3 and 4 in the area included in SMRs. For deep rock, IPA falls between proposals 1-3 and 2-XA in the area included in SMRs. For sandy beaches and shallow sand, Proposal IPA has the lowest representation in SMRs of the 4 proposals. Note that all four proposals have nearly identical representation for estuarine habitats (with the exception of coastal marsh, where Proposal 4 has higher representation than other proposals).

Habitat Replication (Goals 1 and 4)

Replication of habitats within the biogeographic region (Point Conception to the Oregon border) within three to five SMRs is required by the MLPA. For this analysis, the SAT included both north central coast MPAs within the NCCRSR proposals and recently implemented MPAs in the central coast (figures 5a-5c and figures 6a-6b) to assess replication. Additionally, the SAT evaluated habitat replication within the NCCSR for within-habitat ecosystem representation and monitoring and evaluation opportunities. In order to be counted in the replication analysis for a given habitat, the MPA must meet the minimum size guideline and the habitat within the MPA must meet the minimum amount to count for representation (further details on these methods are available in the SAT Evaluation Methods Document).

Compared to evaluations of previous rounds of proposals, there are not marked differences among the MPA proposals in terms of replication. Even at a very high LOP, there is similarity in numbers of replicates across proposals in various habitats.

- When combined with results from the central coast, deep sand (30-100m depth) has the lowest level of replication at the very high LOP (1 to 3 in NCCSR and only 1 in CCSR), and has the most replicates in Proposal 1-3 and the fewest replicates in Proposal 2-XA (Figure 5a)
- Kelp is not well replicated, but that this result is likely an artifact of poor data quality for this habitat.
- At or above the moderate-high LOP (Figure 5c), surfgrass has the lowest number of replicates (three to four in NCCSR, seven across both study regions) in all four proposals (again, not considering kelp).
- Estuaries are similarly replicated across all four NCC proposals (three to four in NCCSR) and are replicated entirely at the very high level of protection (Figure 6a) (note: the low protection estuarine area that allows mariculture is not considered for replication).

Size and Spacing (Goals 2 and 6)

Size and spacing analyses consider "clusters" of MPAs at various levels of protection. Analyses include: 1) the proportion of MPA clusters that meet the minimum and preferred SAT size guidelines, and 2) the maximum gaps between habitats within clusters of at least minimum SAT size guidelines (the analysis is conducted separately at different LOPs). Further details on these methods are available in the "SAT Evaluation Methods Document."

In terms of size analysis (figures 7a-7c), there is a great deal of convergence among the four proposals. Across all proposals, most MPA clusters meet the minimum size guidelines. At the very high level of protection, proposals differ less than in previous rounds, although on average proposals 4 and IPA have larger MPAs. At high and moderate-high LOPs, overall MPA cluster sizes increase. At or above a high LOP, all MPAs in all four proposals meet at least the minimum size guidelines. At or above a moderate-high LOP, the majority of MPAs within all four proposals are within the preferred size range. On average, across all levels of protection, proposals 4 and IPA tend to have larger MPAs and the most within the preferred size range.

In the spacing analysis (figures 8a-8c), all four proposals are an improvement over existing MPAs (Proposal 0), which exceeds maximum spacing guidelines for all habitats at very high, high, and moderate-high levels of protection.

- At the very high and high LOPs (figures 8a and 8b), the three NCCSRG proposals have two habitats with gaps that exceed the maximum spacing guidelines (shallow and deep sand in proposals 1-3 and 4, and sandy beach and deep sand in Proposal 2-XA).
- Proposal IPA has three gaps at very high and high LOP in sandy beach, shallow sand, and deep sand habitats.
- At the moderate-high LOP (Figure 8c), Proposal 2-XA meets the spacing guidelines for all habitats, while proposals 1-3 and 4 have a gap that exceeds the SAT guidelines for one habitat (shallow sand), and Proposal IPA has gaps for two habitats (shallow sand and sandy beach). The shallow sand gap is located between Point Reyes and the northern edge of the study region and the sandy beach gap is located between Point Reyes and the southern edge of the study region.

