California MLPA Master Plan Science Advisory Team
Evaluation of Benefits to Marine Birds from Round 3 North Coast Proposed Marine Protected Areas and Special Closures

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Overview

Marine birds are long-lived species, often living more than 20 years (Clapp et al. 1982) that produce few offspring and provide a large amount of parental care compared to most marine species. Thus, marine bird populations can be slow to rebound from adverse human and environmental impacts. Additionally, because marine birds feed near the top of marine food webs, are highly visible, relatively inexpensive to study and respond to oceanographic variability, they are often viewed as indicators of the marine environment (see Cairns 1992).

Marine birds can be categorized into four broad categories based on habitat use: seabirds, shorebirds, waterfowl and marsh birds. Seabirds use coastal waters and at-sea habitats; many come to land only to breed. There are, however, a number of seabird species that occur in the north coast study region (NCSR) that depend on land for resting and preening throughout the year. Shorebirds consist of multiple species of sandpipers and plovers that utilize intertidal habitat along the coast and within bays and estuaries. Waterfowl consist of ducks, grebes and loons that forage and raft in nearshore waters and within bays and estuaries. Marsh birds consist of herons and egrets that typically forage along the coasts of bays and estuaries. There are 13 species of breeding seabirds, more than 25 species of shorebirds, more than 25 species of waterfowl, and 6 species of marsh birds that use the NCSR for breeding, migration, and/or overwintering.

While marine birds are not targeted by recreational or commercial fisheries, they can benefit both directly and indirectly from marine protected area (MPA) establishment. Direct benefits include reduced disturbance at breeding and roosting sites and lower probability of interaction with humans and fishing gear at foraging areas. Indirect benefits include reduced competition for important prey resources. We conducted five separate analyses on proposed MPA arrays to estimate levels of direct and indirect benefits to marine birds: 1) protection of seabird breeding colonies and hot spots, 2) protection of major seabird roosts, 3) protection of nearshore foraging areas, 4) protection of neritic foraging ‘hot spots’, and 5) protection of estuary and coastal habitats and shorebirds and waterfowl within those habitats. In this document, proposed MPAs for the NCSR are evaluated for their potential benefits to marine birds. Evaluations follow the methods described in *Draft Methods Used to Evaluate MPA Proposals in the MLPA North Coast Study Region*.

Protection at Seabird Breeding Colonies, Hot Spots and Roosting Sites

Some seabird species breeding in the NCSR such as guillemots, murrelets, and petrels only come to land to breed and spend the remainder of their lives at sea. Others, such as most pelicans, cormorants and gulls, come to shore on a daily basis to rest and preen. For pelicans and cormorants, trips ashore are essential for survival because their wettable plumage must be dried to avoid hypothermia (Palmer 1962). Thus, it is important that both breeding and roosting sites be protected against human disturbances. For most species, preferred breeding and roost habitats are on offshore rocks, islands, or mainland cliffs free of mammalian predators.

Most species are known to be sensitive to human disturbance to varying degrees (summarized in Carney and Sydeman 1999). Impacts of human disturbance are known to be greatest at breeding sites, where reproduction can be dramatically affected. Because most seabirds are colonial breeders (i.e., nesting in high concentrations), high proportions of populations can be affected by severe or frequent disturbances. Impacts to birds tend to be most pronounced when humans enter the immediate area. Responses vary by species and location, but for many species, intrusion results in most if not all birds fleeing from the immediate area. Birds on nests often will flee, leaving the eggs or chicks behind. During that time, nest contents are vulnerable to predators such as gulls and ravens, exposed to the elements, and susceptible to displacement. While some birds return to nests once an intruder has gone, others tend to abandon nesting efforts. For example, Brandt's Cormorants have been observed to abandon nests en masse from even single events of human intrusion to the colony (McChesney 1997). Many studies have documented reductions in breeding success and colony attendance, as well as colony abandonment, resulting from human intrusion (Carney and Sydeman 1999).

Although often not as easily identified, activities such as close approaches to colonies and roosts or loud noises can evoke responses similar to direct human intrusions. Close approaches can include humans on foot, boats, low-flying aircraft, motor vehicles, surfers, or other sources (Jaques et al. 1996, Carney and Sydeman 1999, Jaques and Strong 2002). Studies of such disturbances on seabirds and other waterbirds have shown various results that often depend on species, location, habitat and level of habituation to human activity. However, several studies have shown reductions in breeding success or population sizes as a result of such human disturbance (e.g., Wallace and Wallace 1998, Carney and Sydeman 1999, Thayer et al. 1999, Beale and Monaghan 2004, Bouton et al. 2005, Rojek et al. 2007). In some cases, reductions in breeding success from disturbance can occur in the absence of visible behavioral changes (Beale and Monaghan 2004).

