California MLPA Master Plan Science Advisory Team
Evaluation of BRTF-Recommended MPA Proposals for the North Coast Study Region: Habitat Representation, Habitat Replication, MPA Size and MPA Spacing Analyses

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The Marine Life Protection Act (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 protected habitats primarily address goals 2 and 6 of the MLPA, which focus on marine life populations and connectivity.

The MLPA North Coast Regional Stakeholder Group (NCRSG) developed a single MPA proposal during round three of the north coast study region (NCSR) MPA planning process. During deliberations at its October 25-26, 2010 and December 9, 2010 meetings, the MLPA Blue Ribbon Task Force (BRTF) chose to forward two complete MPA proposals to the California Fish and Game Commission: The NCRSG proposal with minor revisions proposed by the stakeholders, and an enhanced compliance alternative proposed by the BRTF that uses the same geographies as the NCRSG proposal. The discussion and associated figures and tables in this document compare the Revised Round 3 NCRSG MPA Proposal (abbreviated RNCP), the North Coast Enhanced Compliance Alternative MPA Proposal (abbreviated ECA), and the 'no action' alternative (Proposal 0, labeled as "P0" in figures and tables) for each of the four evaluations.

Methods for these analyses, including explanations of levels of protection (LOPs), are described in an associated document: *Draft Methods Used to Evaluate Marine Protected Area Proposals in the MLPA North Coast Study Region* (SAT Evaluation Methods Document). Evaluations of how well proposals meet the various design guidelines for individual MPAs and the regional network are meant to be complementary; individual evaluations (e.g., habitat representation or MPA size) focus on specific goals of the MLPA, but do not necessarily integrate across all goals.

The RNCP includes a number of MPAs intended to accommodate non-commercial, traditional tribal activities, however, under current statutory authority according to the State of California, exclusive rights cannot be granted to any one group. Therefore, any proposed non-commercial uses in MPAs intended to accommodate a particular group, including tribes and tribal communities, must be open to all recreational users. The NCRSG identified MPAs within the RNCP that are intended to accommodate tribal uses and requested that MLPA Initiative staff work with California Department of Fish and Game staff to identify the species and gear types that are legally appropriate for each MPA, based on input from north coast tribes and tribal communities. If available, MLPA Initiative staff drew from the uses identified by tribes and tribal communities that were specific to proposed MPAs. If no specific information was available for a proposed MPA (such as Reading Rock State Marine Conservation Area [SMCA]), then the general list of all identified tribal uses for the NCSR was employed.

In the ECA, the BRTF chose to maintain the same general MPA geographies included in the NCRSG proposal with some changes to MPA configurations and allowed uses within these geographies. For example, in many areas where the NCRSG proposed recreational uses to

accommodate non-commercial traditional tribal activities, the ECA splits the area into two contiguous MPAs. One of these MPAs, referred to as a "ribbon" MPA, is confined to nearshore habitats and extends from the shore seaward to a distance of approximate 1000 feet offshore. These nearshore "ribbon" MPAs have proposed uses that accommodate the full range of identified traditional tribal activities for that area. The second contiguous MPA extends offshore from the "ribbon" MPA and accommodates only those activities that have been assigned an LOP of moderate-high or high by the SAT. In several cases, including the Reading Rock SMCA and South Humboldt Bay State Marine Recreational Management Area, the BRTF chose to increase the LOP of an entire MPA by eliminating all activities with an LOP below moderate-high and accommodating only those activities that have been assigned an LOP of moderate-high or high by the SAT. Like the NCRSG proposal, all proposed uses intended to accommodate traditional tribal activities are proposed as open to all recreational users at this time.

Several MPAs in both the RNCP and the ECA are intended to accommodate tribal activities only when it becomes possible within the State of California authority to limit allowed activities to tribes and tribal communities. The intention of the NCRSG and BRTF, to be applied in the future when it becomes possible, is to accommodate exclusive tribal activities in these MPAs. Because these MPAs do not currently include proposed allowed uses to accommodate tribal activities, the assigned LOPs are not affected at this time.

Effects of Nearshore "Ribbon" MPAs on SAT Evaluation Results

Nearshore "ribbon" MPAs of the type proposed in the ECA split the 0-30 meter (m) depth zone into two MPAs with different LOPs. As described in Chapter 4: Habitat Representation Analyses in the SAT Evaluation Methods document, due to the strong depth dependence of nearshore marine communities, only MPAs that encompass the full range of depths in the 0-30m depth zone are likely to include the complete suite of species associated with these nearshore habitats. For this reason, the SAT only considers those MPAs or MPA clusters that encompass the entire depth zone, from the shoreline to 30m depth, to contribute toward representation of nearshore habitats (0-30m rock, 0-30m soft bottom, and kelp) in the MPA network. In cases where the 0-30m depth zone is split across multiple MPAs with different levels of protection, these nearshore habitats are evaluated at the lowest LOP afforded within the 0-30m depth zone, consistent with the way that multiple proposed uses affect LOP assignments for a given MPA. Likewise, replication of 0-30m habitats requires the entire 0-30m depth zone to be included in the MPA or MPA cluster, and spacing results are based upon spacing between habitat replicates (see Chapter 5: Habitat Replication Analyses, and Chapter 7: MPA Spacing in the SAT Evaluation Methods Document for further details).

The nearshore "ribbon" MPAs included in the ECA propose a wide variety of recreational uses in the nearshore portion of the 0-30m habitat that may alter marine communities across the entire 0-30m depth zone. Consequently, all ribbon MPAs proposed in the ECA were assigned a moderate-low or low LOP based on the specific proposed allowed uses, and the 0-30m habitats encompassed in these nearshore/offshore MPA clusters were evaluated at these LOPs. As a result, ribbon MPA configurations do little to increase habitat representation and

replication at moderate-high or above protection for nearshore and shoreline habitats, but do provide increased protection for deeper habitats (30-100m and 100-3000m depth zones). Thus, evaluation results for the ECA are largely similar to those for the RNCP with respect to representation and replication of 0-30m habitats; the one exception is the Reading Rock SMCA, where the ribbon design was not used, and the ECA limits proposed allowed uses to those that are assigned an LOP of moderate-high or high across the entire 0-30m depth zone. The Reading Rock SMCA configuration in the ECA increases the representation and replication of several 0-30m and shoreline habitats at moderate-high protection as compared to the RNCP, with important consequences for habitat replication across bioregions and habitat spacing results.

In contrast to the habitat-specific evaluations (representation, replication, and spacing), size evaluations and study region summaries by LOP are based solely on the LOP assignment and spatial area of MPAs (i.e., the evaluations do not consider whether an MPA extends all the way to shore or includes specific habitats). Thus, the size evaluation results at moderate-high protection show more and larger MPAs in the ECA as compared to the RNCP. Likewise, the study region summary shows a large proportion of the total MPA area at moderate high protection in the ECA. However, some of the moderate-high protection MPAs in the ECA are unlikely to provide moderate-high protection for the 0-30m habitats partially included within them because of the uses proposed in the adjacent, nearshore “ribbon” MPAs. To avoid potential inconsistencies and conflicts between area-based and habitat-specific evaluation results (e.g., MPAs that meet size guidelines at a moderate-high or above LOP, but are unlikely to provide this same level of protection to some of the habitats contained within them), the SAT has recommended throughout the MLPA planning process that MPAs encompass entire depth zones (i.e. 0-30m or 30-100m) and not split depth zones into multiple MPAs with different LOPs.

Habitat Representation

Habitat abundance in the NCSR varies by habitat type and bioregion (Figure 1.1a). The most abundant mapped open coast habitat in the study region is soft bottom at 30-100 meters (m) depth, which is also the most abundant habitat in each of the two bioregions where it encompasses over 200 square miles (sq mi) in each. Several rock and rock-associated habitats, including rocky shores, kelp, and rock 0-30m are more abundant in the southern bioregion, whereas soft bottom habitats are more abundant in the northern bioregion, with the exception of deep soft bottom habitat (100-3000m). Deep rock (100-3000m) is rare in the NCSR, found only between Cape Mendocino and Shelter Cove, with roughly 0.4 sq mi of mapped area available in each bioregion. Canyon habitat also is rare in the NCSR, with roughly 3 sq mi available in the northern bioregion and 4.5 sq mi available in the southern bioregion.

Estuarine habitats, including total estuary area, tidal flats, and coastal marsh, are much more abundant in the northern bioregion (Figure 1.1b). Total estuary habitat available in the northern bioregion is approximately 42 sq mi compared to a total of about 1 sq mi in the southern bioregion. In particular, approximately two-thirds of the available estuarine habitat in the

northern bioregion is found within Humboldt Bay (as indicated in Figure 1.1b). Humboldt Bay encompasses roughly 27 sq mi, which is over six times greater than the next largest estuary in the study region, the Eel River estuary (about 4 sq mi). The other large estuaries (> 1.0 sq mi) in the study region also are all located in the northern bioregion (Lake Earl, Big Lagoon, Klamath River and Smith River), whereas the largest estuary in the southern bioregion is the Big River estuary (approximately 0.35 sq mi). Furthermore, most of the estuaries found in the southern bioregion are characterized by narrow channels and surrounded by steep sides, limiting the availability of coastal marsh, tidal flats, and eelgrass habitat.

The availability of eelgrass is much higher in the northern bioregion due to the large, dense eelgrass beds found in Humboldt Bay. Eelgrass is not comprehensively mapped across the study region, and high resolution mapping appropriate for assessing area is only available for Humboldt Bay (labeled as “mapped eelgrass” in figures and tables). Approximately 7 sq mi of mapped eelgrass is available in Humboldt Bay. MLPA Initiative staff also has confirmed eelgrass presence/absence for all major estuaries in the study region which allows the SAT to assess the proportion of known eelgrass locations protected (labeled as “all eelgrass locations” in figures and tables).

The availability of open coast habitat replicates (i.e. sufficient quantity of each open coast habitat to be included as a replicate in standard SAT evaluations of habitat replication and MPA spacing) by latitude throughout the NCSR can be found in Figure 1.2.

An overall summary of the Revised NCRSG MPA Proposal (RNCP) and the North Coast Enhanced Compliance Alternative (ECA) by designation type and by LOP can be found in Figure 1.3.

Key Points from Proposal Summary Graphs (Figure 1.3)

- The RNCP and ECA each include six state marine reserves (SMRs) encompassing 5.0% of the study region.
- The RNCP includes seven SMCAs encompassing 8.0% of the study region. However, only one SMCA has an assigned LOP at moderate-high or above (Point St. George Reef Offshore SMCA). All other SMCAs include proposed recreational take open to all recreational users, intended to accommodate a range of traditional tribal uses, that reduce the LOP to moderate-low or low.
- The ECA includes eleven SMCAs encompassing 8.0% of the study region. Six of the proposed SMCAs have been assigned an LOP at or above moderate-high, five of which include proposed allowed uses to accommodate a limited set of traditional tribal uses. The other five SMCAs include proposed recreational take open to all recreational users, intended to accommodate a range of traditional tribal uses, that reduce the LOP to moderate-low or low.
- Both proposals include one state marine park (SMP) and three state marine recreational management areas (SMRMAs). In the RNCP, one of the SMRMAs has an assigned LOP at very high while the SMP and two of the SMRMAs are assigned LOPs below

moderate-high. In the ECA, two of the SMRMAs are assigned a very high LOP, while the SMP and one SMRMA are assigned LOPs below moderate-high.

- The proportion of the study region area in MPAs at or above moderate-high LOP, including SMRs, SMCAs, and SMRMAs, is 5.9% for RNCP and 12.3% for ECA.
- No MPAs are proposed at high LOP in either proposal.

Key Points from Habitat Representation Analyses (Figures 2.1 – 2.6)

Rocky Habitats

- The RNCP and ECA each include less than 5% of available rock 0-30m habitat and less than 10% of available rocky shores, offshore rocks, and kelp habitats in very high protection MPAs.
- The RNCP and ECA each include at least 20% of available rock 30-100m and rock 100-3000m habitats in very high protection MPAs (range 21-35%), although the deepest rock habitat is rare in the study region so large percentages do not correspond to large areas.
- At moderate-high protection RNCP includes an additional 1.1% of available rock 30-100m as compared to very high protection.
- At moderate-high protection, the ECA includes roughly an additional 0.2% of rocky shores and rock 0-30m, an additional 1.5% of offshore rocks and rock 30-100m, and an additional 2.5% of rock 100-3000m as compared to very high protection.
- The RNCP includes shoreline and nearshore rocky habitats (rocky shores, offshore rocks, kelp, and rock 0-30m) in MPAs of two different LOPs: Very high LOP MPAs, or low LOP MPAs with recreational uses intended to accommodate tribal activities. The ECA includes an identical percentage of these habitats in very high LOP and an identical total percentage, but changes to allowed uses increase the LOP assigned to some habitats to moderate or moderate-high.

Soft-bottom Habitats

- The RNCP and ECA each include 2-3% of available beaches and soft 0-30m habitats in very high LOP MPAs, and a slightly larger proportion of soft 30-100m and soft 100-3000m habitats (6-7%) in very high LOP MPAs.
- The RNCP and ECA each include approximately 20% of available canyon habitat in very high LOP MPAs, although this habitat is rare in the study region so large percentages do not correspond to large areas.
- At moderate-high protection, RNCP includes an additional 2-3% of available soft 30-100m and soft 100-3000m habitats as compared to very high protection.
- At moderate-high LOP, the ECA includes an additional 1.5% of available beaches and soft 0-30m habitats and an additional 7-11% of soft 30-100m, soft 100-3000m, and canyon habitats as compared to very high protection.

- The RNCP includes shoreline and nearshore soft-bottom habitats (beaches and soft 0-30m) in two types of MPAs: very high LOP MPAs or moderate-low to low LOP MPAs with recreational uses intended to accommodate tribal activities. The ECA includes an identical percentage of these habitats in very high LOP and an identical total percentage, but changes to allowed uses increase the LOP assigned to some habitats to moderate-high (soft 30-100m and soft 100-3000m).