Appendix: Associated Figures

Figure 1: Percent of Study Region Area within Proposals by MPA Designation

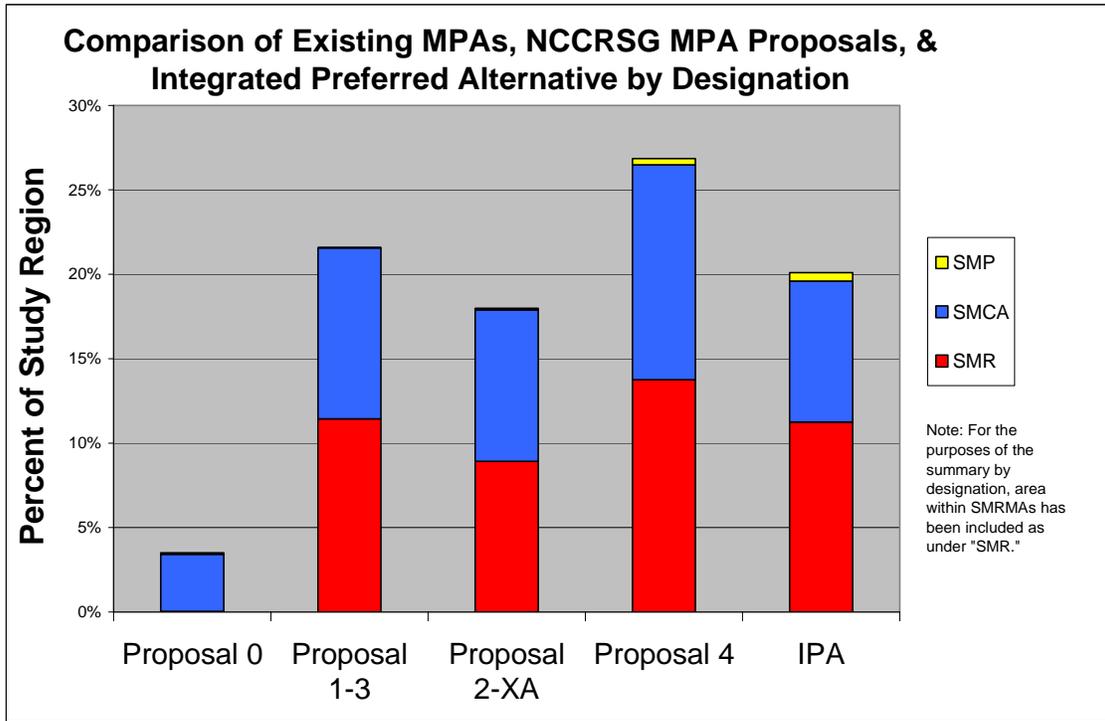