Protection of Food Resources and Foraging Areas

During the breeding season, marine birds are central place foragers, continuously returning to the breeding site throughout the day to provision young. Provisioning young is energetically taxing to breeding adults and the spatial constraints of central place foraging makes them highly dependent on localized prey availability (Pichegru et al. 2009). Marine birds may benefit from MPA establishment if there is a subsequent increase in their forage base. Prey availability has been shown to affect coloniality (whether birds form large or small colonies), the timing of reproduction, clutch sizes and levels of egg abandonment, chick growth and non-predator related chick mortality (Anderson and Gress 1984, Safina and Burger 1988, Pierotti and Annetti 1990, Massey *et al.* 1992, Ainley *et al.* 1995, Monagham 1996, Golet *et al.* 2000).

We have identified two general foraging strategies used by seabirds within the NCSR: 1) nearshore foraging that occurs close to the breeding colony and 2) foraging at neritic 'hot spots' that attract congregations of pelagic prey. For our purposes, we defined nearshore foraging as a strategy used by breeding seabirds that typically forage within three miles of the colony. These species are sensitive to changes in local prey availability that can have dramatic effects on breeding success, survivorship and population status (Ainley and Boekelheide 1990, Nur and Sydeman 1999, Sydeman et al. 2001). For example, the Pelagic Cormorant and Pigeon Guillemot colonies at the Southeast Farallon Islands have undergone declines in reproductive performance and population size that are consistent with a decline in the local availability of juvenile rockfish (Sydeman et al. 2001, Warzybok and Bradley 2007).

Additionally, Robinette et al. (2007) showed that both spatial and temporal variability in sanddab recruitment was reflected in the diet of Pigeon Guillemots breeding at Point Arguello, central California. Establishing MPAs adjacent to the breeding colonies of seabirds with short foraging ranges will provide protection by decreasing competition for local prey resources and reduced displacement by boats during foraging. 'Hot spot' foraging is a strategy used by both central place foragers and migrant and overwintering birds not constrained to a breeding colony. Many studies have shown that neritic foraging seabirds congregate in predictable areas (e.g., Ford et al. 2004, Yen et al. 2004) and it has even been suggested that these congregations can be used to select areas for MPA establishment (see Harris et al. 2007, Pichegru et al. 2009). Establishing MPAs in areas of high seabird concentrations will reduce direct interactions with humans similarly targeting these areas of high prey concentrations.

Protection of Shorebirds and Wintering Waterfowl and Estuary and Coastal Habitats

Protecting the intertidal habitat of estuaries and coastal beaches will likely have direct benefits for shorebirds. For waterfowl, the eelgrass beds of the coastal estuaries provide food that is crucial for several species of geese and dabbling ducks. Additionally, waterfowl have been shown to be impacted by human caused disturbances (see Peters and Otis 2006). Protection of eelgrass beds, and estuarine habitat in general, would provide direct benefits to these birds. Finally, protecting the prey base of foraging marsh birds will provide benefits through reduced competition with humans.

Of special interest is the population of Marbled Godwits in Humboldt Bay as there is evidence that the majority of godwits wintering there are from the Alaska breeding population, which is separate from the rest of the Marbled Godwit breeding population and much smaller in numbers. High Marbled Godwit feeding densities have been documented at Samoa Bridge, Eureka Slough and the Elk River Mouth, but the Round 3 NCRSG MPA proposal does not capture these areas. The mudflats between Manila and Samoa on the west shore of Arcata Bay have higher mean densities of shorebirds than the other sites in Humboldt Bay, and again this MPA proposal does not capture this area.

Methods

Evaluations follow the methods described in the *Draft Methods Used to Evaluate Marine Protected Area Proposals in the MLPA North Coast Study Region*. Proposed MPAs would provide protection only against consumptive activities. Non-consumptive activities such as kayaking and surfing can still create disturbances at seabird breeding and roosting sites. This issue can be addressed through the use of no-entry special closure areas. Special closures are considered to provide the greatest benefit to marine birds, followed by state marine reserves (SMRs) and some state marine conservation areas (SMCAs) depending on the proposed regulations (see Table 9.2 in *Draft Methods Used to Evaluate Marine Protected Area Proposals in the MLPA North Coast Study Region* for criteria to qualify SMCAs to be included in evaluations). In Round 3, the MLPA North Coast Regional Stakeholder Group (NCRSG) came to agreement on a single marine protected area (MPA) proposal. In the NCRSG MPA Proposal, some MPAs propose recreational uses that are intended to accommodate tribal activities but are open to all non-commercial users to maintain compliance with California law.