Estuarine Habitats

- In the northern bioregion, the RNCP does not include any estuarine habitats at very high LOP, but includes some proportion of estuary, marsh, and eelgrass at moderate-low LOP with recreational uses intended to accommodate tribal activities.
- In the northern bioregion at very high LOP, the ECA includes 1-2% of available estuary and coastal marsh habitats, 3% of available mapped eelgrass habitat, captures one of four eelgrass locations, but does not protect any available tidal flat habitat.
- In the southern bioregion, at very high LOP, both the RNCP and ECA protect 17-36% of available habitat for three estuarine habitats (estuary, coastal marsh, and eelgrass locations), but do not include any tidal flats habitat.
- Some portion of available estuarine habitats in the southern bioregion in both proposals are included in MPAs that were assigned LOPs below moderate-high due to a combination of general recreational uses and uses intended to accommodate tribal activities.

Habitat Replication

The replication guideline in the *California Marine Life Protection Act Master Plan for Marine Protected Areas* specifies that each habitat should be replicated in three to five SMRs in each biogeographical region (Point Conception to the California-Oregon border). This guideline has already been met by existing MPAs from the central coast and north central coast study regions. However, the SAT has recommended that habitats be replicated in at least one MPA in each of the two bioregions of the NCSR to that ensure the full diversity of a given habitat is represented within the MPA network and to provide monitoring and evaluation opportunities. In order to be included in the replication analysis an MPA must meet the minimum size guideline (9 sq mi), and a given habitat within the MPA must be present in a sufficient amount to encompass 90% of the biodiversity associated with that habitat (see Chapter 5: Habitat Replication Analyses in the SAT Evaluation Methods Document for further details).

The results of the habitat replication analysis are displayed in figures 3.1 to 3.4. In Figure 3.1, the number of open coast MPAs that contain a sufficient amount of each habitat to achieve a replicate are shown for each MPA proposal at very high (Figure 3.1a) and moderate-high LOPs (Figure 3.1b). Figure 3.2 contains similar information to 3.1, but is conducted only for estuarine habitats. Figure 3.3 shows the number of open coast MPAs that contain a sufficient amount of each habitat to count as a replicate by bioregion for each MPA proposal at very high (Figure 3.3a) and moderate-high LOPs (Figure 3.3b). The portion of bars outlined in black in

Figure 3.3 indicates habitat replicates that occur in proposed MPAs that span the bioregion boundary and thus can reasonably be assigned to either bioregion. Figure 3.4 contains similar information to 3.3, but is conducted only for estuarine habitats. Grey bars in figures 3.1 – 3.4 indicate the number of replicates elsewhere in the biogeographic region (Point Conception to the California-Oregon border).

Key Points From the Habitat Replication Analyses (Figures 3.1 – 3.2)

- At very high LOP, there are at least three to five replicates already existing elsewhere in the biogeographic region for all open coast and estuarine habitats except rock 100-3000m and soft 100-3000m. At moderate-high LOP, there are at least three to five replicates already existing elsewhere in the biogeographic region for all open coast and estuarine habitats.
- At very high LOP, the RNCP and ECA each include one to five replicates of each open coast habitat. Replication at very high LOP for both proposals is (with the number of replicates in parentheses): Beaches (1), rocky shores (3), kelp (1), rock 0-30m (1), rock 30-100m (5), rock 100-3000m (1), soft 0-30m (3), soft 30-100m (3), soft 100-3000m (1).
- At moderate-high LOP, the RNCP includes an additional replicate of rock 30-100m, soft 30-100m, and soft 100-3000m habitats. Total replication for the RNCP at moderate high LOP is (with the number of replicates in parentheses): Beaches (1), rocky shores (3), kelp (1), rock 0-30m (1), rock 30-100m (6), rock 100-3000m (1), soft 0-30m (3), soft 30-100m (4), soft 100-3000m (2).
- At moderate-high LOP, the ECA includes additional replicates of beaches, rocky shores, rock 30-100m, soft 0-30m, soft 30-100m, and soft 100-3000m habitats. Total replication for the ECA at moderate high LOP is (number of replicates in parentheses): Beaches (2), rocky shores (4), kelp (1), rock 0-30m (1), rock 30-100m (6), rock 100-3000m (1), soft 0-30m (4), soft 30-100m (7), soft 100-3000m (4).
- At very high and moderate-high LOP, the RNCP includes one replicate for estuary, coastal marsh, and eelgrass location habitats (Ten Mile Estuary SMRMA), but no replicates of mapped eelgrass habitat, which occurs only within Humboldt Bay.
- At very high and moderate-high LOP, the ECA includes two replicates of estuary, coastal marsh, and eelgrass location habitats (Ten Mile Estuary SMRMA and South Humboldt Bay SMRMA), and one replicate of mapped eelgrass habitat, which occurs only within Humboldt Bay.

Key Points from the Analyses of Habitat Replication by Bioregion (Figures 3.3 – 3.4)

- Existing MPAs located in the northern bioregion of the MLPA North Central Coast Study Region (NCCSR) contribute to replication of many habitats except rock 100-3000m, soft 100-3000m, and mapped eelgrass. Replicates of habitats in existing NCCSR MPAs are counted toward replication in the southern bioregion of the NCSR. Because of the bioregional overlap between the NCCSR and the southern bioregion of the NCSR, the RNCP and ECA can achieve replication guidelines by replicating habitats in the northern bioregion of the NCSR only.

- At very high LOP:
  - The RNCP and ECA each include at least one replicate of all open coast habitats in the southern bioregion, in addition to the already occurring habitat replicates contributed by existing MPAs in the NCCSR.
  - The RNCP and ECA include an identical number of replicates for all open coast habitats in both bioregions.
  - The RNCP and ECA do not include replicates of three open coast habitats (beaches, kelp, and rock 0-30m) in the northern bioregion, but include at least one replicate of all other open coast habitats in the northern bioregion.
  - Replicates of rock 30-100m, rock 100-3000m, soft 30-100m, and soft 100-3000m habitats are included in both proposals in the Mattole Canyon SMR, which spans the bioregion boundary. These replicates that fall on the bioregional divide can reasonably be assigned to either bioregion. Note that rock 100-3000m is rare and only available in one location near the bioregional boundary; however, the other habitats are available elsewhere in the northern bioregion.
  - In the RNCP, each available estuarine habitat in the southern bioregion is replicated by the Ten Mile Estuary SMRMA, however none of the estuarine habitats in the northern bioregion are replicated.
  - In the ECA, each available estuarine habitat is replicated in both bioregions, by the Ten Mile Estuary SMRMA in the southern bioregion and the South Humboldt Bay SMRMA in the northern bioregion.
- At or above moderate-high LOP:
  - The RNCP includes additional replicates of rock 30-100m, soft 30-100m, and soft 100-3000m habitats in the northern bioregion, but replication is not increased for any other habitat in the northern bioregion or any habitat in the southern bioregion above that evaluated at very high LOP.
  - ECA includes additional replicates of beaches, rocky shores, rock 30-100m, soft 0-30m, soft 30-100m, and soft 100-3000m habitats in the northern bioregion, and additional replicates of soft 30-100m and soft 100-3000m habitats in the southern bioregion above that evaluated at very high LOP.
  - Kelp and rock 0-30m habitats are not replicated in the northern bioregion in any MPA in either proposal, regardless of LOP.

MPA Size

MPA size guidelines were developed to provide for the persistence of important bottom-dwelling fish and invertebrate groups within MPAs (see Chapter 6: MPA Size in the SAT Evaluation Methods Document for further details). To accommodate adult movements and life history needs for a range of species, science guidelines in the *California Marine Life Protection Act Master Plan for Marine Protected Areas* state that MPAs should have a minimum

alongshore span of 3-6 statute miles (preferably 6-12.5 statute miles) and should extend offshore to deep waters (note that state waters generally extend offshore to 3 nautical miles). The SAT combined and simplified these two guidelines to recommend that an individual MPA or MPA cluster should have a minimum area of 9-18 square statute miles (preferably 18-36 square statute miles).

The size analysis only considers the number of MPA "clusters" (adjacent MPAs at or above a given LOP) that meet the minimum and preferred size guidelines at very high and moderate-high and above LOP (at high LOP and above is not included since neither the RNCP or ECA include any MPAs with an assigned LOP of high). An MPA cluster may consist of a single MPA, or several contiguous MPAs. Estuarine MPAs are not included in the size analysis because the sizes of estuaries are fixed.

Figure 4.1 displays results of the MPA size analysis. Each proposal is displayed on a separate horizontal line in the figures and each circle indicates the size of an MPA "cluster", with larger MPA clusters further to the right and smaller MPA clusters further to the left. The pink shaded area to the far left of a figure indicates MPA clusters that fall below the minimum MPA size recommended by the SAT (9 square statute miles). The yellow shaded area in the middle of the figure indicates MPA clusters that are bigger than the minimum size guideline, but smaller than the preferred size (18 square statute miles). The blue shaded area to the right of the figure indicates MPA clusters that fall within the preferred size range (18 – 36 square statute miles). Where the sizes of two or more MPAs in a given proposal are identical or very similar, the data points are encompassed within a slightly larger black circle and denoted by a number above to indicate how many MPAs are within the larger black circle (e.g. "x3" means there are three MPAs of nearly identical size). These results also are tabulated on the right hand side of the figure. Table 4.2 lists MPA cluster sizes from smallest to largest for each proposal. As with other size analyses estuarine MPAs are not included in Table 4.2.

Key Points from the Size Analyses (Figure 4.1 and Table 4.2)

- At very high LOP, both the RNCP and ECA include five proposed 'backbone' MPA clusters that are within the minimum size range, one MPA below minimum size, and no MPAs within the preferred size range.
- At or above moderate-high LOP:
  - One MPA cluster in the ECA meets the preferred size guidelines and none of the MPA clusters in the RNCP meet the preferred size guidelines.
  - In the RNCP, one additional MPA cluster meets the size guidelines (Point St. George Reef Offshore SMCA) for a total of six MPA clusters within the minimum size range.
  - In the ECA, four additional MPA clusters meet the size guidelines for a total of ten MPA clusters within the minimum size range (including the one preferred size MPA cluster).

MPA Spacing

MPA spacing guidelines were developed to provide for the dispersal of larvae for a range of important bottom-dwelling fish and invertebrate groups between MPAs and to promote connectivity in the network. Further details on these methods are available in Chapter 7: MPA Spacing of the SAT Evaluation Methods Document. To facilitate dispersal and connectivity, spacing guidelines along the mainland recommend that habitats be replicated in MPAs placed at a maximum of 31-62 statute miles from each other. Since marine populations are generally habitat specific, the spacing evaluation is conducted for each habitat. To be included in the spacing analysis, habitats must be protected in sufficient quantity to count as a replicate, which encompasses the amount of habitat needed to include 90% of the associated species (see habitat replication, above). MPAs or MPA clusters also must meet the minimum size guidelines (9 square statute miles) to be included in the spacing analysis.

Spacing analyses include: 1) the maximum distance (gap) between MPA clusters that include a replicate of each habitat (figures 5.1-5.2) and 2) the number of spacing gaps that exceed SAT spacing guidelines (greater than 62 statute miles) for a given habitat (Figure 5.3 a-d). Both analyses are conducted for MPAs at very high and moderate-high and above LOP. Spacing is measured between MPAs that contain replicates of the same habitats, extending from the nearest MPA established in the north central coast study region to the California - Oregon border for open coast habitats, and to the southernmost estuary in Oregon that is at least the minimum estuarine size (Chetco River) for estuarine habitats.

Maximum Distance (Gap)

Figure 5.1 displays the results of the MPA spacing analysis for all open coast habitats. Figure 5.2 displays the results of the MPA spacing analysis for all estuarine habitats. The height of each bar indicates the maximum distance between adjacent habitat replicates in a given proposal. These maximum distances, or gaps, for each habitat may be compared to the spacing guidelines, a maximum of 31 to 62 miles between MPAs, which is indicated by the horizontal dashed red lines on the figure. Habitats marked with an asterisk in the legend are distributed such that it is not possible for the spacing guidelines to be met. For all habitats, spacing in excess of the guideline or minimum possible gap is reflected with hatch marks across the bars.

Gaps that Exceed the Spacing Guidelines

Table 5.3a-b provides the number of spacing gaps that exceed spacing guidelines between adjacent MPA clusters for a given habitat. The location and distance of each gap also is identified for each habitat. The intent of this analysis is to provide detailed information about spacing gaps by habitat for each proposal, in order to identify specific MPA proposal designs that result in large spacing gaps that could compromise the network function of the proposed MPAs.