Figure 2: Percent of Study Region Area within Proposals by Level of Protection

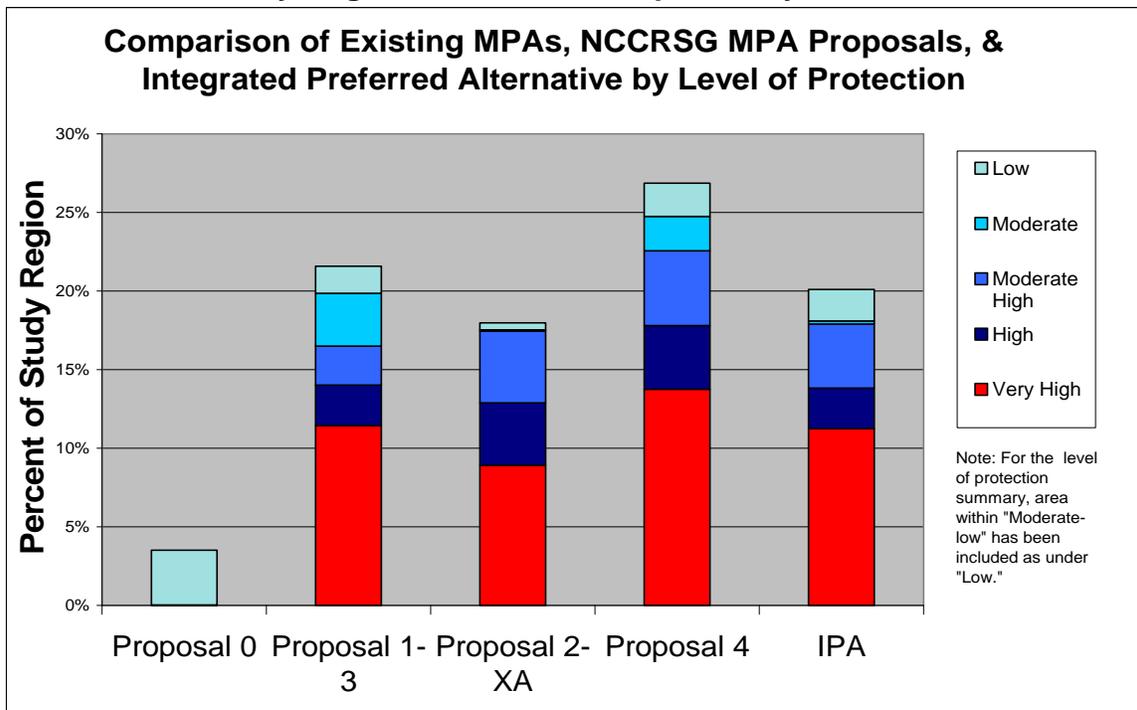


Figure 3: Habitat Representation