For Round 3, we evaluated the NCRSG MPA Proposal (NCP) using standard methods and we also performed a supplemental evaluation. The standard evaluation includes all recreational take proposed in each MPA including recreational take intended only to accommodate tribal uses but open to all recreational users. The NCRSG MPA Proposal - Supplemental Evaluation (SUP) does not include proposed recreational take intended only to accommodate tribal uses. The supplemental evaluation is referred to as NCRSG MPA Proposal – Supplemental Evaluation (SUP). The NCRSG also forwarded a Round 3 NCRSG Special Closures Recommendation, which is separate from the NCRSG MPA Proposal but intended to accompany it and is, therefore, included in our evaluation. The evaluation includes analyzing the potential benefits to: 1) seabird breeding areas, 2) seabird roosting areas 3) nearshore seabird foraging areas, 4) neritic foraging areas, and 5) shorebirds and waterfowl and the estuarine waterways and coastal habitats they use.

Results

Seabird Breeding Colonies and Hot Spots

The abundance and distribution of all seabird species breeding within the NCSR are shown in Table 1. Common Murres are by far the most abundant species breeding in the NCSR, accounting for 85% of the total breeding seabirds in the NCSR.

Table 2 shows the potential benefits provided by each proposed MPA and proposed special closure in Round 3. Table 3 shows the summary of benefits for the NCRSG MPA Proposal and the NCRSG MPA Proposal – Supplemental Evaluation, based on SMRs and SMCAs meeting the criteria for this analysis, and the NCRSG Special Closures Recommendation.

The Round 3 NCRSG MPA Proposal and the NCRSG Special Closures Recommendation protect most breeding seabirds and hot spots, with approximately 65% of the breeding seabirds and 5 of the 8 designated hot spots included. This is less than the round 2 Ruby 1 proposal (85% of breeding birds protected) almost entirely due the omission of breeding hotspots at Green, Flatiron, and False Cape rocks. The NCRSG Special Closures Recommendation and NCRSG MPA Proposal together protect large numbers of the seabird species that nest on the surface in large colonies and are particularly sensitive to disturbance events such as the Brandt's Cormorant (50%) and Common Murre (70%). It also includes a high proportion of Rhinoceros Auklet (95%) and Tufted Puffin (50%) colonies. The NCRSG MPA Proposal – Supplemental Evaluation showed some additional benefits to Black Oystercatchers, Pelagic Cormorants, Pigeon Guillemots and Western Gulls. Success in protection of seabird colonies was driven by special closure designations (Tables 2 and 3). Note that special closures are based on number and species of birds, but special closure sites are not equally sensitive to vessel disturbance due to their topography. False Klamath Rock, for example, has high cliff faces below the colonies and nesting birds are not generally affected by nearby vessels, whereas Flatiron and False Cape rocks have lower relief with seabirds and pinnipeds affected by close vessels.

Major Seabird Roosts

Data on California Brown Pelican roosting abundance and distribution were used in this analysis to identify major seabird roosts. California Brown Pelicans have been well studied in the NCSR and use habitats used by other roosting seabirds. All pelican roosts were placed in

one of three categories depending on the number of pelicans observed at roost sites. Roosts were placed in the 'high' category if maximum counts exceeded 500 pelicans, 'medium' if 100-500 pelicans were observed, and 'low' if never more than 100 pelicans were observed. In the north coast study region, there are many small and medium pelican roosts and few large roosts.

Table 5 shows the number of roosts captured by all proposed MPAs and special closures while Table 6 shows the summary of number of roosts captured by MPAs meeting the criteria to provide benefits to seabirds for each evaluation and special closures. Proposal 0 did not capture any important pelican roosts in the north coast study region in qualifying MPAs (based on proposed allowed uses and criteria in Table 9.2 in *Draft Methods Used to Evaluate Marine Protected Area Proposals in the MLPA North Coast Study Region*).

The number of pelican roosts included in the NCRSG MPA Proposal are low, with 7 roosts contained in the MPA proposal, 3 in qualifying MPAs for the NCP and an additional one for the SUP, and 5 more in special closures, for a total of 8 for NCP and 9 for SUP out of 69 roosts in the NCSR (12% or 13% respectively, Tables 5, 6). Pelican numbers typically peak in the NCSR in fall, which is not included in the seasonal special closures, thus benefits to this species are less than would appear. Still, the NCRSG MPA Proposal represents an increase in protection to roosting seabirds over existing conditions (Proposal 0). Because offshore roost rocks are relatively abundant in the NCSR, protection of roost sites is far less critical than protection of large nesting colonies.