Key Points from the Spacing Analyses (Figures 5.1 and 5.2, Table 5.3)

- Habitat spacing guidelines cannot be met for three open coast habitats: Kelp (115 mi minimum gap), rock 100-3000m (110 mi minimum gap), and soft bottom 100-3000m (95 mi minimum gap).
- Habitat spacing guidelines cannot be met for any of the three estuarine habitats for which spacing is calculated: Estuary (64 mi minimum gap), coastal marsh (83 mi minimum gap), and eelgrass locations (83 mi minimum gap).
- At very high LOP:
  - The RNCP approaches the spacing guidelines for two of twelve key habitats: Rock 30-100m and soft 30-100m.
  - ECA approaches the spacing guidelines for three of twelve key habitats: Rock 30-100m, soft 30-100m, and marsh.
  - The RNCP and ECA both have spacing gaps for the remaining nine or ten of twelve key habitats, including: Beaches, rocky shores, kelp, rock 0-30m, rock 100-3000m, soft 0-30m, soft 100-3000m, estuary (RNCP only), marsh and eelgrass.
- At or above moderate-high LOP:
  - The RNCP achieves or approaches the spacing guidelines or minimum possible spacing for three of twelve key habitats (rock 30-100m, rock 100-3000m, and soft 30-100m), with gaps that exceed the guideline for the remaining nine key habitats (beaches, rocky shores, kelp, rock 0-30m, soft 0-30m, soft 100-3000m, estuary, marsh and eelgrass).
  - The ECA achieves or approaches the spacing guidelines or minimum possible spacing for six of twelve key habitats (rocky shores, rock 30-100m, rock 100-3000m, soft 30-100m, soft 100-3000m, and marsh), with gaps that exceed the guideline for the remaining six key habitats (beaches, kelp, rock 0-30m, soft 0-30m, estuary, and eelgrass)

Gap Detail for Open Coast Habitats

- For all open coast habitats, spacing gaps at very high LOP are identical in the RNCP and ECA due to identical configuration of open coast SMRs.
- **Beaches**: Gaps between replicates of beach habitat in the RNCP exceed the spacing guidelines at very high and moderate-high LOP because the only replicate of this habitat included at or above moderate-high LOP occurs in the Ten Mile SMR, 174 miles from the Oregon border and 95 miles from Bodega Head SMR (the nearest replicate to the south). In the ECA, the maximum gap for beaches is smaller as a result of changes to the allowed uses in the Reading Rock SMCA that increase the LOP to moderate-high. In the ECA, the two spacing gaps in excess of the guidelines for beach habitats occur between Reading Rock SMCA and the Ten Mile cluster (126 mi) and between the Ten Mile cluster and Bodega Head cluster in the NCCSR (95 mi). Note that midway through the NCSR planning process the southern gap for beach habitat was increased from 64 miles to 95 miles, after the California Fish and Game Commission amended Stewarts

Point SMR (in the NCCSR), which caused this MPA to lose a replicate of beach habitat. Beach habitat is abundant in the NCSR with replicates available along most sections of the coast (figures 1.1-1.2).

- **Rocky Shores:** Gaps between replicates of rocky shore habitat in the RNCP exceed the spacing guidelines at very high and moderate-high LOP, because no replicates of this habitat are included at or above moderate-high LOP between the South Cape Mendocino SMR and the Oregon border (109 mi). In the ECA at moderate-high LOP, spacing guidelines are achieved for rocky shores as a result of changes to the allowed uses in the Reading Rock SMCA that increase the LOP to moderate-high. Rocky shore habitat is abundant in the study region with replicates available along most sections of the coast except a stretch near the mouth of Humboldt Bay (figures 1.1-1.2).
- **Kelp:** Gaps between replicates of kelp habitat in the RNCP and ECA exceed the spacing guidelines at very high and moderate-high LOP because the only replicate of this habitat included at or above moderate-high LOP occurs in the Ten Mile SMR, 174 miles from the Oregon border and 40 miles from the Pt. Arena cluster (the nearest replicate to the south in the NCCSR). The furthest north MPA in which the RNCP and ECA include a sufficient amount of kelp habitat to constitute a replicate is the Vizcaino SMCA, but nearshore habitats are assigned a low LOP in both proposals due to proposed recreational uses intended to accommodate tribal activities in this MPA. Achieving minimum possible spacing for kelp habitat would require placement of MPAs that replicate kelp habitat near Crescent City and Shelter Cove.
- **Rock 0-30m:** Gaps between replicates of rock 0-30m habitat in the RNCP and ECA exceed the spacing guidelines at very high and moderate-high LOP, because the only replicate of this habitat included at or above moderate-high LOP occurs in the Ten Mile SMR, 174 miles from the Oregon border and 40 miles from the Pt. Arena cluster (the nearest replicate to the south in the NCCSR). Rock 0-30m habitat is abundant in the southern bioregion, but unevenly distributed in the northern bioregion, with replicates available only near Trinidad and Crescent City (figures 1.1-1.2).
- **Rock 30-100m:** At very high LOP, gaps between replicates of rock 30-100m habitat in the RNCP and ECA approach the spacing guidelines, with only one gap (64 miles between the Ten Mile SMR and Stewarts Point SMR) in excess of the guideline. At moderate-high LOP all gaps between replicates of rock 30-100m habitat are within the spacing guidelines for both proposals.
- **Rock 100-3000m:** At both very high and moderate-high LOP, the RNCP and ECA approach the minimum possible spacing for rock 100-3000m habitat by including this habitat in the Mattole Canyon SMR, the only location in the NCSR known to have sufficient habitat to count as a replicate (Figures 1.1-1.2).
- **Soft 0-30m:** Gaps between replicates of soft 0-30m habitat in the RNCP exceed the spacing guidelines at very high and moderate-high LOP, because there are no replicates at or above moderate-high between the South Cape Mendocino SMR and the Oregon border (109 mi), and a second gap occurs between the Ten Mile cluster and Bodega Head cluster in the NCCSR (95 mi). In the ECA, the maximum gap for soft 0-30m habitat is smaller as a result of changes to the allowed uses in the Reading Rock SMCA that

increase the LOP to moderate-high. In the ECA, the one spacing gap in excess of the guidelines for soft 0-30m habitat occurs between the Ten Mile cluster and Bodega Head cluster in the NCCSR (95 mi). Soft 0-30m habitat is abundant in the study region with replicates available along most sections of the coast (figures 1.1-1.2).

- **Soft 30-100m:** At very high and moderate-high LOP, gaps between replicates of soft 30-100m habitat in the RNCP and ECA approach the spacing guidelines, with two gaps slightly in excess of the guidelines (67 miles between the Mattole Canyon SMR and Reading Rock SMR, and 64 miles between the Ten Mile SMR and Stewarts Point SMR).
- **Soft 100-3000m:** By including replicates of soft 100-3000m habitat in the Point St. George SMCA and the Mattole Canyon SMR, the RNCP has a 121 mile gap for soft 100-3000m habitat at very high and moderate-high LOP. This gap is further reduced to 102 miles (approaching the minimum possible gap) in the ECA at moderate-high evaluation by inclusion of a replicate of soft 100-3000m habitat in the Vizcaino SMCA.

Gap Detail for Estuarine Habitats

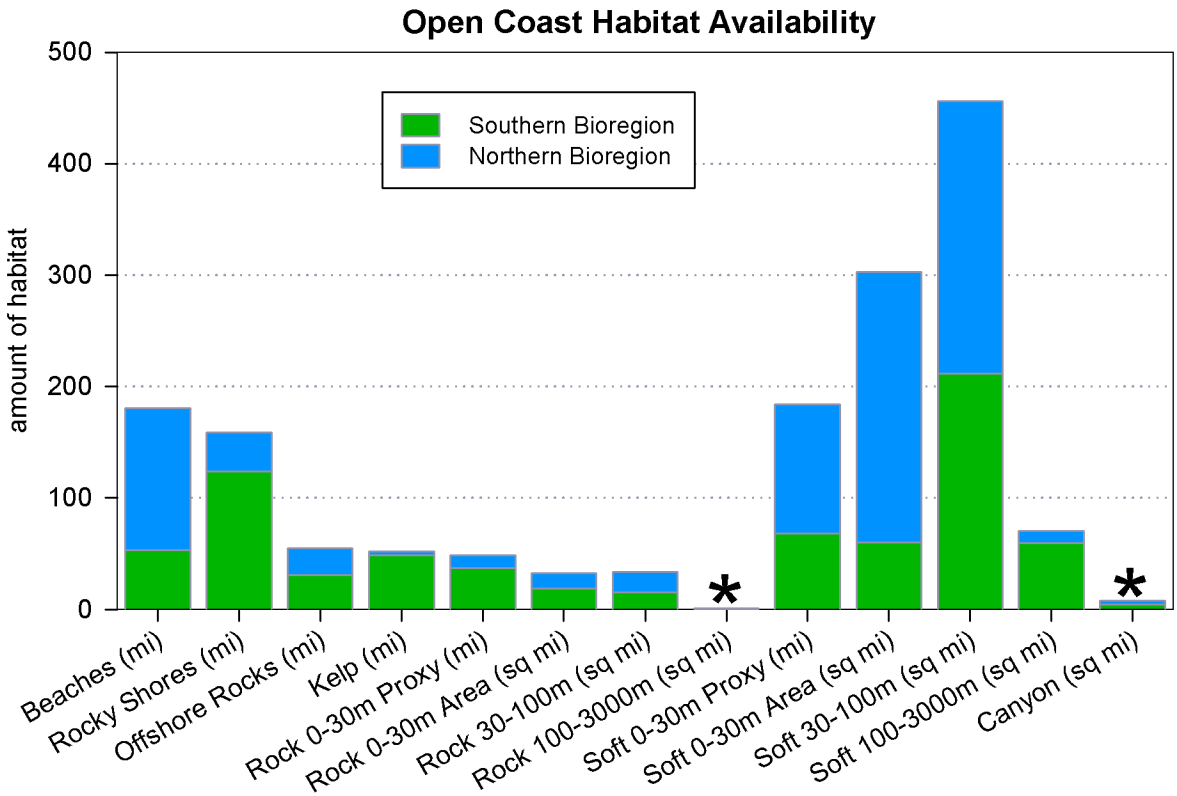
- The RNCP and ECA differ in the number of estuarine MPAs that were assigned a very high LOP (the RNCP includes one and the ECA includes two). Neither proposal includes any estuarine MPAs at high or moderate-high LOP, but both proposals include two estuarine MPAs with LOPs below moderate-high.
- **Estuary:** Gaps between replicates of estuary habitat in the RNCP exceed the spacing guidelines at very high and moderate-high LOP, because the only replicate of this habitat included at or above moderate-high LOP occurs in the Ten Mile Estuary SMRMA, 181 miles from the Chetco River in Oregon and 89 miles from the Russian River SMRMA (the nearest replicate to the south in the NCCSR). In the ECA, two replicates of estuary habitat exist at very high LOP, one in the Ten Mile SMRMA and one in the South Humboldt Bay SMRMA. Several gaps in excess of the spacing guidelines still remain in the ECA at moderate-high LOP, including an 89 mile gap between the Chetco River, OR and the South Humboldt Bay SMRMA, a 92 mile gap between the South Humboldt Bay SMRMA and the Ten Mile Estuary SMRMA, and an 89 mile gap between Ten Mile Estuary SMRMA and the Russian River SMRMA. The estuarine MPA at the Navarro River estuary included in both proposals is below the minimum size to count as an estuarine replicate (Navarro River MPA is 0.06 sq mi; minimum size is 0.12 sq mi).
- **Coastal Marsh:** Gaps between replicates of coastal marsh habitat in the RNCP exceed the spacing guidelines at very high and moderate-high LOP, because the only replicate of this habitat included at or above moderate-high LOP occurs in the Ten Mile Estuary SMRMA, 181 miles from the Chetco River in Oregon and 89 miles from the Russian River SMRMA (the nearest replicate to the south in the NCCSR). In the ECA, two replicates of marsh habitat exist at very high LOP, one in the Ten Mile SMRMA and one in the South Humboldt Bay SMRMA. Several gaps in excess of the spacing guidelines still remain in the ECA at moderate-high LOP including an 89 mile gap between the Chetco River, OR and the South Humboldt Bay SMRMA, a 92 mile gap between the South Humboldt Bay SMRMA and the Ten Mile Estuary SMRMA, and an 89 mile gap

between the Ten Mile MPA and the Russian River SMRMA (the nearest replicate to the south in the NCCSR).

- **Eelgrass Locations:** Gaps between replicates of known eelgrass locations in the RNCP exceed the spacing guidelines at very high and moderate-high LOP, because the only replicate of this habitat included at or above moderate-high LOP occurs in the Ten Mile Estuary SMRMA, 181 miles from the Chetco River in Oregon and 103 miles from the Estero Americano SMRMA (the nearest replicate to the south). In the ECA, two replicates of eelgrass exist at very high LOP, one in the Ten Mile Estuary SMRMA and one in the South Humboldt Bay SMRMA. Several gaps in excess of the SAT spacing guidelines still remain in the ECA, including an 89 mile gap between the Chetco River, OR and the South Humboldt Bay SMRMA, a 92 mile gap between the South Humboldt Bay SMRMA and the Ten Mile Estuary SMRMA, and a 103 mile gap between the Ten Mile Estuary SMRMA and the Estero Americano SMRMA (the nearest replicate to the south in the NCCSR).