for Open Coast Habitats

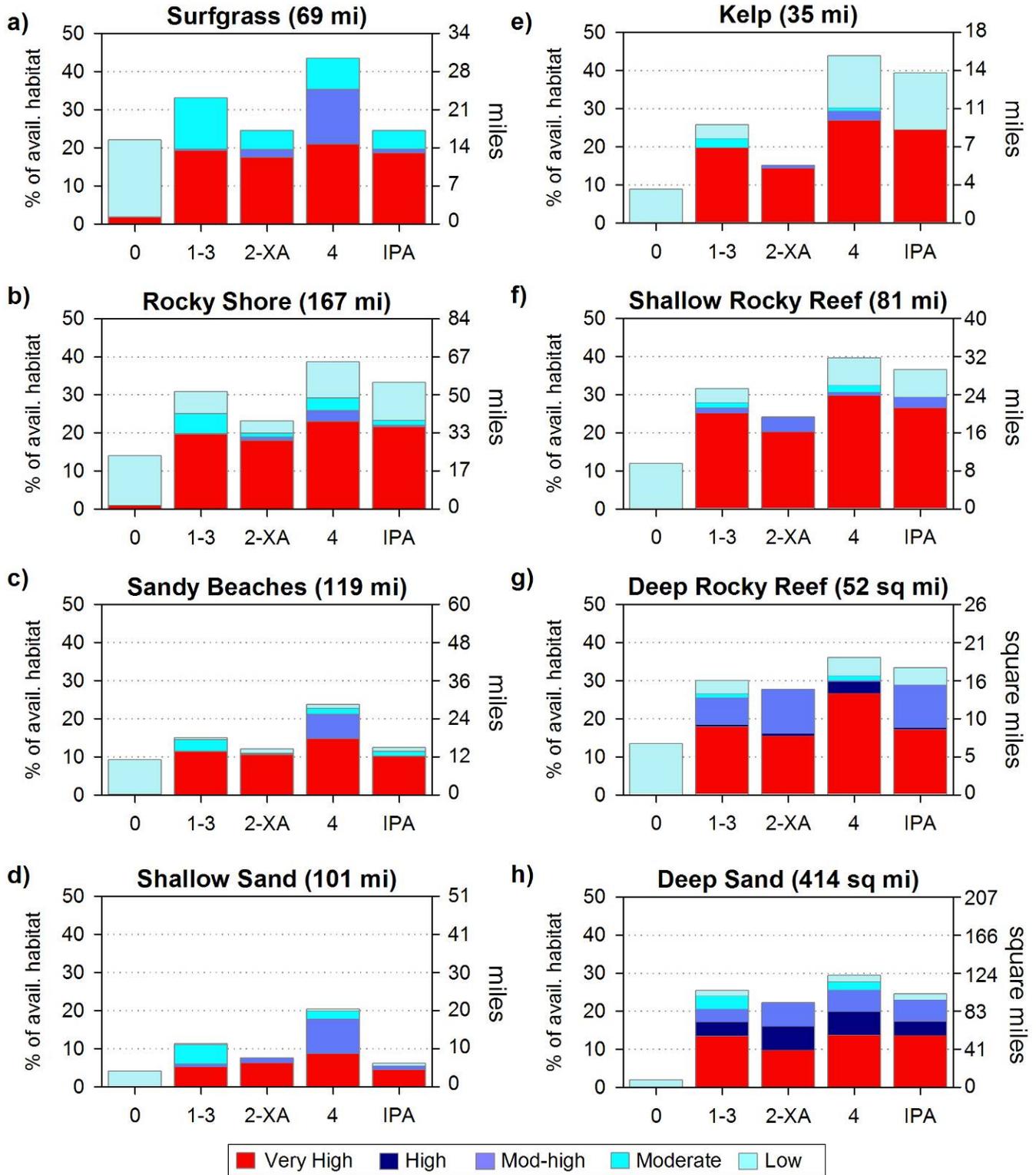


Figure 4: Habitat Representation for Estuarine Habitats