Nearshore Seabird Foraging Areas

The nearshore foraging analysis focused on four species with limited foraging ranges during the breeding season: Brandt's Cormorant, Common Murre, Pelagic Cormorant and Pigeon Guillemot. Weighted areas were calculated by multiplying seabird colony size as a percent of the bioregion population with the amount of that colony's foraging area captured by a given MPA. It is important to understand that this captures the amount of foraging area around colonies, so that special closures contribute little to this metric as they provide protection only to a small area around the breeding colonies themselves. Also, some of the state marine conservation areas (SMCAs) with certain allowable uses are not counted in this analysis because those uses diminish their contribution to these species (see Table 9.2 in *Draft Methods Used to Evaluate Marine Protected Area Proposals in the MLPA North Coast Study Region*). Table 7 shows the weighted area captured by each proposed MPA and special closure. Table 8 compares the Round 3 proposal and special closure recommendation based on the total weighted areas captured by MPAs and special closures that met the criteria for this analysis.

The NCRSG MPA Proposal increases benefits to nearshore foraging seabirds over Proposal 0. Because MPAs were generally not placed near major colonies (and special closures protect so little forage area), benefits to seabird foraging were tiny compared to the potential if MPAs were co-located close to colonies. Pyramid Point SMCA (not included in NCP, included in SUP), South Cape Mendocino SMR, and Ten Mile SMR were all close enough to colonies to achieve appreciable benefits (Table 7). Vizcaino SMCA also captured forage area but was not

included in NCP or SUP due to the proposed allowed uses. Pelagic Cormorants and Pigeon Guillemots are essentially obligate near shore foragers, thus improved foraging benefits to these species are more important than for Brandt's Cormorants and Common Murres which can range farther offshore.

Neritic Foraging Hot Spots

The neritic foraging analysis identified areas of persistent use by pelagic foraging seabirds and marine mammals and quantified the amount of these areas captured by proposed MPAs and special closures. Species groups were selected by their differing habitat use, thus 'hot spot' (defined as the top 10% of density in the NCSR) locations are likely to differ between groups. Table 9 shows the neritic hot spot areas captured by proposed MPAs and special closures from Round 3 and number of birds in 4 species groups using the area (but not including MPAs that did not overlap with a hot spot for any species group). Table 10 compares the total protected hot spot areas within SMRs, SMCAs that met the criteria for this analysis and special closures.

Considering the entire MPA array, Pyramid Point and Reading Rock SMCAs stood out as capturing hotspot areas for 3 species groups, and the Vizcaino SMCA and Ten Mile SMR captured hotspot area for the remaining group (mostly Common Murre and Brandt's Cormorant, Table 9). When only SMRs and qualifying SMCAs are considered, the Pyramid Point SMCA (in SUP) and Ten Mile SMR (in both NCP and SUP) were the only MPAs to protect hotspots (Table 10).

As with the near colony foraging analysis, it is important to understand that this analysis measures important foraging area at sea, and because special closures encompass little ocean surface, they contribute little to this analysis.

Shorebirds, Waterfowl, Estuarine Waterways and Coastal Habitats

The estuary and coastal habitats analysis quantified the amount of estuary, tidal flat, coastal marsh and beach habitat protected by proposed MPAs. All proposed special closures are located around offshore rocks and do not include any of these habitats, and are, therefore, not included in this analysis. Table 11 compares the species groups protected in estuaries in Round 3 MPAs. Data used for this analysis does not include estuaries south of the Eel River. The NCRSG MPA Proposal did not include SMRs or SMCAs that met the criteria to benefit these species groups, therefore there is no summary table of benefits. The NCRSG MPA Proposal also did not provide potential protection of shorebirds in Humboldt Bay because only a single state marine recreational management area (SMRMA), which allows waterfowl hunting, was proposed in Humboldt Bay. Therefore, no proposed MPAs met the criteria to benefit these species groups and no summary table of benefits was created.

The NCRSG MPA Proposal includes only a portion of south Humboldt Bay, that does include excellent foraging habitat for shorebirds and waterfowl, but since it also allows hunting, there will likely be a level of disturbance that reduces its value during the hunting seasons.

The Ten Mile Estuary SMRMA will provide some benefits to small numbers of estuarine waterfowl, mainly diving ducks and herons when waterfowl hunting is not occurring.

