California MLPA Master Plan Science Advisory Team
Evaluations of Benefits to Marine Birds from Round 2 North Coast Proposed Marine Protected Areas
Revised July 1, 2010

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. Marbled Godwit feeding densities have been documented higher at Samoa Bridge, Eureka Slough and the Elk River Mouth, and draft MPA proposals capturing these areas in a proposed MPA are noted. 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 draft MPA proposals capturing this area in a proposed MPA are noted. This is particularly evident in the smaller shorebirds such as Dunlin, Western and Least Sandpipers, which make up the largest numbers of shorebirds in the bay.

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 for SMCAs to be included in evaluations). Some SMCAs also propose unidentified tribal uses, and therefore it is not possible to assess the level of benefit to marine birds these SMCAs may provide. SMCAs with proposed tribal uses are identified in the tables. 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 north coast study region are shown in Table 1. Common Murres are by far the most abundant species breeding in the north coast study region, accounting for 85% of the total breeding seabirds in the NCSR.

Table 2 shows the potential benefits provided by each proposed MPA and special closure within the draft MPA proposals. Table 3 shows the summary of benefits by each draft MPA proposal based on the proposed special closures, SMRs and SMCAs meeting the criteria for this analysis.

Ruby Draft MPA Proposal 1 (Ruby 1) and its associated special closures protect the most breeding seabirds and hot spots, with approximately 88% of the breeding seabirds and all 8 of the designated hot spots. Ruby 1 protects large numbers of the seabird species that nest in large colonies and are particularly sensitive to disturbance events such as the Brandt's Cormorant (66%), Common Murre (95%), and Tufted Puffin (71%). It also includes the largest portion of Rhinoceros Auklets (97%) and Fork-tailed Storm-petrel colonies (36%). The main distinction between Ruby 1 and the two Sapphire draft MPA proposals (Sapphire 1 and Sapphire 2) is the inclusion in Ruby 1 – special closures of the two important seabird breeding sites of Green Rock and Flatiron Rock north of Trinidad.

The two Sapphire draft MPA proposals and their associated special closures are next in their ability to protect breeding seabirds with approximately 64% of the breeders included. Sapphire 1 includes three of the designated hot spots while Sapphire 2 only includes 2. A large portion of the protected seabirds are associated with the Castle Rock Special Closure, which the two Sapphire special closure proposals share with Ruby 1 – special closures. Seasonal closures (such as Castle Rock Special Closure in Sapphire 2) should be defined more completely; for seabirds the season should extend from March 15 to September 1.

The Ruby 2 Draft MPA Proposal (Ruby 2) and its associated special closures protect the fewest seabirds, with approximately 22% of the breeding seabirds and three of the designated hot spots. The designated hot spots include False Klamath Rock, Steamboat Rock (only in a SMR, not as a separate special closure as it is in the other three proposals) and a seasonal closure at Vizcaino Rock, but exclude the large breeding colony at Castle Rock and the colonies at Green Rock and Flatiron Rock, which accounts for the bulk of the difference.

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 north coast study region 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 and special closures meeting the criteria to provide benefits to seabirds for each draft MPA proposal. Proposal 0 did not capture any important pelican roosts in the north coast study region in qualifying MPAs.

The number of pelican roosts included in the various proposals are all low, with the highest being Ruby 1 (including SMCAs with proposed tribal uses) with 5 protected roosts. Sapphire 2 (including SMCAs with proposed tribal uses) was next with 4 protected roosts. Ruby 1 (not including SMCAs with proposed tribal uses), Ruby 2 and Sapphire 1 (with and without SMCAs with proposed tribal uses), and Sapphire 2 (not including SMCAs with proposed tribal uses) all protect 2 roosts. Sapphire 2 (not including SMCAs with proposed tribal uses) protects only 1 roost.

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 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. Table 7 shows the weighted area captured by each proposed MPA and special closure. Table 8 compares all proposals based on the total weighted areas captured by MPAs and special closures that met the criteria for this analysis.