Figure 1.1: North Coast Study Region Habitat Availability

a)



* 0.8 sq mi of Rock 100-3000m habitat available in the study region.
* 7.5 sq mi of Canyon habitat available in the study region.

b)

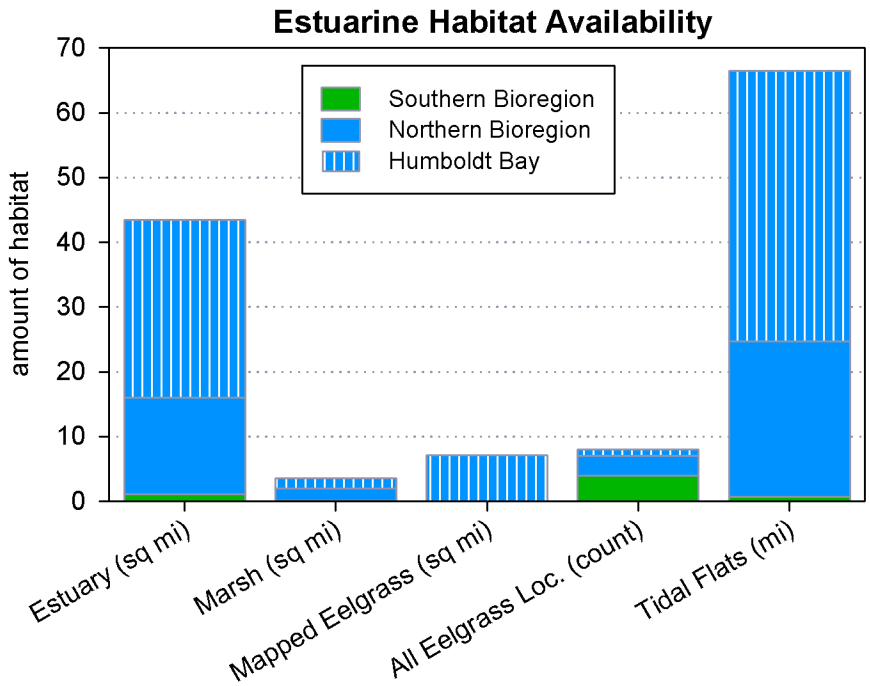


Figure 1.2: Geographic Availability of Open Coast Habitat Replicates Compared to BRTF-Recommended MPA Proposals for the North Coast Study Region

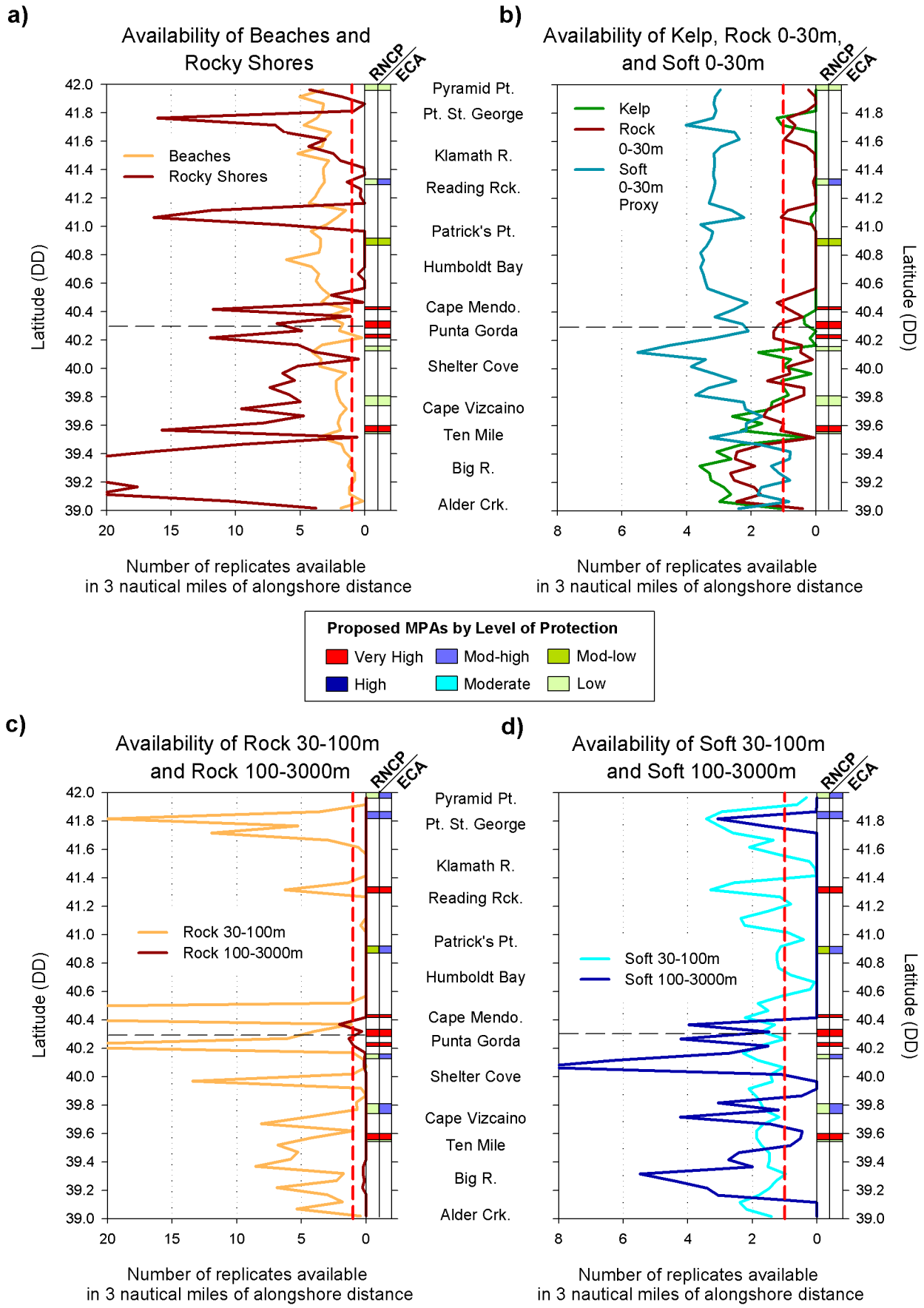
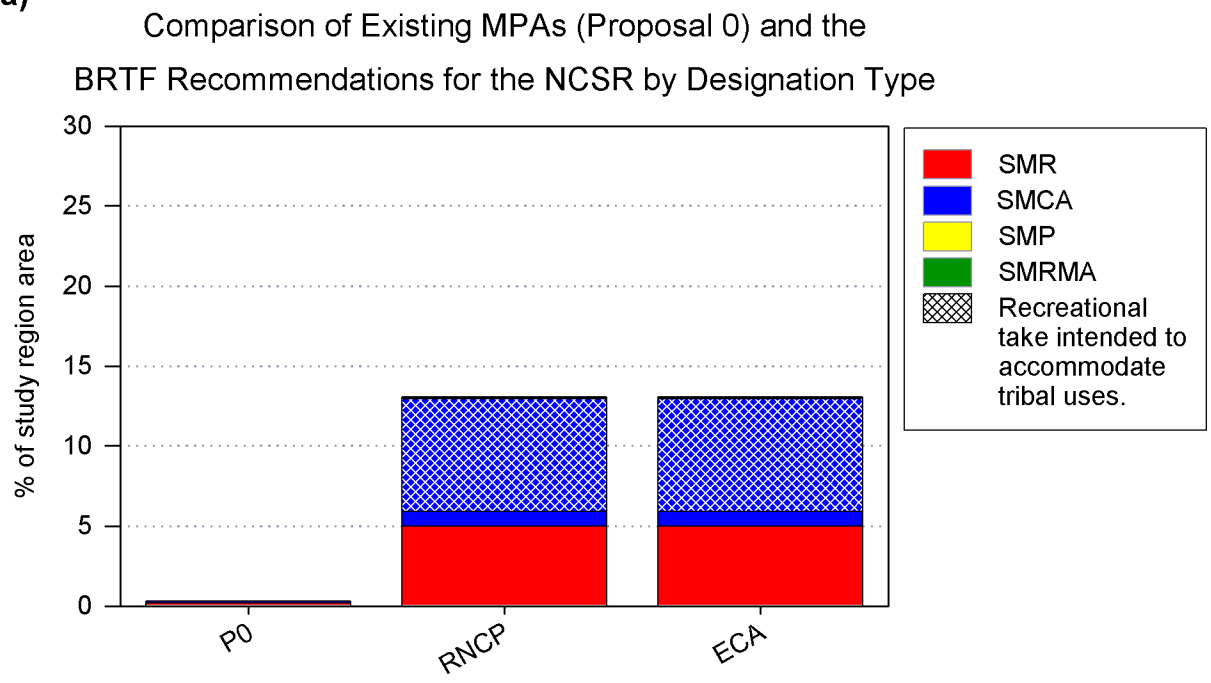


Figure 1.3: Summary of MPA Designations and Levels of Protection for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region

a)



b)

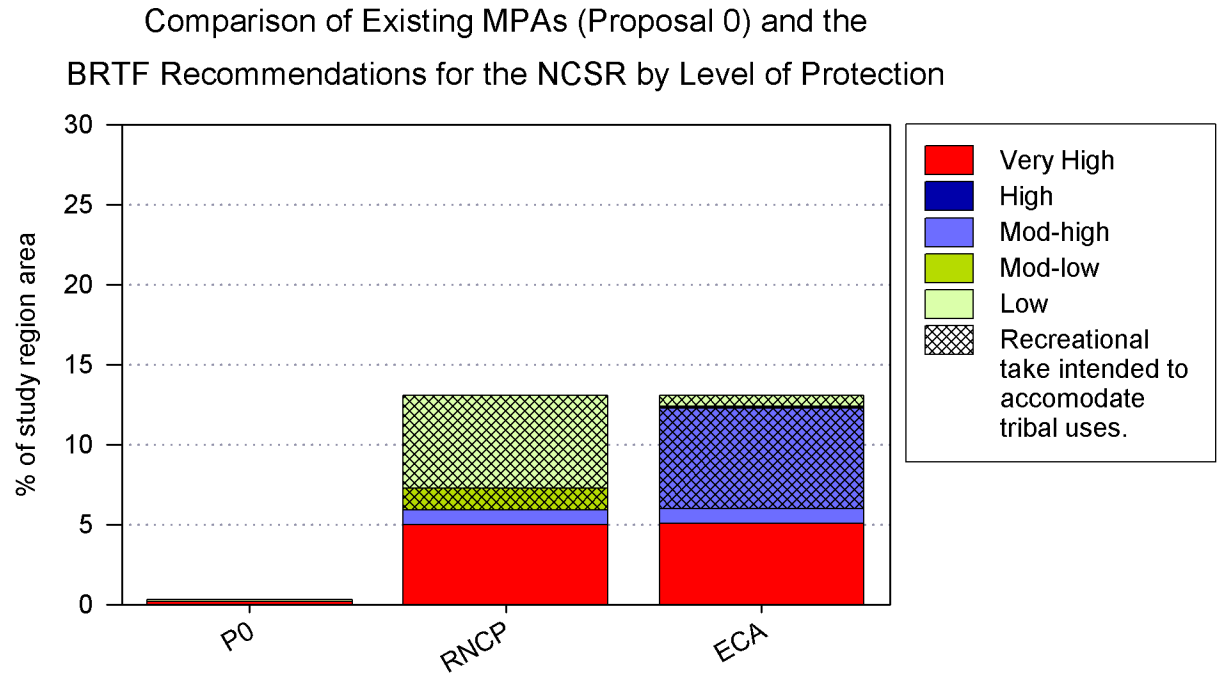


Figure 2.1: Rocky Habitat Representation for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region

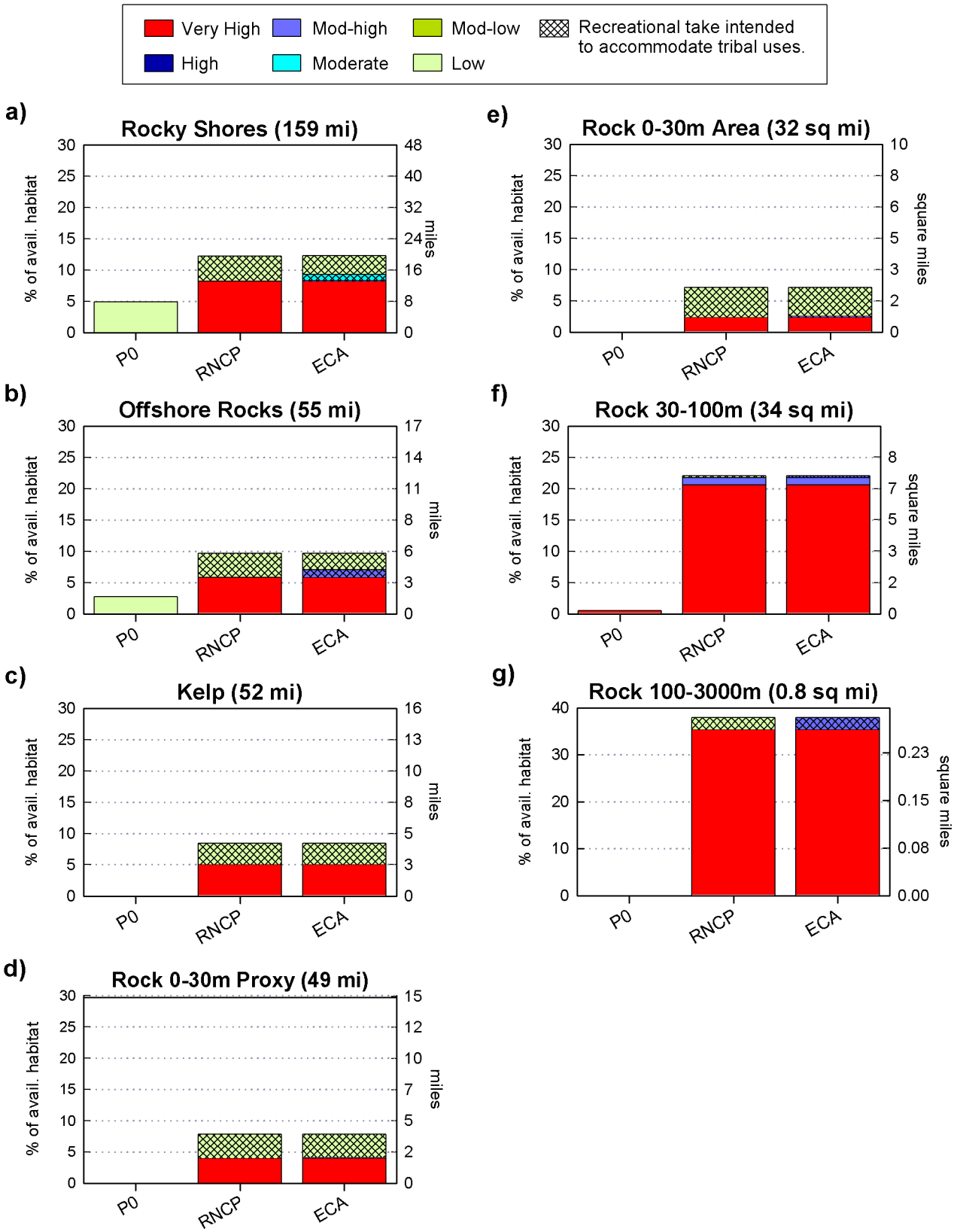


Figure 2.2: Soft Bottom Habitat Representation for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region