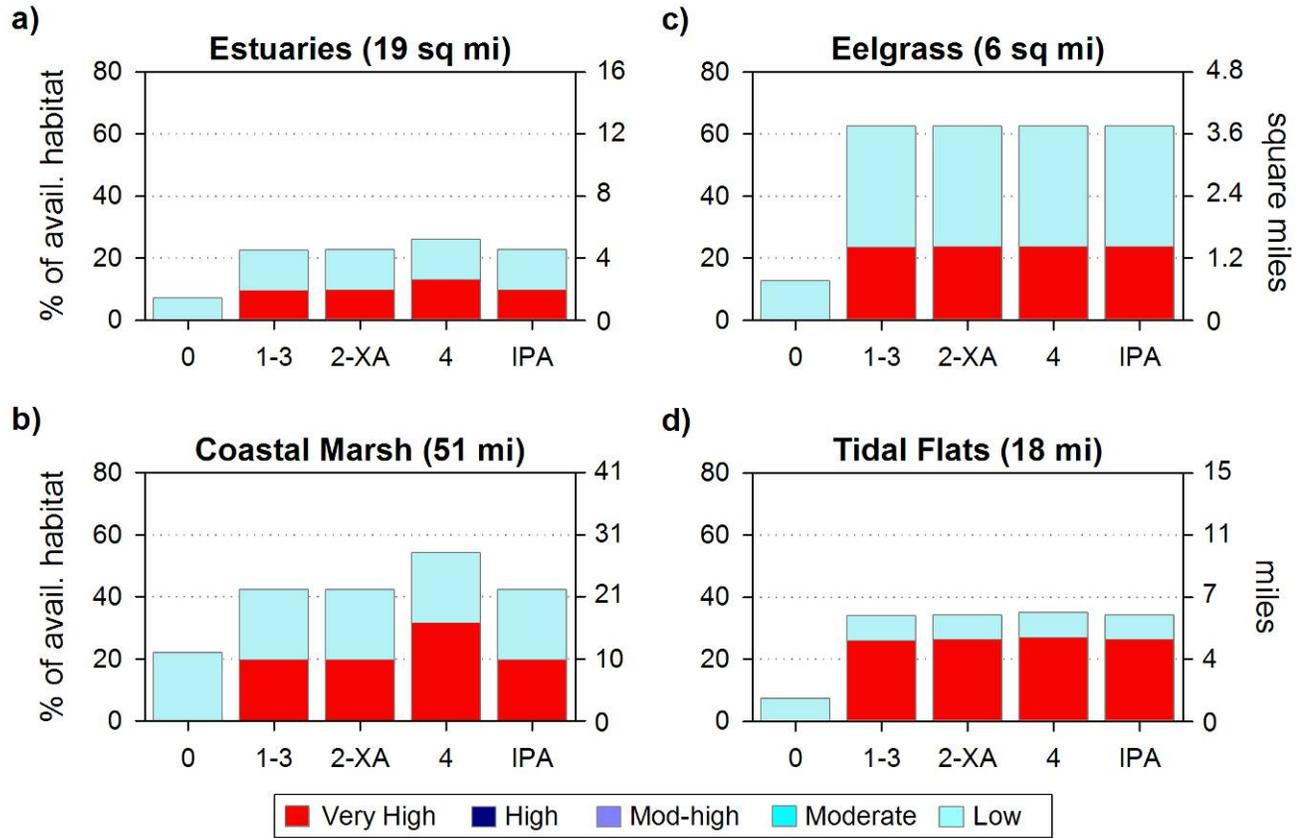


Figure 5: Habitat Replication for Open Coast Habitats

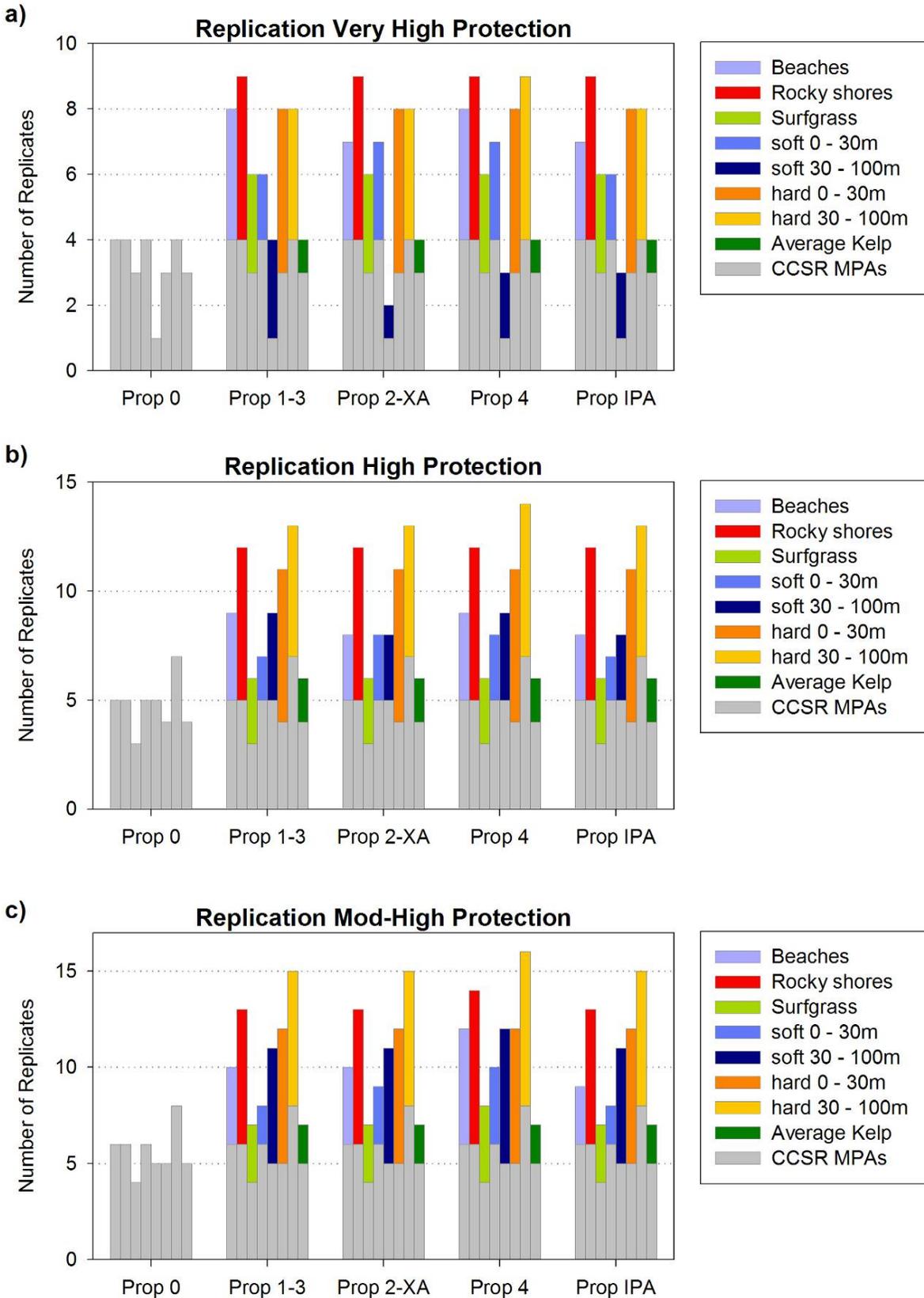


Figure 6: Habitat Replication