All four proposals increase benefits to nearshore foraging seabirds over Proposal 0. These benefits are more evident for the species that are distributed more widely (e.g. Pelagic Cormorant and Pigeon Guillemot) than for those that are concentrated in large colonies (e.g. Brandt's Cormorant and Common Murre). Sapphire 1 provides the highest benefits to the large colony breeders while Sapphire 2 (not including SMCAs with proposed tribal uses) provides the least benefit.

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. Table 9 shows the neritic hot spot areas captured by MPAs and special closures from each draft MPA proposal 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 and SMCAs that met the criteria for this analysis among draft MPA proposals.

Overall, Sapphire 1 had the largest MPA area overlap with foraging hot spots among the draft MPA proposals (62.04 sq. mi.), followed by Ruby 1 (57.2 sq. mi., Table 9), but using only MPAs that met the criteria for this analysis, all proposals were similar when including SMCAs with proposed tribal uses (10.2 to 16.3 sq. mi.) except Ruby 2 (6 sq. mi., Table 10).

Comparing proposals for all MPAs from Table 9 for bird numbers, Sapphire 1 afforded the greatest protection to foraging birds, largely due Reading Rock and Vizcaino SMCA areas including high Scoter and Murre (other seabird) numbers, respectively. Ruby 2 provided the least protection to foraging.

Comparing only MPAs that met the criteria for this analysis from Table 10, Ruby 1 shows over twice the number of birds protected over Sapphire 2, the next greatest foraging protection proposal. These are followed by Sapphire 1 and Ruby 2 in order of numbers protected, summing all 4 species groups. Table 10 is best interpreted including tribal uses, considering that such uses are likely on shore or very near shore, and thus not expected to impact neritic foraging activities

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 across the draft MPA proposals. Data used for this analysis does not include estuaries south of the Eel River. No draft MPA proposals included SMRs or SMCAs that met the criteria to benefit

these species groups, therefore there is no summary table of benefits by draft MPA proposal. Table 12 compares potential protection of shorebirds in Humboldt Bay across the draft MPA proposals. Only state marine recreational management areas (SMRMAs), which allow waterfowl hunting, were proposed in Humboldt Bay. Therefore, no draft MPA proposals included MPAs that met the criteria to benefit these species groups and no summary table of benefits by draft MPA proposal was created.

The proposals basically differ in the amount of potential benefit given to shorebirds and waterfowl by the size of the protected areas in Humboldt Bay. Both Ruby 1 and Sapphire 1 include a portion of northeastern Humboldt Bay and portions of south Humboldt Bay. The portion of northern Humboldt Bay that is included in these two proposals is characterized by quality shorebird foraging and roosting sites around the mouth of Jacoby Creek and the area around and within the Arcata Marsh and Wildlife Sanctuary. Ruby 1 included excellent foraging habitat in the southern part of the bay and important roosting sites in the Humboldt Bay National Wildlife Refuge (NWR). Sapphire 1 includes potentially more eelgrass beds in the south bay, but does not include the roost sites on the Humboldt Bay NWR.

Both Ruby 2 and Sapphire 2 limit their influence in Humboldt Bay to a small portion of the southwestern part of the bay, leaving out the eelgrass beds just north of the SMRMA and the roost sites on the Humboldt Bay NWR.

There is little difference among the proposals in regards to contribution of coastal habitats for shorebirds and waterfowl, aside from slightly more coastal beach and coastal marsh miles in those SMCAs that propose tribal uses.

Summary

There are substantial differences between the draft MPA proposals and their associated special closures in their potential benefits to seabirds. Ruby 1, with its associated special closures, especially Flatiron Rock and Green Rock special closures which are exclusive to this proposal, provides for the most number of breeding and roosting seabirds, protects the most hot spots, is competitive in the nearshore foraging areas and protects higher numbers of neritic hot spot foragers. Ruby 1 also provides the most estuarine habitat in Humboldt Bay. The Sapphire draft MPA proposals and their associated special closures are next in line in their benefits to seabirds, with Sapphire 1 providing more benefits primarily because of the inclusion of Castle Rock Special Closure. Ruby 2 provides the least benefits in regards to seabird benefits primarily because of its exclusion of a Castle Rock Special Closure.