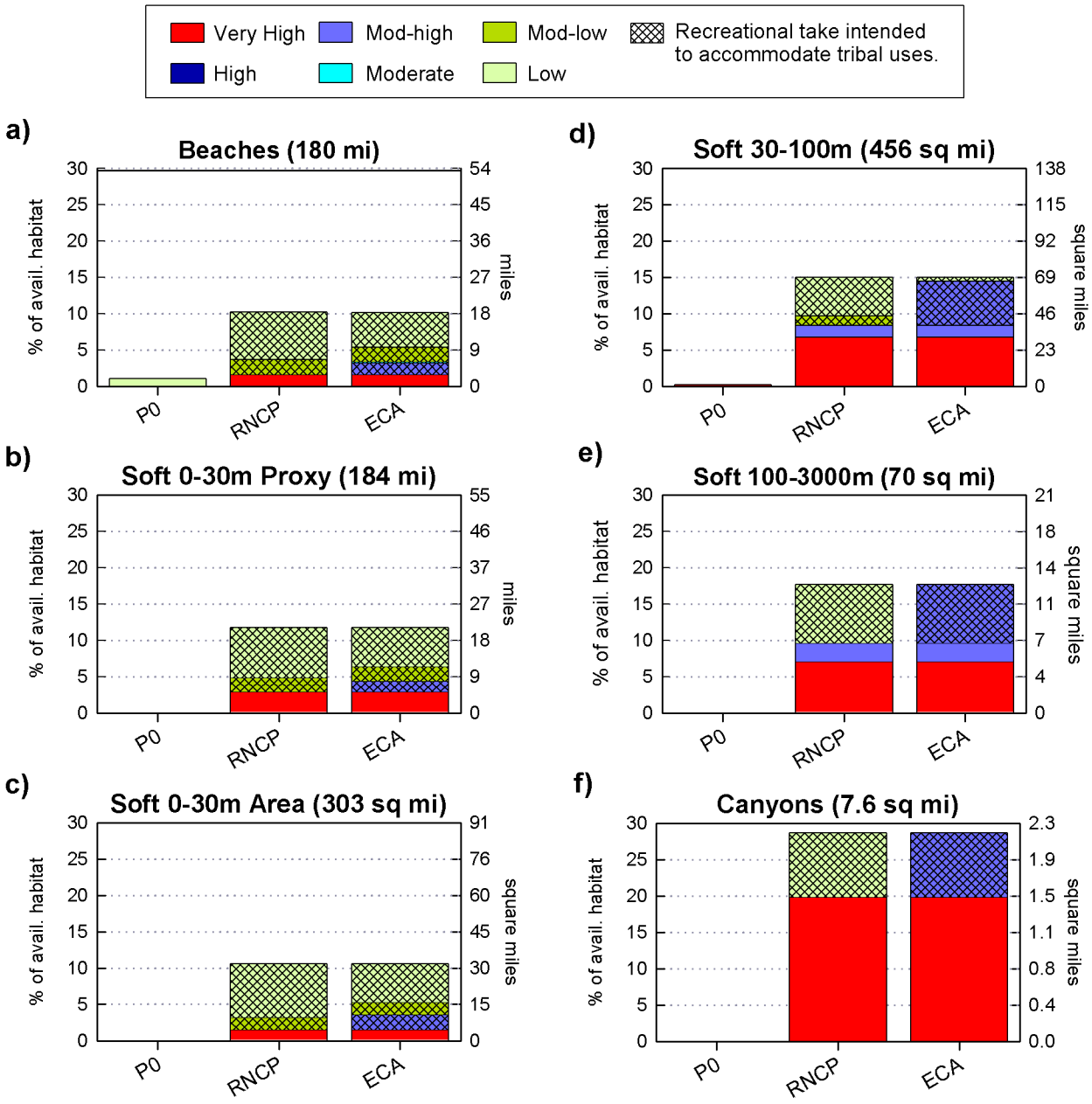


Figure 2.3: Estuarine Habitat Representation by Bioregion for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region

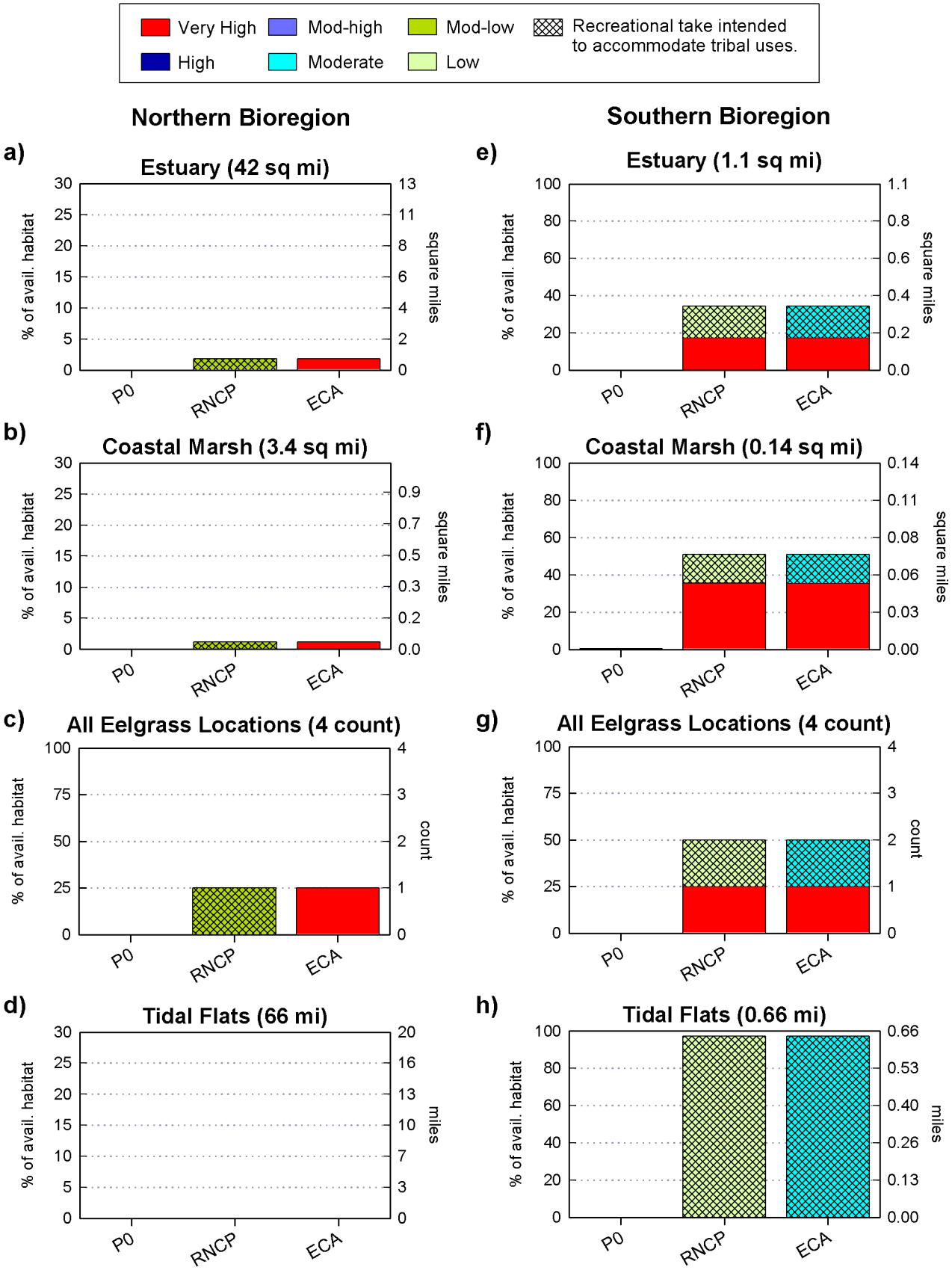
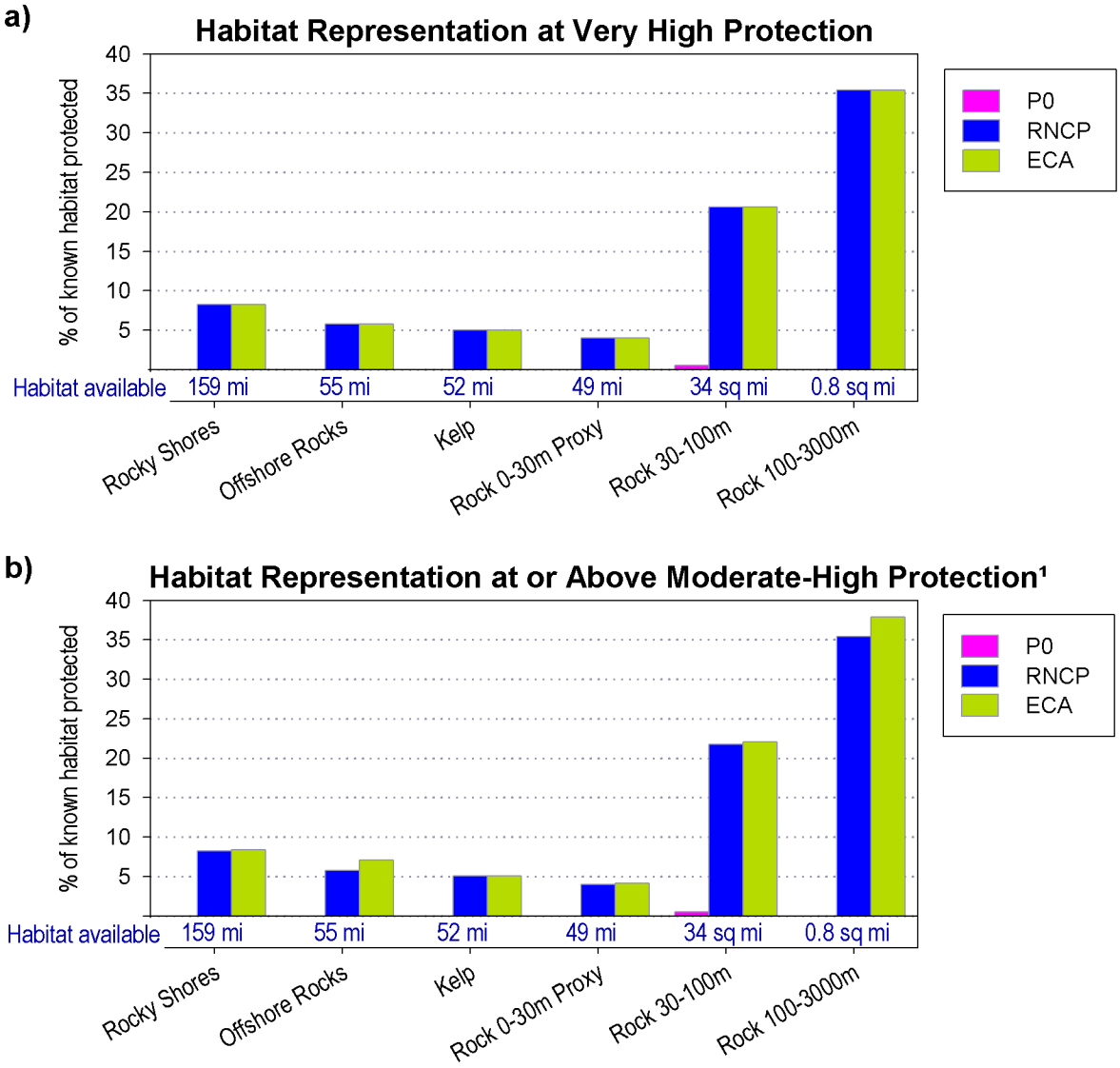
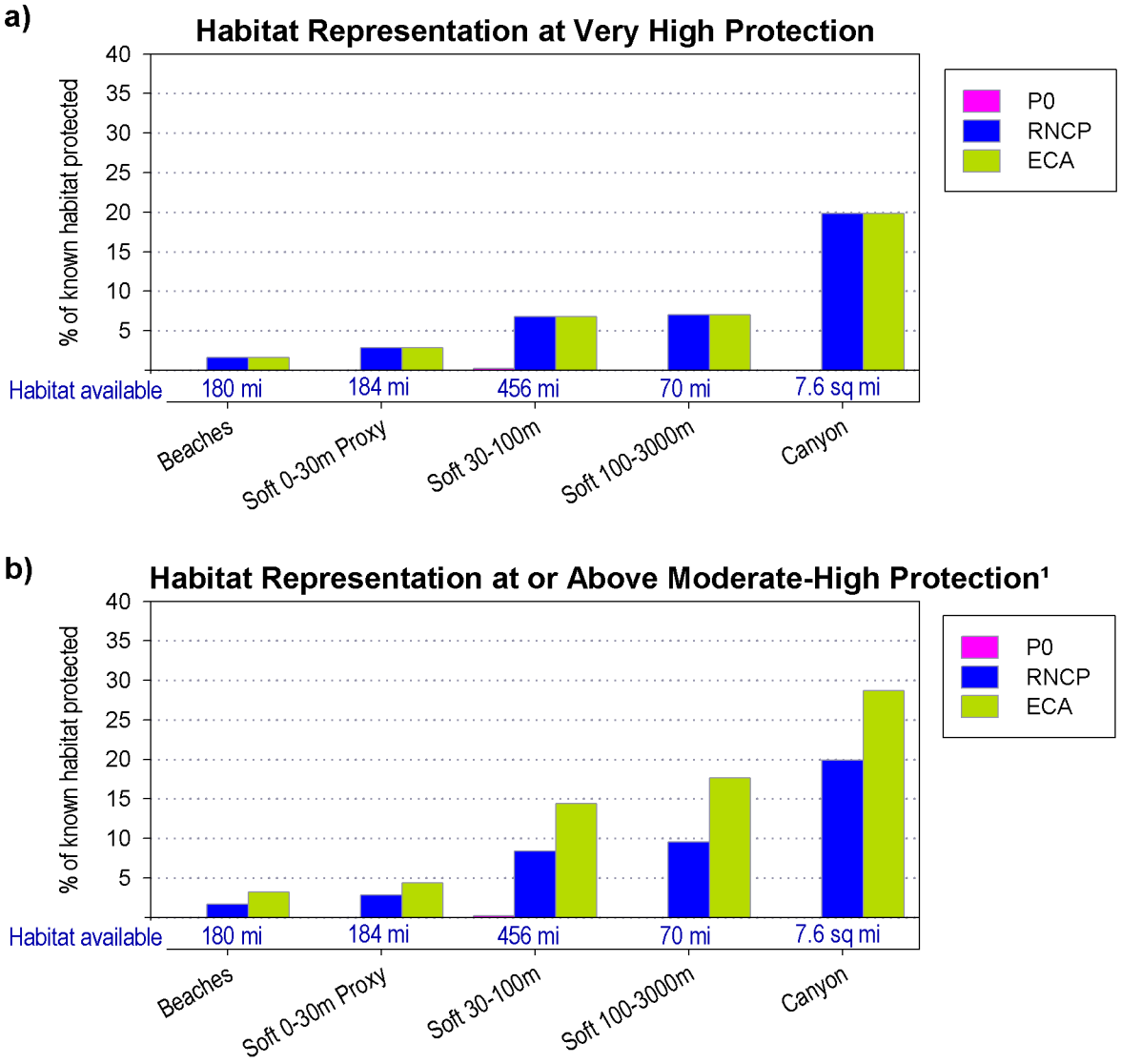