for Estuarine Habitats

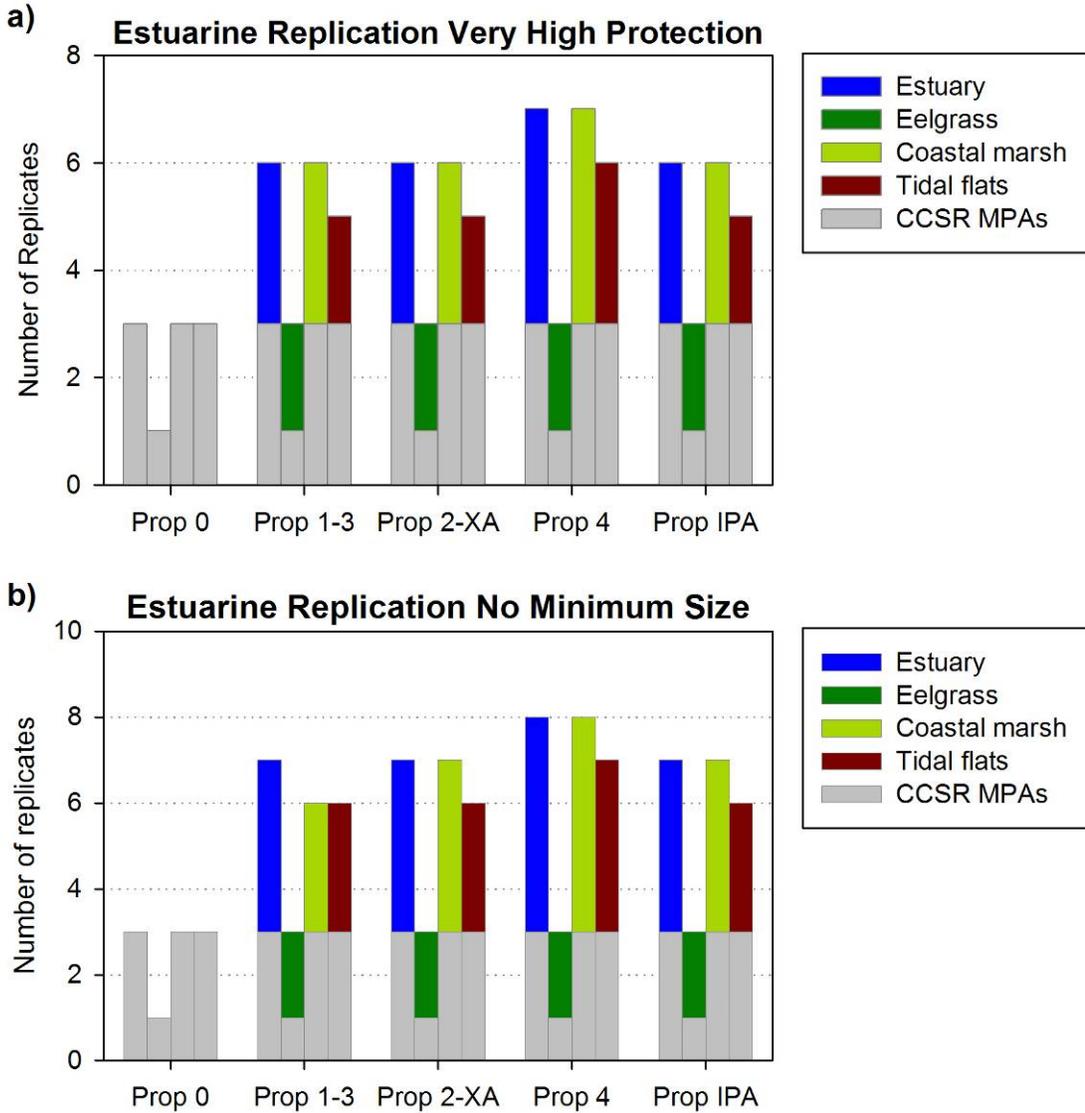
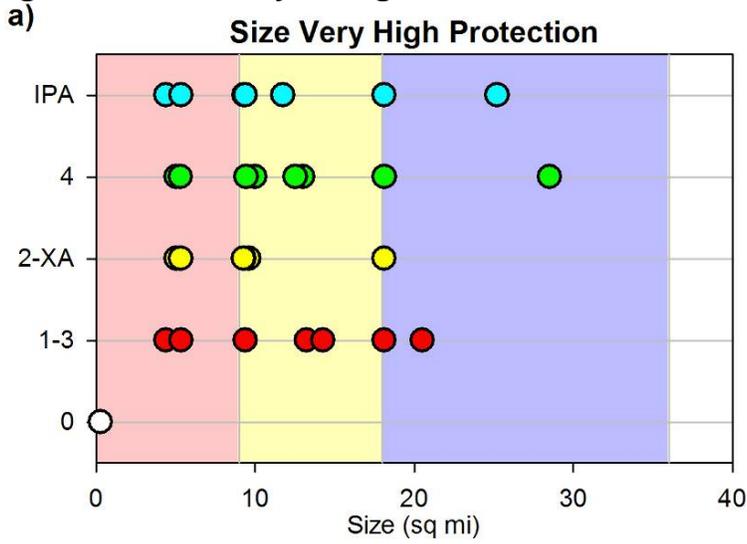
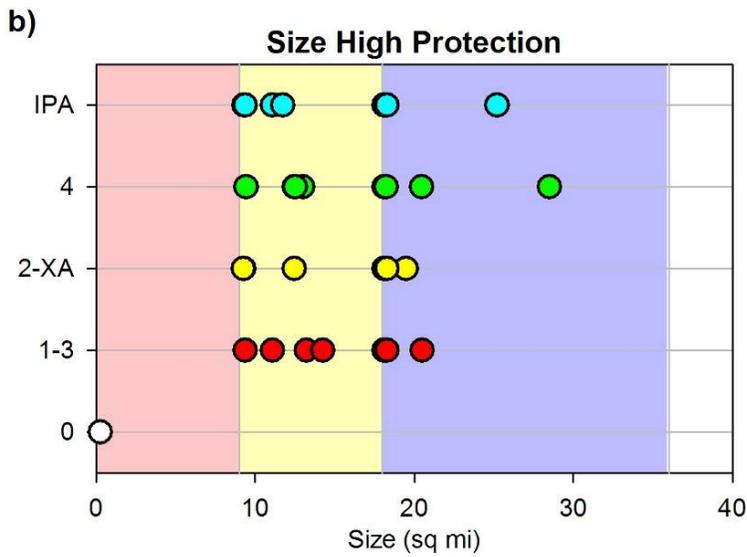