Summary

Seabird Breeding Colonies and Hot Spots

The NCRSG Special Closures Recommendation is very beneficial to seabirds, particularly at Castle Rock, one of the largest seabird colonies in the continental United States. Castle Rock is used by a great variety of birds and marine mammals throughout the year. The inclusion of Green and Flatiron Rocks north of Trinidad as seasonal special closures would have improved the special closures recommendation. The other breeding colony hot spot special closures are appropriately designated as seasonal. For nesting seabirds, the important segment of the year is between 1 March and 31 August. The NCRSG MPA Proposal and NCRSG MPA Proposal – Supplemental Evaluation without associated special closures includes very few important seabird breeding areas.

Seabird Roosting Sites

Unlike areas in other parts of the state, seabird roosting sites are common here on the north coast, and only a few of them are large, consistent roosts. Protection of important roost sites in the proposed MPAs and special closures represents an improvement over existing conditions.

Nearshore Foraging Areas

The benefits provided by protecting nearshore foraging areas are not as significant as the protection of breeding sites, but can benefit seabirds nonetheless. Because few MPAs in NCP and SUP were located close to breeding colonies, benefits to nearshore foraging species were not substantial, but still represent an improvement over existing conditions. This is particularly true for Pigeon Guillemots and Pelagic Cormorants, who depend on prey resources close to their nesting areas.

Neritic Foraging Areas

The 4 species groups were designated based on differing foraging habitat patterns, and consequently their foraging hot spots vary, making summary comparisons difficult. Pyramid Point SMCA (included only in SUP), Reading Rock SMCA (not included in either NCP or SUP), Rockport Rocks Seasonal Special Closures, and Vizcaino Rock Seasonal Special Closure overlapped with foraging hotspots. Larger protected areas would have provided more benefits to seabirds for neritic foraging.

Shorebirds, Waterfowl, Estuarine Waterways and Coastal Habitats

The NCRSG MPA Proposal will have minor, but positive benefits to shorebirds and waterfowl in southern Humboldt Bay (outside of the waterfowl hunting season) and slight positive benefits to herons and some waterfowl in the Ten Mile River estuary.

Special Closures

The SMCAs and SMRs currently proposed would provide protection only against consumptive activities. Non-consumptive activities such as close approach by boats, kayaking and surfing can still create disturbances at seabird breeding and roosting sites. Tremendous benefits to breeding seabirds can be provided using the special closures. Seasonal closures can provide excellent protection to breeding seabirds and so are recommended at the hot spots. Year round closures achieve the same results with the added protection to roosting birds and pinnipeds during the non-breeding season, such as the proposed special closure at Castle Rock.

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TABLES

Table 1. Numbers of breeding seabirds of 12 species within the north coast study region

Species	No. Animals
Total Number of Species	12
Black Oystercatcher (BLOY)	248
Brandt's Cormorant (BRCO)[a]	13105
Cassin's Auklet (CAAU)	4833
Common Murre (COMU)	258010
Double-crested Cormorant (DCCO)	2873
Fork-tailed Storm-Petrel (FTSP)	419
Leach's Storm-Petrel (LESP)[b]	9414
Pelagic Cormorant (PECO)	5675
Pigeon Guillemot (PIGU)	3148
Rhinoceros Auklet (RHAU)	1063
Tufted Puffin (TUPU)	181
Western Gull (WEGU)	4046
Study Region Total	303014

[a] *American Ornithologists' Union (AOU) code for Brandt's Cormorant has been updated to BRAC since this data was collected.*

[b] *American Ornithologists' Union (AOU) code for Leach's Storm-petrel has been updated to LHSP since this data was collected.*

Table 2. Numbers and percentages of marine birds at breeding colonies in Round 3 MPAs and special closures. [a] Not included in Table 3 because benefits to seabirds are reduced by allowed take activities.

Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Proposal 0														
(None in Proposal 0)														
NCP														
Pyramid Point SMCA[a]	4	52	<0.1%	3 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	31 (0.5%)	12 (0.4%)	0 (0.0%)	0 (0.0%)	6 (0.1%)
South Cape Mendocino SMR	4	9690	3.2%	0 (0.0%)	464 (3.5%)	9163 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)	0 (0.0%)	0 (0.0%)	62 (1.5%)
Sea Lion Gulch SMR	2	19	<0.1%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	17 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.0%)
Vizcaino SMCA[a]	4	46	<0.1%	3 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9 (0.2%)	20 (0.6%)	0 (0.0%)	0 (0.0%)	14 (0.3%)
Ten Mile SMR	5	525	0.2%	3 (1.2%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	169 (3.0%)	58 (1.8%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
SUP														
Pyramid Point SMCA	4	52	<0.1%	3 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	31 (0.5%)	12 (0.4%)	0 (0.0%)	0 (0.0%)	6 (0.1%)
South Cape Mendocino SMR	4	9690	3.2%	0 (0.0%)	464 (3.5%)	9163 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)	0 (0.0%)	0 (0.0%)	62 (1.5%)
Sea Lion Gulch SMR	2	19	<0.1%	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	17 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.0%)
Vizcaino SMCA[a]	4	46	<0.1%	3 (1.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9 (0.2%)	20 (0.6%)	0 (0.0%)	0 (0.0%)	14 (0.3%)

Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Ten Mile SMR	5	525	0.2%	3 (1.2%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	169 (3.0%)	58 (1.8%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Special Closures														
Southwest Seal Rock Special Closure	4	151	0.0%	5 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	134 (2.4%)	6 (0.2%)	0 (0.0%)	0 (0.0%)	6 (0.1%)
Castle Rock Special Closure	11	119796	39.5%	4 (1.6%)	2490 (19.0%)	108318 (42.0%)	0 (0.0%)	100 (23.9%)	926 (9.8%)	392 (6.9%)	360 (11.4%)	1005 (94.5%)	82 (45.3%)	1370 (33.9%)
False Klamath Rock Seasonal Special Closure	8	44980	14.8%	2 (0.8%)	713 (5.4%)	43898 (17.0%)	84 (2.9%)	0 (0.0%)	0 (0.0%)	115 (2.0%)	72 (2.3%)	0 (0.0%)	4 (2.2%)	92 (2.3%)
Sugarloaf Island Special Closure	8	1648	0.5%	3 (1.2%)	293 (2.2%)	0 (0.0%)	274 (9.5%)	0 (0.0%)	0 (0.0%)	627 (11.0%)	172 (5.5%)	7 (0.7%)	4 (2.2%)	268 (6.6%)
Steamboat Rock Seasonal Special Closure	4	9690	3.2%	0 (0.0%)	464 (3.5%)	9163 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)	0 (0.0%)	0 (0.0%)	62 (1.5%)
Rockport Rocks Seasonal Special Closure	7	2509	0.8%	1 (0.4%)	847 (6.5%)	1544 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	91 (1.6%)	8 (0.3%)	2 (0.2%)	0 (0.0%)	16 (0.4%)
Vizcaino Rock Special Seasonal Closure	7	8799	2.9%	2 (0.8%)	1698 (13.0%)	6930 (2.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	70 (1.2%)	42 (1.3%)	1 (0.1%)	0 (0.0%)	56 (1.4%)

Note: Proposed MPAs and special closures not included in the table do not contain breeding seabird colonies.

Table 3. Comparison of numbers and percentages of marine birds breeding within Round 3 SMRs, qualifying SMCAs and special closures

Name	Black Oyster-catcher	Brandt's Cormorant	Common Murre	Double-crested Cormorant	Fork-tailed Storm-petrel	Leach's Storm-petrel	Pelagic Cormorant	Pigeon Guillemot	Rhinoceros Aukle	Tufted Puffin	Western Gull
P0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
NCP	3 (1.2%)	721 (5.5%)	9163 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	186 (3.3%)	59 (1.9%)	0 (0.0%)	0 (0.0%)	102 (2.5%)
SUP	6 (2.4%)	721 (5.5%)	9163 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	217 (3.8%)	71 (2.3%)	0 (0.0%)	0 (0.0%)	108 (2.7%)
Special Closures	17 (6.9%)	6505 (49.6%)	169853 (65.8%)	358 (12.5%)	100 (23.9%)	926 (9.8%)	1429 (25.2%)	661 (21.0%)	1015 (95.5%)	90 (49.7%)	1870 (46.2%)

Table 4. Comparison of protection of the top eight marine bird breeding hot spots

Breeding Hot Spots	Proposal 0	NCP	SUP	Special Closures
Castle Rock				Castle Rock Special Closure
False Klamath Rock				False Klamath Rock Seasonal Special Closure
Green Rock				
Flatiron Rock				
False Cape Rocks				
Steamboat Rock		South Cape Mendocino SMR	South Cape Mendocino SMR	Steamboat Rock Seasonal Special Closure

Breeding Hot Spots	Proposal 0	NCP	SUP	Special Closures
Rockport Rocks				Rockport Rocks Seasonal Special Closure
Cape Vizcaino				Vizcaino Rock Seasonal Special Closure

Table 5. Brown Pelican roosts by roost size category within Round 3 MPAs and special closures. Not included in Table 6 because benefits to seabirds are reduced by allowed take activities.