Figure 2.4: Rocky Habitat Representation Overview for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



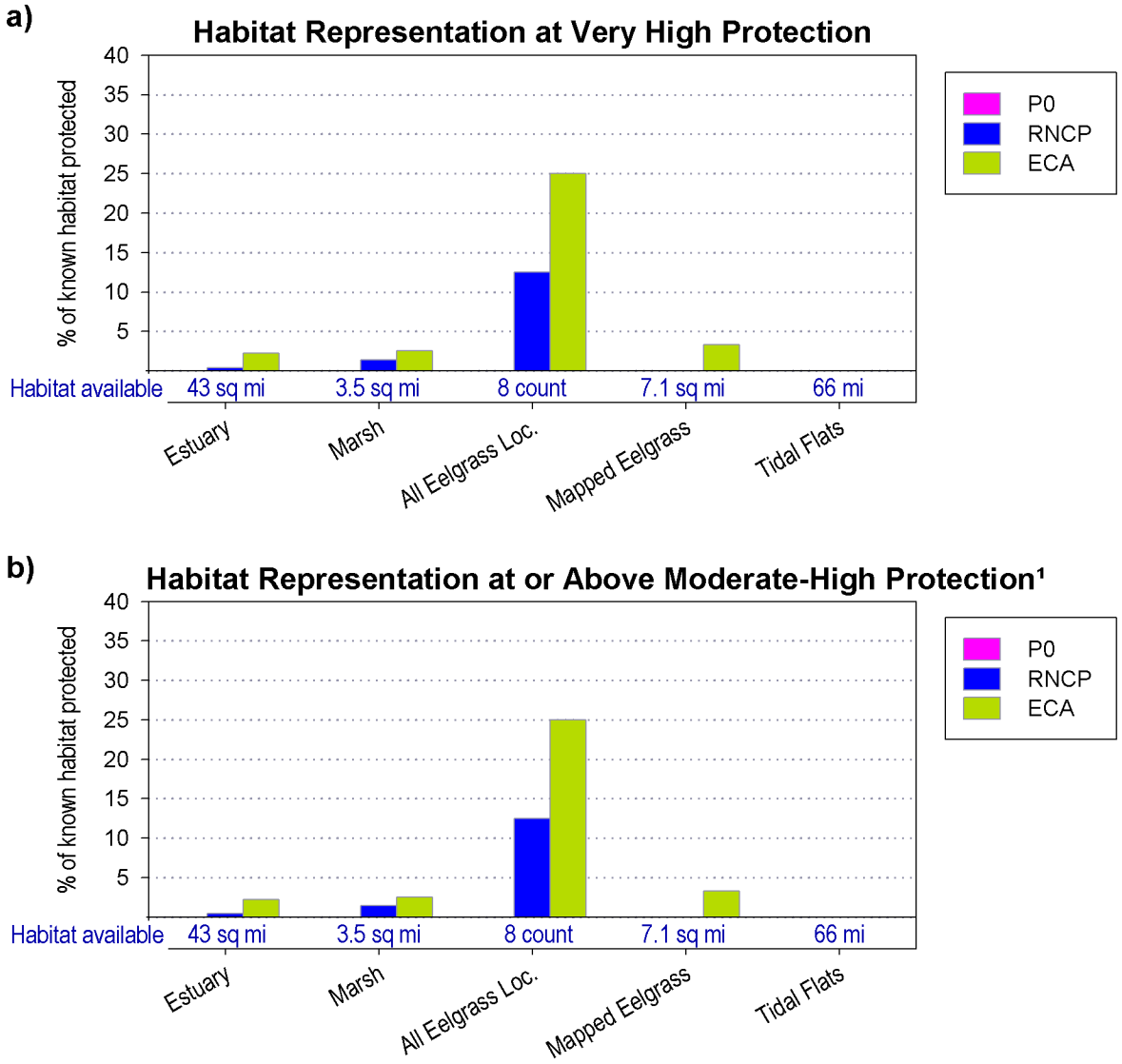
¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 2.5: Soft Bottom Habitat Representation Overview for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



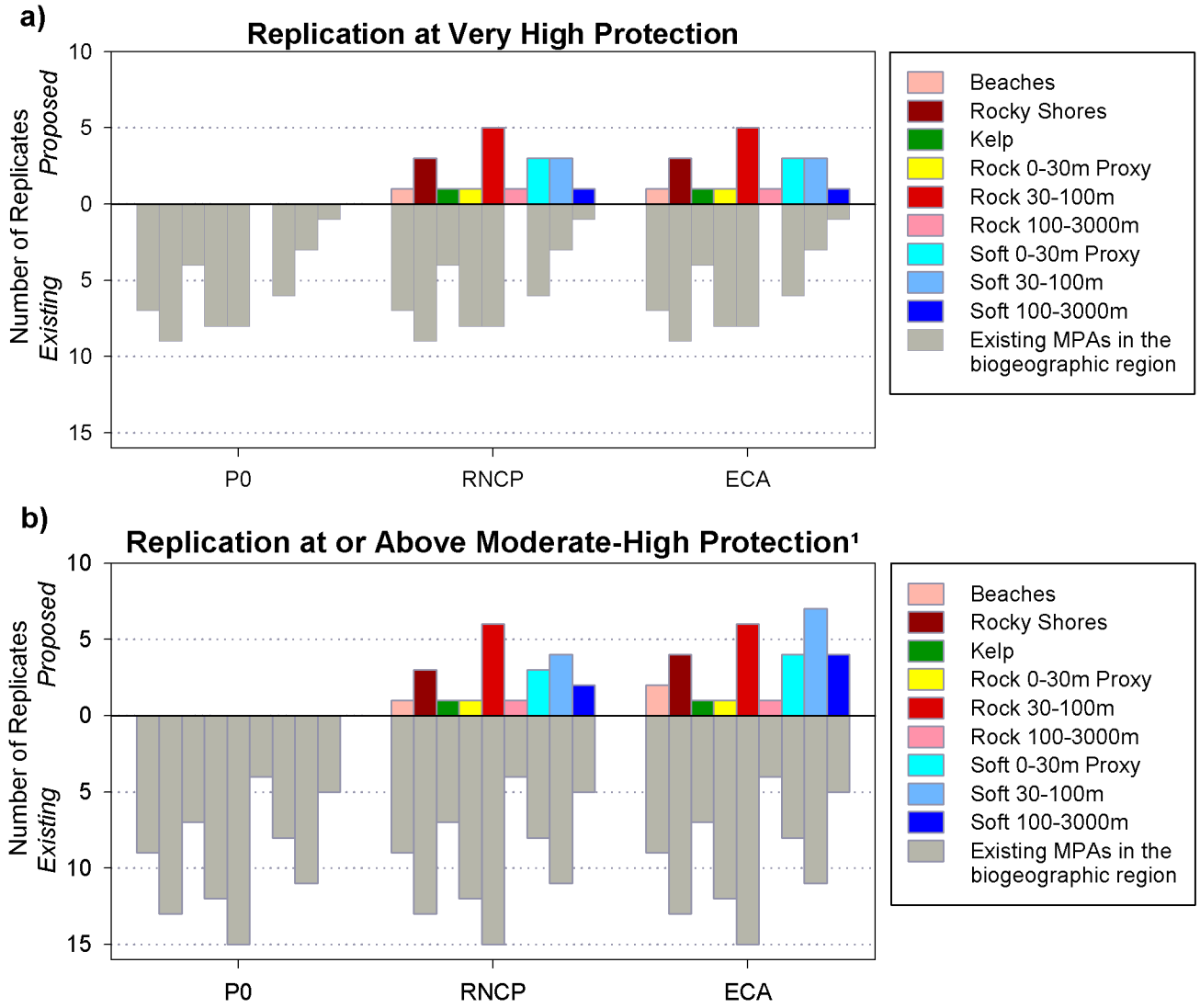
¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 2.6: Estuarine Habitat Representation Overview for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



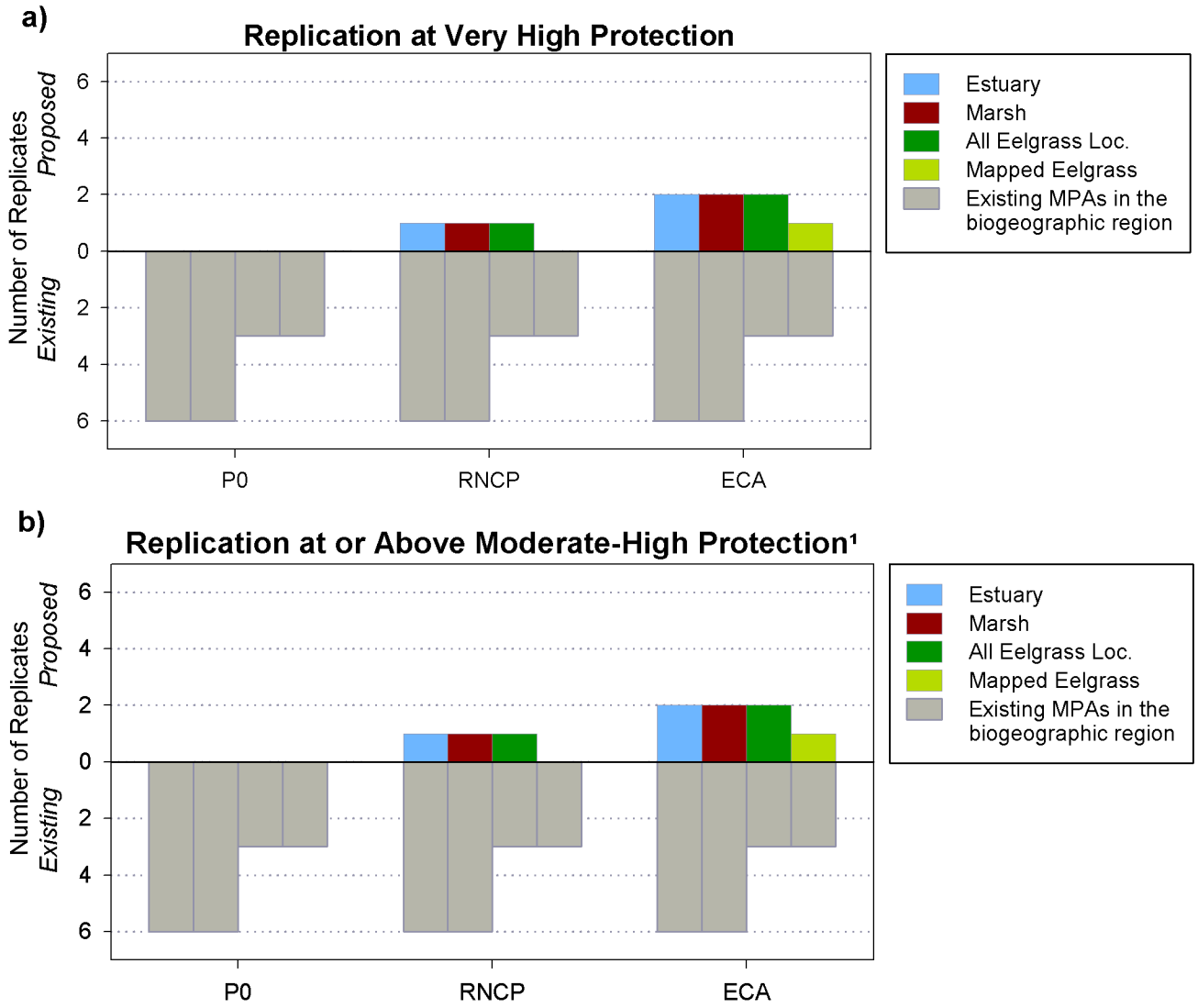
¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 3.1: Open Coast Habitat Replication for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