<u>Seabird Breeding Colonies and Hot Spots.</u> Including Castle Rock, one of the largest seabird colonies in the continental United States, makes three of the draft special closure proposals very beneficial to seabirds. The further inclusion of two important bird colonies north of Trinidad, Green Rock and Flatiron Rock, adds substantially to Ruby 1 – special closures. All of these breeding colony hot spots could be seasonal. For seabirds, the important segment of the year is between 1 March and 30 August.

Seabird Roosting Sites. Unlike areas in other parts of the state, seabird roosting sites are common here on the north coast, and few of them are large, consistent roosts. For this reason there is little difference between the proposals in terms of seabird roosting sites.

Nearshore Foraging Areas. The benefits provided by protecting nearshore foraging areas are not as significant as the protection of breeding sites, but can benefit our seabirds nonetheless. The largest unknown in this part of the analysis is the character of tribal uses. If these uses are not deleterious to seabird foraging activities, then all of the proposals can benefit seabird nearshore foraging activities. With better understanding of these tribal activities, we will be better able to judge these impacts.

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 between proposals difficult. Sapphire 1 had the largest area overlap with foraging hotspots (62.04 sq. mi.), followed by Ruby 1 (57.2 sq. mi.), but using only MPAs that met the criteria for this analysis, all proposals were similar when including SMCAs with proposed tribal uses (10.2 to 16.3 sq. mi.) except Ruby 2 (6 sq. mi., Table 10). Tribal uses are expected to occur on or very near shore, and thus not likely to impact neritic foraging.

Special Closure Areas. The SMCAs and SMRs currently proposed 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. 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 during the non-breeding season.

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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 draft MPA proposal

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)														
Ruby 1														
Pyramid Point SMR	4	52	0.0%	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%)
False Klamath Cove SMCA[a]	8	44998	14.9%	2 (0.8%)	713 (5.4%)	43898 (17.0%)	84 (2.9%)	0 (0.0%)	0 (0.0%)	115 (2.0%)	88 (2.8%)	0 (0.0%)	4 (2.2%)	94 (2.3%)
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%)
Vizcaino SMCA[a]	7	2555	0.8%	4 (1.6%)	847 (6.5%)	1544 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	100 (1.8%)	28 (0.9%)	2 (0.2%)	0 (0.0%)	30 (0.7%)
Ten Mile SMCA[a]	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%)
Ruby 2														
Pyramid Point SMR	4	52	0.0%	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%)
Petrolia Lighthouse SMR	2	19	0.0%	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]	7	2555	0.8%	4 (1.6%)	847 (6.5%)	1544 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	100 (1.8%)	28 (0.9%)	2 (0.2%)	0 (0.0%)	30 (0.7%)

Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Sapphire 1														
Pyramid Point SMR	4	52	0.0%	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%)
Pyramid Point SMCA[a]	9	3322	1.1%	12 (4.8%)	774 (5.9%)	0 (0.0%)	1102 (38.4%)	0 (0.0%)	1 (0.0%)	402 (7.1%)	359 (11.4%)	1 (0.1%)	27 (14.9%)	644 (15.9%)
Wilson Rock SMCA[a]	8	44998	14.9%	2 (0.8%)	713 (5.4%)	43898 (17.0%)	84 (2.9%)	0 (0.0%)	0 (0.0%)	115 (2.0%)	88 (2.8%)	0 (0.0%)	4 (2.2%)	94 (2.3%)
Reading Rock SMR	7	3021	1.0%	0 (0.0%)	246 (1.9%)	2742 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (0.1%)	3 (0.1%)	1 (0.1%)	8 (4.4%)	15 (0.4%)
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%)
Vizcaino SMCA[a]	7	11354	3.7%	6 (2.4%)	2545 (19.4%)	8474 (3.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	170 (3.0%)	70 (2.2%)	3 (0.3%)	0 (0.0%)	86 (2.1%)
Ten Mile SMCA[a]	5	461	0.2%	2 (0.8%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	114 (2.0%)	50 (1.6%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Petrolia Lighthouse SMR	2	19	0.0%	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%)
Sapphire 2														
Pyramid Point SMCA[b]	9	3374	1.1%	15 (6.0%)	774 (5.9%)	0 (0.0%)	1102 (38.4%)	0 (0.0%)	1 (0.0%)	433 (7.6%)	371 (11.8%)	1 (0.1%)	27 (14.9%)	650 (16.1%)
Wilson Rock SMCA[a]	8	44998	14.9%	2 (0.8%)	713 (5.4%)	43898 (17.0%)	84 (2.9%)	0 (0.0%)	0 (0.0%)	115 (2.0%)	88 (2.8%)	0 (0.0%)	4 (2.2%)	94 (2.3%)
Reading Rock SMCA[a]	7	3021	1.0%	0 (0.0%)	246 (1.9%)	2742 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (0.1%)	3 (0.1%)	1 (0.1%)	8 (4.4%)	15 (0.4%)

Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
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%)
Petrolia Lighthouse SMCA[b]	2	19	0.0%	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	0.0%	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 SMCA[a]	5	461	0.2%	2 (0.8%)	257 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	114 (2.0%)	50 (1.6%)	0 (0.0%)	0 (0.0%)	38 (0.9%)
Ruby 1 - Special Closure														
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 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%)
Green Rock Special Closure	11	32318	10.7%	2 (0.8%)	62 (0.5%)	32021 (12.4%)	0 (0.0%)	50 (11.9%)	1 (0.0%)	4 (0.1%)	25 (0.8%)	12 (1.1%)	29 (16.0%)	28 (0.7%)
Flatiron Rock Special Closure	7	34617	11.4%	6 (2.4%)	1032 (7.9%)	33456 (13.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.1%)	3 (0.1%)	0 (0.0%)	2 (1.1%)	114 (2.8%)
False Cape Rock Special Closure	7	12244	4.0%	2 (0.8%)	792 (6.0%)	11051 (4.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	240 (4.2%)	55 (1.7%)	0 (0.0%)	8 (4.4%)	96 (2.4%)

Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
Steamboat Rock 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 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 Closure (seasonal)	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%)
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%)
Ruby 2 - Special Closure														
False Klamath Rock 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%)
Vizcaino Rock Special Closure (seasonal)	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%)
Sapphire 1 - Special Closure														
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%)

Name	No. of Species	Total Birds (No.)	Total Birds (%)	BLOY	BRCO	COMU	DCCO	FTSP	LESP	PECO	PIGU	RHAU	TUPU	WEGU
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%)
Steamboat Rock 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%)
Vizcaino Rock Special Closure (seasonal)	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%)
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%)
Sapphire 2 - Special Closure														
Castle Rock Special Closure (seasonal)	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%)
Steamboat Rock 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%)
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%)

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

[a] *Not included in Table 3 because benefits to seabirds are reduced by allowed take activities.*

[b] *May or may not contribute benefits to seabirds based on unidentified proposed tribal uses.*

Table 3. Comparison between draft MPA proposals of numbers and percentages of marine birds breeding within proposed 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%
Ruby 1	1.2%	3.5%	3.6%	0.0%	0.0%	0.0%	0.5%	0.4%	0.0%	0.0%	1.7%
Ruby 1 - special closure	10.9%	64.0%	95.5%	12.5%	35.8%	9.8%	29.6%	23.6%	96.6%	71.3%	52.1%
Ruby 2	1.2%	3.5%	3.6%	0.0%	0.0%	0.0%	0.8%	0.4%	0.0%	0.0%	1.7%
Ruby 2 - special closure	2.8%	20.6%	19.7%	12.5%	0.0%	0.0%	14.3%	9.1%	0.8%	4.4%	10.3%
Sapphire 1	1.2%	5.4%	4.6%	0.0%	0.0%	0.0%	1.0%	0.5%	0.1%	4.4%	2.1%
Sapphire 1 - special closure	5.6%	37.7%	48.2%	9.5%	23.9%	9.8%	21.6%	18.5%	95.3%	47.5%	43.5%
Sapphire 2 - w/o tribal use SMCAs	0.0%	3.5%	3.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%
Sapphire 2 - w/tribal use SMCAs	6.0%	9.4%	3.6%	38.4%	0.0%	0.0%	7.9%	11.8%	0.1%	14.9%	17.6%
Sapphire 2 - special closure	2.8%	24.8%	45.5%	9.5%	23.9%	9.8%	18.0%	16.9%	95.2%	47.5%	42.0%