MPA Name	Roost Category	Number of Roosts
	Proposal 0	
MacKerricher SMCA[a]	Low	1
	NCP	
Pyramid Point SMCA[a]	Low	1
Reading Rock SMCA[a]	Low	1
South Cape Mendocino SMR	Low	1
Vizcaino SMCA[a]	Low	2
Ten Mile SMR	Low	2
	SUP	
Pyramid Point SMCA	Low	1
Reading Rock SMCA[a]	Low	1
South Cape Mendocino SMR	Low	1
Vizcaino SMCA[a]	Low	2
Ten Mile SMR	Low	2
	Special Closures	
Castle Rock Special Closure	Low	1
False Klamath Rock Seasonal Special Closure	Medium	1
Steamboat Rock Seasonal Special Closure	Low	1
Rockport Rocks Seasonal Special Closures	Low	1
Vizcaino Rock Seasonal Special Closure	Low	1

Note: Proposed MPAs and special closures not included in the table do not contain Brown Pelican roosts.

Table 6. Comparison of size and number of Brown Pelican roosts within Round 3 SMRs, qualifying SMCAs and special closures

Draft MPA Proposal	High (>500 birds)	Medium (100-500 birds)	Low (never more than 100 birds)
Proposal 0	0	0	0
NCP	0	0	3
SUP	0	0	4
Special Closures	0	1	4

Table 7. Total contributions of nearshore weighted foraging index for four species of breeding seabirds in Round 3 MPAs and special closures. Not included in Table 8 because benefits to seabirds are reduced by allowed take activities.

Name	BRCO	PECO	COMU	PIGU	Name	BRCO	PECO	COMU	PIGU
Proposal 0					Special Closures				
MacKerricher SMCA[a]	0.00	<.01	0.00	0.02	Southwest Seal Rock Special Closure	0.00	<.01	0.00	<.01
Point Cabrillo SMCA[a]	0.02	0.02	<.01	0.02	Castle Rock Special Closure	0.01	<.01	0.03	<.01
Punta Gorda SMR	0.00	<.01	0.00	0.00	False Klamath Rock Seasonal Special Closure	<.01	<.01	<.01	<.01
Russian Gulch SMCA[a]	<.01	<.01	<.01	<.01	Sugarloaf Island Special Closure	<.01	<.01	<.01	<.01
Van Damme SMCA[a]	<.01	<.01	<.01	<.01	Steamboat Rock Seasonal Special Closure	<.01	<.01	<.01	<.01
					Rockport Rocks Seasonal Special Closure	<.01	<.01	<.01	<.01
					Vizcaino Rock Seasonal Special Closure	<.01	<.01	<.01	<.01
NCP					SUP				
Pyramid Point SMCA[a]	0.59	0.76	0.00	1.17	Pyramid Point SMCA	0.59	0.76	0.00	1.17
Point St. George Reef Offshore SMCA[a]	0.00	0.04	0.00	<.01	Point St. George Reef Offshore SMCA[a]	0.00	0.04	0.00	<.01
Reading Rock SMR	0.13	<.01	0.07	<.01	Reading Rock SMR	0.13	<.01	0.07	<.01
Reading Rock SMCA[a]	0.09	<.01	0.05	<.01	Reading Rock SMCA[a]	0.09	<.01	0.05	<.01
Samoa SMCA[a]	0.00	0.00	0.00	0.00	Samoa SMCA[a]	0.00	0.00	0.00	0.00
South Humboldt Bay SMRMA[a]	0.00	0.00	0.00	0.00	South Humboldt Bay SMRMA[a]	0.00	0.00	0.00	0.00
South Cape Mendocino SMR	0.28	0.53	0.17	0.26	South Cape Mendocino SMR	0.28	0.53	0.17	0.26
Mattole Canyon SMR	0.02	0.02	0.00	0.00	Mattole Canyon SMR	0.02	0.02	0.00	0.00
Sea Lion Gulch SMR	0.00	0.02	0.00	0.00	Sea Lion Gulch SMR	0.00	0.02	0.00	0.00
Vizcaino SMCA[a]	2.82	0.51	0.48	0.52	Vizcaino SMCA[a]	2.82	0.51	0.48	0.52
Ten Mile SMR	0.19	0.55	0.00	0.50	Ten Mile SMR	0.19	0.55	0.00	0.50
Ten Mile Beach SMCA[a]	0.05	0.08	0.00	0.05	Ten Mile Beach SMCA[a]	0.05	0.08	0.00	0.05
Ten Mile Estuary SMRMA[a]	<.01	<.01	0.00	<.01	Ten Mile Estuary SMRMA[a]	<.01	<.01	0.00	<.01
Point Cabrillo SMR	0.04	0.03	<.01	0.03	Point Cabrillo SMR	0.04	0.03	<.01	0.03