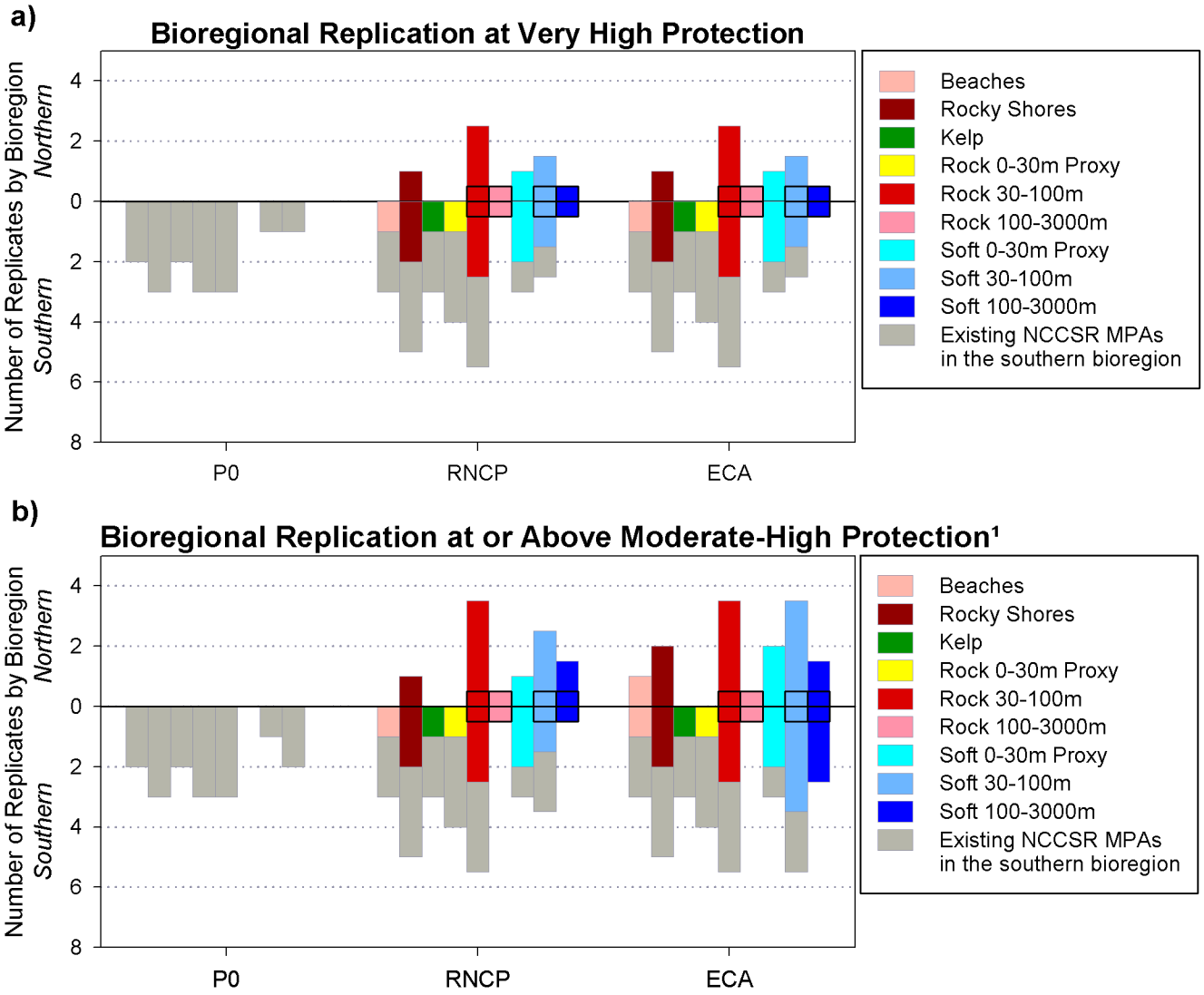
¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 3.2: Estuarine Habitat Replication for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



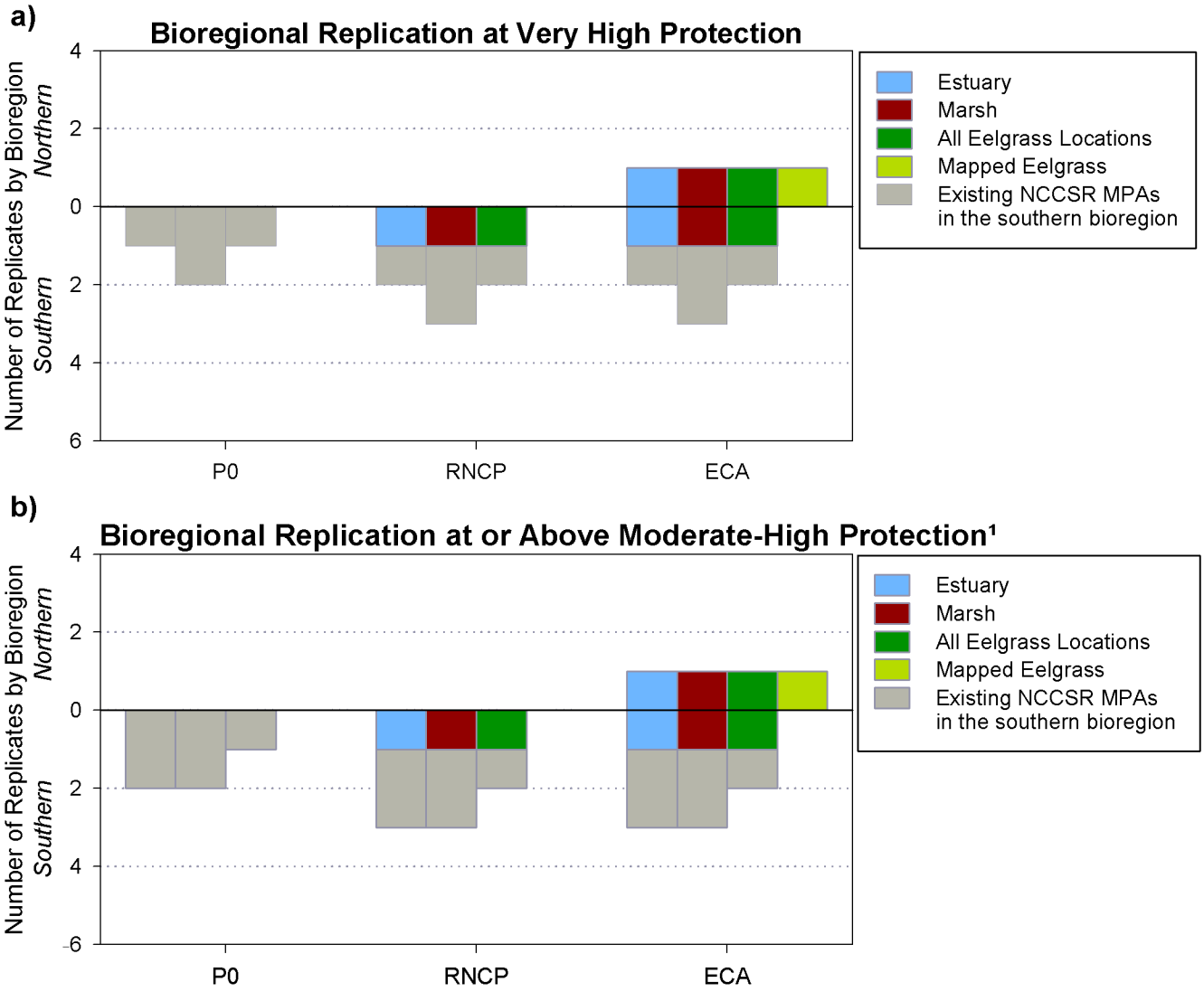
¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 3.3: Open Coast Habitat Replication by Bioregion for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

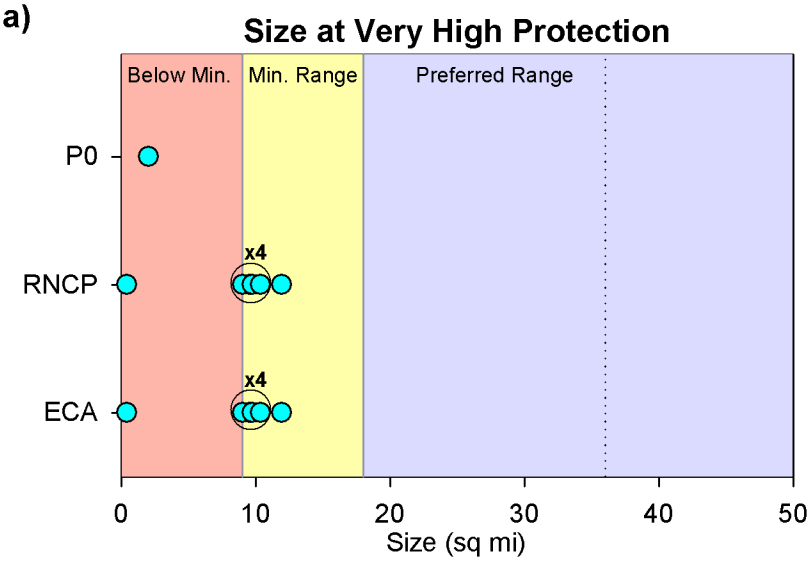
Figure 3.4: Estuarine Habitat Replication by Bioregion for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

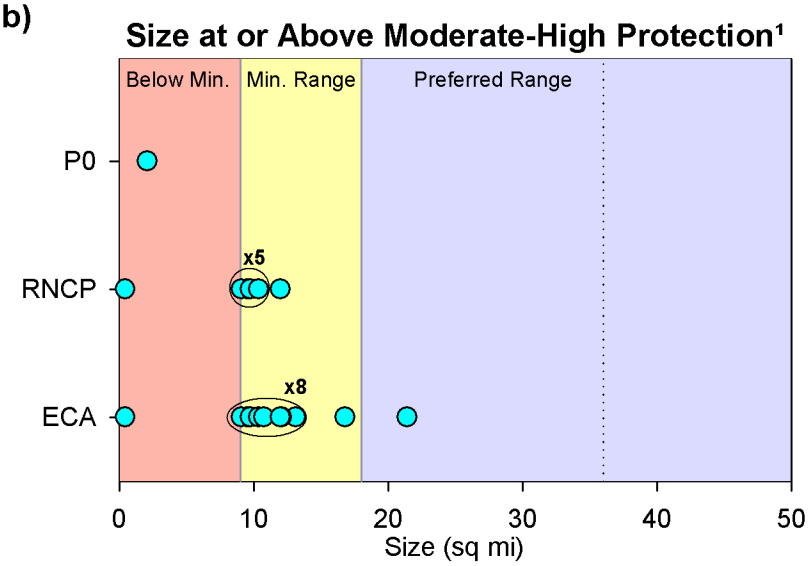
Figure 4.1: MPA Cluster Size for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region

a)



Number of MPA Clusters at Very High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
P0	1	0	0	1
RNCP	1	5	0	6
ECA	1	5	0	6

b)



Number of MPA Clusters at Moderate-High Protection				
Proposal	Below Min. Size	Min. Size Range	Pref. Size Range	Total # Clusters
P0	1	0	0	1
RNCP	1	6	0	7
ECA	1	9	1	11

¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

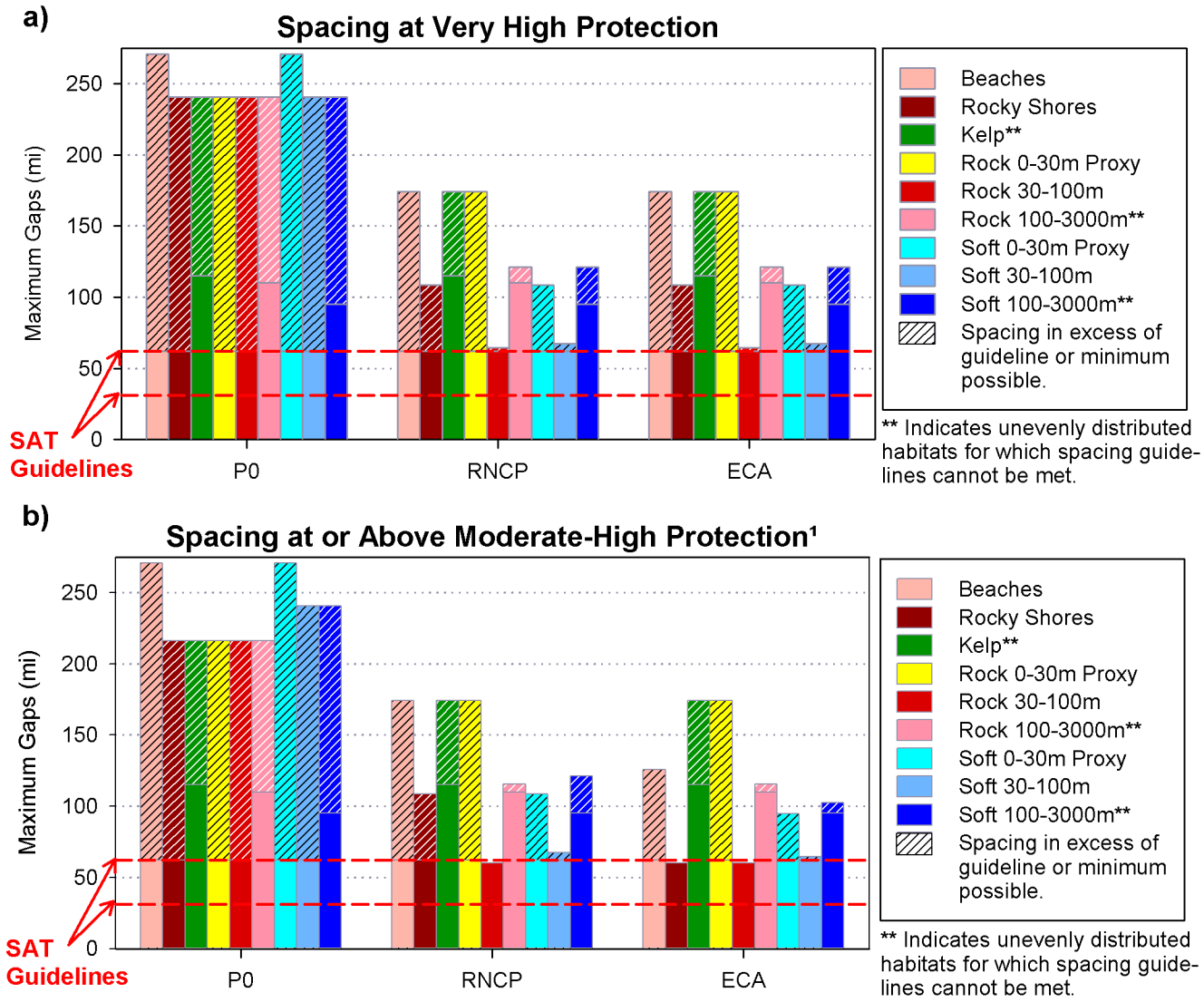
Table 4.2: MPA Cluster size for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region