Table 4. Comparison between draft MPA proposals and associated special closures of protection of the top eight marine bird breeding hot spots

Breeding Hot Spots	Proposal 0	Ruby 1	Ruby 1 - Special Closures	Ruby 2	Ruby 2 - Special Closures	Sapphire 1	Sapphire 1 - Special Closures	Sapphire 2	Sapphire 2 - Special Closures
Castle Rock			Castle Rock Special Closure				Castle Rock Special Closure		Castle Rock Special Closure (seasonal)
False Klamath Rock			False Klamath Rock Special Closure		False Klamath Rock Special Closure				

Breeding Hot Spots	Proposal 0	Ruby 1	Ruby 1 - Special Closures	Ruby 2	Ruby 2 - Special Closures	Sapphire 1	Sapphire 1 - Special Closures	Sapphire 2	Sapphire 2 - Special Closures
Green Rock			Green Rock Special Closure						
Flatiron Rock			Flatiron Special Closure						
False Cape Rocks			False Cape Rock Special Closure						
Steamboat Rock		South Cape Mendocino SMR	Steamboat Rock Special Closure	South Cape Mendocino SMR		South Cape Mendocino SMR	Steamboat Rock Special Closure	South Cape Mendocino SMR	Steamboat Rock Special Closure
Rockport Rocks			Rockport Rocks Special Closure						
Cape Vizcaino			Vizcaino Rock Special Closure (seasonal)		Vizcaino Rock Special Closure (seasonal)		Vizcaino Rock Special Closure (seasonal)		

Table 5. Major Brown Pelican roosts by roost size category within draft MPA proposals and associated special closures

MPA Name	Roost Category	Number of Roosts
	Proposal 0	
MacKerricher SMCA[a]	Low	1
	Ruby 1	
Pyramid Point SMCA[b]	Low	1
False Klamath Cove SMCA[a]	Medium	1
South Cape Mendocino SMR	Low	1
Vizcaino SMCA[a]	Low	3
Ten Mile SMCA[b]	Low	2
MacKerricher SMCA[a]	Low	1
Vizcaino Rock Special Closure (seasonal)	Low	1
	Ruby 2	
Pyramid Point SMCA[a]	Low	1
South Cape Mendocino SMR	Low	1
Vizcaino SMCA[a]	Low	3
Vizcaino Rock Special Closure (seasonal)	Low	1
	Sapphire 1	
Pyramid Point SMCA[a]	Low	2
Pyramid Point SMCA[a]	Medium	1
Wilson Rock SMCA[a]	Medium	1
South Cape Mendocino SMR	Low	1
Vizcaino SMCA[a]	Low	4
Ten Mile SMCA[a]	Low	2
MacKerricher SMCA[a]	Low	1
Vizcaino Rock Special Closure (seasonal)	Low	1
	Sapphire 2	
Pyramid Point SMCA[b]	Low	2
Pyramid Point SMCA[b]	Medium	1
Wilson Rock SMCA[a]	Medium	1
South Cape Mendocino SMR	Low	1
Vizcaino SMCA[a]	Low	2
Ten Mile SMCA[a]	Low	2

Note: Proposed MPAs and special closures not included in the table do not contain Brown Pelican roosts.
[a] *Not included in Table 6 because benefits to seabirds are reduced by allowed take activities.*
[b] *May or may not contribute benefits to seabirds based on unidentified proposed tribal uses.*

Table 6. Comparison between draft MPA proposals of size and number of Brown Pelican roosts within proposed SMRs, qualifying SMCAs and special closures

Draft MPA Proposal (includes associated special closures)	High (>500 birds)	Medium (100-500 birds)	Low (never more than 100 birds)
Proposal 0	0	0	0
Ruby 1 - w/o tribal use SMCAs	0	0	2
Ruby 1 - w/tribal use SMCAs	0	0	5
Ruby 2 - w/o tribal use SMCAs	0	0	2
Ruby 2 - w/tribal use SMCAs	0	0	2
Sapphire 1 - w/o tribal use SMCAs	0	0	2
Sapphire 1 - w/tribal use SMCAs	0	0	2
Sapphire 2 - w/o tribal use SMCAs	0	0	1
Sapphire 2 - w/tribal use SMCAs	0	1	3