Name	BRCO	PECO	COMU	PIGU	Name	BRCO	PECO	COMU	PIGU
Big River Estuary SMP[a]	<.01	<.01	<.01	0.01	Big River Estuary SMP[a]	<.01	<.01	<.01	0.01
Navarro River Estuary SMRMA[a]	<.01	<.01	0.00	<.01	Navarro River Estuary SMRMA[a]	<.01	<.01	0.00	<.01

Note: MPAs and special closures not shown did not contribute to nearshore foraging area for any of these species.

Table 8. Comparison of draft MPA proposals to total contributions of weighted foraging areas for four species of breeding seabirds

	Brandt's Cormorant	Pelagic Cormorant	Common Murre	Pigeon Guillemot
Proposal 0	0.00	0.00	0.00	0.00
NCP	0.66	1.15	0.24	0.80
SUP	1.24	1.91	0.24	1.97
Special closures	0.03	0.02	0.04	0.02

Table 9. Comparison of diversity, area protected and mean number of birds contained in neritic foraging hot spots that overlap with Round 3 MPAs and special closures. [a] Not included in Table 10 because benefits to seabirds are reduced by allowed take activities.

MPA name	Species Diversity	Area (sq. mi.)	Loons, Grebes and Scoters	Pigeon Guillemots and Pelagic Cormorants	Marbled Murrelets	All Other Seabirds
			Average Number of Animals Sighted			
			Proposal 0			
MacKerricher SMCA	13	0.5	-	9.15	-	-
			NCP			
Pyramid Point SMCA[a]	17	8.27	287.5	88.5	197.7	-
Reading Rock SMCA[a]	14	7.73	2387.8	-	348.2	-
Vizcaino SMCA[a]	15	20.68	-	163.3	-	1961.4
Ten Mile SMR	14	8.57	-	-	-	1129.0
			SUP			
Pyramid Point SMCA	17	8.27	287.5	88.5	197.7	-
Reading Rock SMCA[a]	14	7.73	2387.8	-	348.2	-
Vizcaino SMCA[a]	15	20.68	-	163.3	-	1961.4
Ten Mile SMR	14	8.57	-	-	-	1129.0
			Special Closures			
False Klamath Rock Seasonal Special Closure	16	0.07	-	0.88	-	-

MPA name	Species Diversity	Area (sq. mi.)	Loons, Grebes and Scoters	Pigeon Guillemots and Pelagic Cormorants	Marbled Murrelets	All Other Seabirds
			Average Number of Animals Sighted			
Rockport Rocks: Seasonal Special Closure	8	0.01	-	-	-	2.36
Vizcaino Rock Seasonal Special Closure	8	0.01	-	-	-	1.54

Note: MPAs and special closures not shown did not contribute to neritic foraging hot spot area for any of these species.

Table 10. Comparison of total neritic foraging hot spot area protections for 4 species groups of seabirds within SMR and SMCA that meet protection criteria for seabirds

Name	Species Diversity	Area (sq. mi)	Loons, Grebes and Scoters	Pigeon Guillemots and Pelagic Cormorants	Marbled Murrelets	All Other Seabirds
			Average Number of Animals Sighted			
Proposal 0	-	-	-	-	-	-
NCP	14	13.85	-	-	-	1129.02
SUP	17	22.12	287.47	88.51	197.67	1129.02
Special Closures	16	0.23	-	0.88	-	3.91

Table 11. Comparison of protection of estuarine species groups and associated area of estuary in proposed MPAs.

MPA Name	% Area of Estuary in Proposed MPA	# of groups repre-sented	Dabbling Ducks	Diving Ducks	Geese	Sea ducks	Shore-birds	Swans
			Proposal 0 (none in Proposal 0)					
			NCP					
South Humboldt Bay SMRMA	7.18%	6	medium	high	high	high	high	high
			SUP					
South Humboldt Bay SMRMA	7.18%	6	medium	high	high	high	high	high

Notes: MPAs not shown did not contribute to estuarine species protection. Data did not include estuaries south of the Eel River.

All state marine recreational management areas (SMRMAs) allow waterfowl hunting.