Very High Protection	Proposal		
	Proposal 0	Revised NCRSG MPA Proposal	North Coast Enhanced Compliance Alternative
Cluster size in square miles from smallest to largest excluding estuarine MPAs.	2.1	0.4	0.4
		9.1	9.1
		9.6	9.6
		9.8	9.8
		10.4	10.4
		12.0	12.0

At or Above Moderate-High Protection[1]	Proposal		
	Proposal 0	Revised NCRSG MPA Proposal	North Coast Enhanced Compliance Alternative
Cluster size in square miles from smallest to largest excluding estuarine MPAs.	2.1	0.4	0.4
		9.1	9.1
		9.5	9.5
		9.6	9.8
		9.8	10.4
		10.4	10.7
		12.0	12.0
			12.1
			13.1
			16.8
			21.4

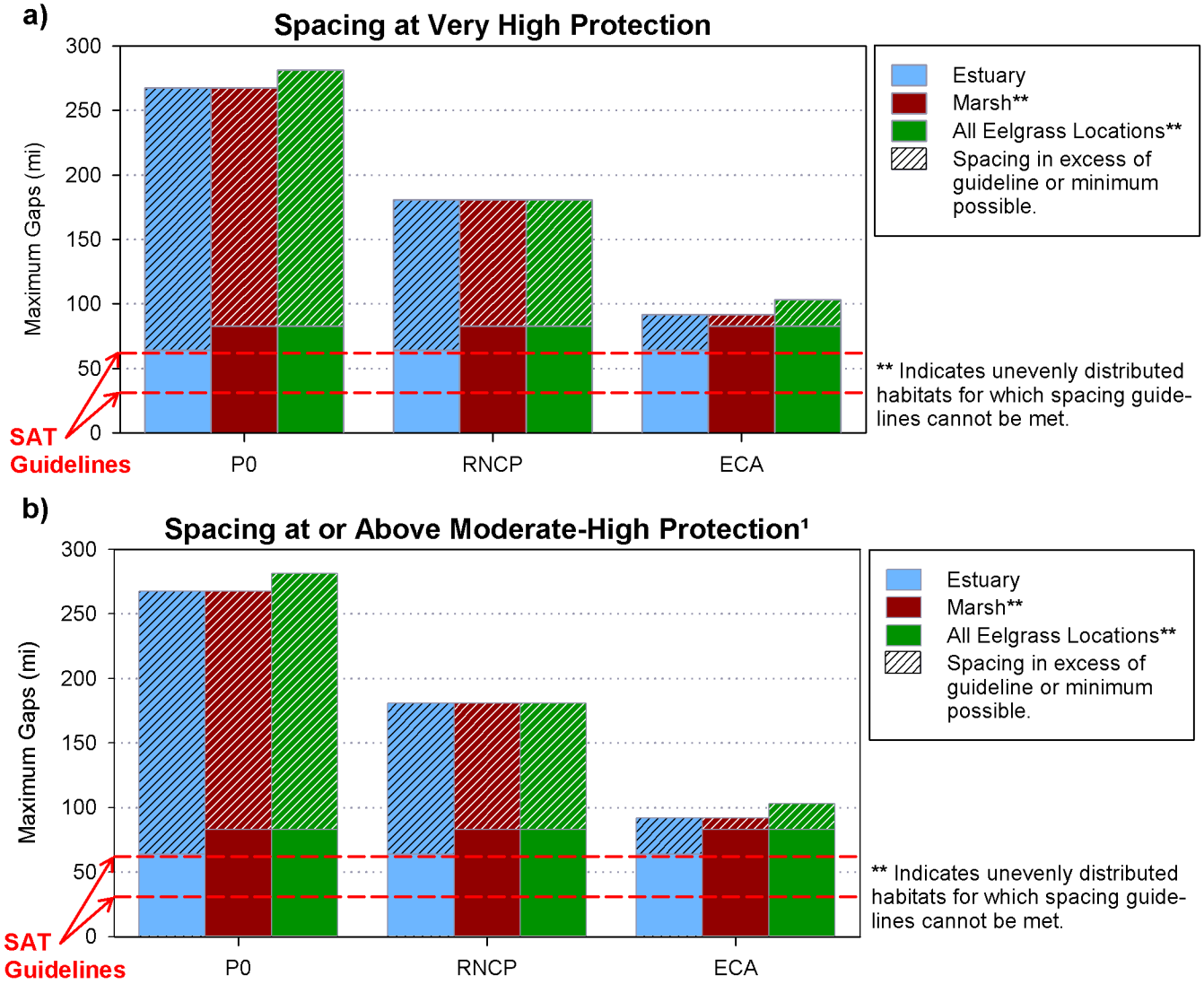
[1] Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 5.1: Habitat Spacing for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Figure 5.2: Estuarine Habitat Spacing for Existing MPAs (P0) and BRTF-Recommended MPA Proposals for the North Coast Study Region



¹ Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Table 5.3a: Gaps that exceed the SAT spacing guidelines and their locations for Revised Round 3 North Coast Regional Stakeholder Group Marine Protected Area Proposal

Revised NCRSG MPA Proposal		Very High Protection					
Habitat	# gaps over guideline	gap #1 (miles)	gap #1 location	gap #2 (miles)	gap #2 location	gap #3 (miles)	gap #3 location
Beaches	2	174	Oregon Border to Skip Wollenberg/Ten Mile Cluster	95	Skip Wollenberg/Ten Mile Cluster to Bodega Head Cluster		
Rocky Shores	2	109	Oregon Border to South Cape Mendocino SMR	64	Skip Wollenberg/Ten Mile Cluster to Stewarts Point Cluster		
Kelp	2	174	Oregon Border to Skip Wollenberg/Ten Mile Cluster	64	Skip Wollenberg/Ten Mile Cluster to Stewarts Point Cluster		
Rock 0-30m Proxy	2	174	Oregon Border to Skip Wollenberg/Ten Mile Cluster	64	Skip Wollenberg/Ten Mile Cluster to Stewarts Point Cluster		
Rock 30-100m	1	64	Skip Wollenberg/Ten Mile Cluster to Stewarts Point Cluster				
Rock 100-3000m	2	121	Mattole Canyon SMR to Stewarts Point Cluster	116	Oregon Border to Mattole Canyon SMR		
Soft 0-30m Proxy	2	109	Oregon Border to South Cape Mendocino SMR	95	Skip Wollenberg/Ten Mile Cluster to Bodega Head Cluster		
Soft 30-100m	2	67	Reading Rock Cluster to Mattole Canyon SMR	64	Skip Wollenberg/Ten Mile Cluster to Stewarts Point Cluster		
Soft 100-3000m	2	121	Mattole Canyon SMR to Stewarts Point Cluster	116	Oregon Border to Mattole Canyon SMR		
Estuary	2	181	Chetco River, OR to Skip Wollenberg/Ten Mile Estuary SMRMA	89	Skip Wollenberg/Ten Mile Estuary SMRMA to Russian River SMRMA		
Marsh	2	181	Chetco River, OR to Skip Wollenberg/Ten Mile Estuary SMRMA	89	Skip Wollenberg/Ten Mile Estuary SMRMA to Russian River SMRMA		
All Eelgrass Loc.	2	181	Chetco River, OR to Skip Wollenberg/Ten Mile Estuary SMRMA	103	Skip Wollenberg/Ten Mile Estuary SMRMA to Estero Americano SMRMA		

Revised NCRSG MPA Proposal		At or Above Moderate-High Protection[1]					
Habitat	# gaps over guideline	gap #1 (miles)	gap #1 location	gap #2 (miles)	gap #2 location	gap #3 (miles)	gap #3 location
Beaches	2	174	Oregon Border to Skip Wollenberg/Ten Mile Cluster	95	Skip Wollenberg/Ten Mile Cluster to Bodega Head Cluster		
Rocky Shores	1	109	Oregon Border to South Cape Mendocino SMR				
Kelp	1	174	Oregon Border to Skip Wollenberg/Ten Mile Cluster				
Rock 0-30m Proxy	1	174	Oregon Border to Skip Wollenberg/Ten Mile Cluster				
Rock 30-100m	0						
Rock 100-3000m	2	116	Oregon Border to Mattole Canyon SMR	97	Mattole Canyon SMR to Point Arena Cluster		
Soft 0-30m Proxy	2	109	Oregon Border to South Cape Mendocino SMR	95	Skip Wollenberg/Ten Mile Cluster to Bodega Head Cluster		
Soft 30-100m	2	67	Reading Rock Cluster to Mattole Canyon SMR	64	Skip Wollenberg/Ten Mile Cluster to Stewarts Point Cluster		
Soft 100-3000m	2	121	Mattole Canyon SMR to Stewarts Point Cluster	102	Point St. George Reef Offshore SMCA to Mattole Canyon SMR		
Estuary	2	181	Chetco River, OR to Skip Wollenberg/Ten Mile Estuary SMRMA	89	Skip Wollenberg/Ten Mile Estuary SMRMA to Russian River SMRMA		
Marsh	2	181	Chetco River, OR to Skip Wollenberg/Ten Mile Estuary SMRMA	89	Skip Wollenberg/Ten Mile Estuary SMRMA to Russian River SMRMA		
All Eelgrass Loc.	2	181	Chetco River, OR to Skip Wollenberg/Ten Mile Estuary SMRMA	103	Skip Wollenberg/Ten Mile Estuary SMRMA to Estero Americano SMRMA		

[1] Evaluations at high protection are not shown here because no high protection MPAs were proposed.

Table 5.3b: Gaps that exceed the SAT spacing guidelines and their locations for North Coast Enhanced Compliance Alternative Marine Protected Area Proposal

North Coast Enhanced Compliance Alternative		Very High Protection					
Habitat	# gaps over guideline	gap #1 (miles)	gap #1 location	gap #2 (miles)	gap #2 location	gap #3 (miles)	gap #3 location
Beaches	2	174	Oregon Border to Ten Mile Cluster	95	Ten Mile Cluster to Bodega Head Cluster		
Rocky Shores	2	109	Oregon Border to South Cape Mendocino SMR	64	Ten Mile Cluster to Stewarts Point Cluster		
Kelp	2	174	Oregon Border to Ten Mile Cluster	64	Ten Mile Cluster to Stewarts Point Cluster		
Rock 0-30m Proxy	2	174	Oregon Border to Ten Mile Cluster	64	Ten Mile Cluster to Stewarts Point Cluster		
Rock 30-100m	1	64	Ten Mile Cluster to Stewarts Point Cluster				
Rock 100-3000m	2	121	Mattole Canyon SMR to Stewarts Point Cluster	116	Oregon Border to Mattole Canyon SMR		
Soft 0-30m Proxy	2	109	Oregon Border to South Cape Mendocino SMR	95	Ten Mile Cluster to Bodega Head Cluster		
Soft 30-100m	2	67	Reading Rock Cluster to Mattole Canyon SMR	64	Ten Mile Cluster to Stewarts Point Cluster		
Soft 100-3000m	2	121	Mattole Canyon SMR to Stewarts Point Cluster	116	Oregon Border to Mattole Canyon SMR		
Estuary	3	92	South Humboldt Bay SMRMA to Skip Wollenberg / Ten Mile Estuary SMRMA	89	Chetco River, OR to South Humboldt Bay SMRMA	89	Skip Wollenberg / Ten Mile Estuary SMRMA to Russian River SMRMA
Marsh	3	92	South Humboldt Bay SMRMA to Skip Wollenberg / Ten Mile Estuary SMRMA	89	Chetco River, OR to South Humboldt Bay SMRMA	89	Skip Wollenberg / Ten Mile Estuary SMRMA to Russian River SMRMA
All Eelgrass Loc.	3	103	Skip Wollenberg / Ten Mile Estuary SMRMA to Estero Americano SMRMA	92	South Humboldt Bay SMRMA to Skip Wollenberg / Ten Mile Estuary SMRMA	89	Chetco River, OR to South Humboldt Bay SMRMA

North Coast Enhanced Compliance Alternative		At or Above Moderate-High Protection[1]					
Habitat	# gaps over guideline	gap #1 (miles)	gap #1 location	gap #2 (miles)	gap #2 location	gap #3 (miles)	gap #3 location
Beaches	2	126	Reading Rock Cluster to Ten Mile Cluster	95	Ten Mile Cluster to Bodega Head Cluster		
Rocky Shores	0						
Kelp	1	174	Oregon Border to Ten Mile Cluster				
Rock 0-30m Proxy	1	174	Oregon Border to Ten Mile Cluster				
Rock 30-100m	0						
Rock 100-3000m	2	116	Oregon Border to Mattole Canyon SMR	97	Mattole Canyon SMR to Point Arena Cluster		
Soft 0-30m Proxy	1	95	Ten Mile Cluster to Bodega Head Cluster				
Soft 30-100m	1	64	Ten Mile Cluster to Stewarts Point Cluster				
Soft 100-3000m	2	102	Point St. George Reef Offshore SMCA to Mattole Canyon SMR	78	Vizcaino Cluster to Stewarts Point Cluster		
Estuary	3	92	South Humboldt Bay SMRMA to Skip Wollenberg / Ten Mile Estuary SMRMA	89	Chetco River, OR to South Humboldt Bay SMRMA	89	Skip Wollenberg / Ten Mile Estuary SMRMA to Russian River SMRMA
Marsh	3	92	South Humboldt Bay SMRMA to Skip Wollenberg / Ten Mile Estuary SMRMA	89	Chetco River, OR to South Humboldt Bay SMRMA	89	Skip Wollenberg / Ten Mile Estuary SMRMA to Russian River SMRMA
All Eelgrass Loc.	3	103	Skip Wollenberg / Ten Mile Estuary SMRMA to Estero Americano SMRMA	92	South Humboldt Bay SMRMA to Skip Wollenberg / Ten Mile Estuary SMRMA	89	Chetco River, OR to South Humboldt Bay SMRMA

[1] Evaluations at high protection are not shown here because no high protection MPAs were proposed.