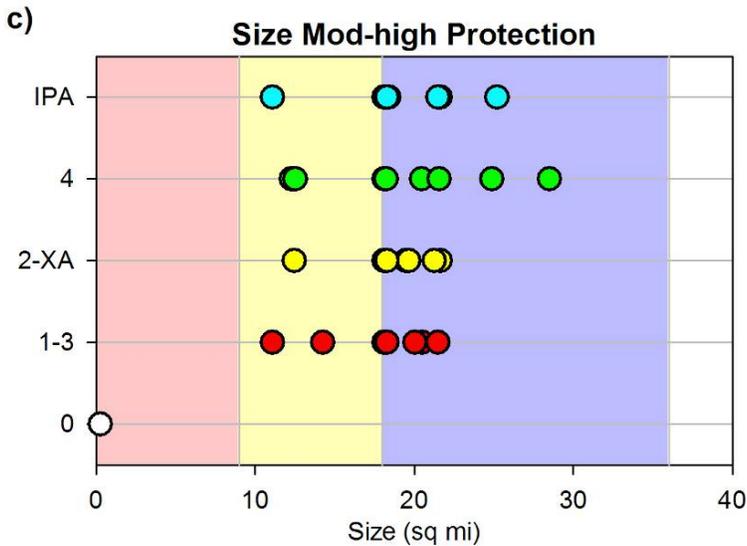
Figure 7: Size Analysis Figures



Proposal	Below Min Size	Min Size Range	Pref Size Range
Prop IPA	2	3	2
Prop 4	2	4	2
Prop 2-XA	2	4	1
Prop 1-3	2	3	2
Prop 0	1	0	0



Proposal	Below Min Size	Min Size Range	Pref Size Range
Prop IPA	0	4	3
Prop 4	0	4	4
Prop 2-XA	0	4	3
Prop 1-3	0	4	3
Prop 0	1	0	0



Proposal	Below Min Size	Min Size Range	Pref Size Range
Prop IPA	0	1	6
Prop 4	0	3	6
Prop 2-XA	0	1	6
Prop 1-3	0	2	5
Prop 0	1	0	0

Figure 8: Spacing Analysis Figures