Table 7. Total contributions of nearshore weighted foraging index for four species of breeding seabirds in draft MPA proposals and associated special closures

MPA Name	BRCO	PECO	COMU	PIGU	Special Closure Name	BRCO	PECO	COMU	PIGU
Proposal 0					Proposal 0 (no special closures)				
MacKerricher SMCA[a]	0.00	<.01	0.00	0.02					
Point Cabrillo SMCA[a]	0.02	0.02	<.01	0.02					
Punta Gorda SMR	0.00	<.01	0.00	0.00					
Russian Gulch SMCA[a]	<.01	<.01	<.01	<.01					
Van Damme SMCA[a]	<.01	<.01	<.01	<.01					
Ruby 1					Ruby 1 - Special Closures				
Big River Estuary SMP[a]	0.02	0.02	<.01	0.02	Castle Rock Special Closure	0.01	<.01	0.03	<.01
False Klamath Cove SMCA[a]	0.39	0.42	1.21	0.38	False Cape Rock Special Closure	<.01	<.01	<.01	<.01
MacKerricher SMCA[a]	0.00	<.01	0.00	0.02	False Klamath Rock Special Closure	<.01	<.01	<.01	<.01
Mattole Canyon SMR	0.02	0.02	0.00	0.00	Flatiron Special Closure	<.01	<.01	<.01	<.01
Navarro River Estuary SMCA[a]	<.01	0.01	0.00	0.01	Green Rock Special Closure	<.01	<.01	<.01	<.01

MPA Name	BRCO	PECO	COMU	PIGU
Petrolia Lighthouse SMR	0.00	0.03	0.00	0.00
Point Cabrillo SMCA[b]	0.03	0.02	<.01	0.02
Point St. George Reef SMCA[a]	0.00	0.03	0.00	<.01
Pyramid Point SMCA[b]	0.05	0.07	0.00	0.10
Pyramid Point SMR	0.42	0.54	0.00	0.84
Reading Rock Offshore SMCA[a]	0.20	0.01	0.11	0.01
Russian Gulch SMCA[a]	<.01	<.01	<.01	<.01
South Cape Mendocino SMR	0.30	0.57	0.18	0.28
Stone Lagoon SMRMA[a]	0.00	<.01	0.00	<.01
Ten Mile Estuary SMCA[b]	<.01	<.01	0.00	<.01
Ten Mile SMCA[b]	0.05	0.15	0.00	0.13
Ten Mile SMR	0.15	0.43	0.00	0.39
Van Damme SMCA[a]	<.01	<.01	<.01	<.01
Vizcaino SMCA[a]	3.63	0.76	0.61	0.80

Special Closure Name	BRCO	PECO	COMU	PIGU
Rockport Rocks Special Closure	<.01	<.01	<.01	<.01
Southwest Seal Rock Special Closure	0.00	<.01	0.00	<.01
Steamboat Rock Special Closure	<.01	<.01	<.01	<.01
Sugarloaf Island Special Closure	<.01	<.01	<.01	<.01
Vizcaino Rock Special Closure (seasonal)	<.01	<.01	<.01	<.01

Ruby 2

Big River Estuary SMP[a]	0.02	0.02	<.01	0.02
Mattole Canyon SMR	0.02	0.02	0.00	0.00
Navarro River Estuary SMCA[a]	<.01	0.01	0.00	0.01
Petrolia Lighthouse SMR	0.00	0.02	0.00	0.00

Ruby 2 - Special Closures

False Klamath Rock Special Closure	<.01	<.01	<.01	<.01
Sugarloaf Island Special Closure	<.01	<.01	<.01	<.01
Vizcaino Rock Special Closure (seasonal)	<.01	<.01	<.01	<.01

MPA Name	BRCO	PECO	COMU	PIGU
Pyramid Point SMCA[a]	0.09	0.11	0.00	0.17
Pyramid Point SMR	0.50	0.64	0.00	1.00
Reading Rock Offshore SMCA[a]	0.14	<.01	0.08	<.01
South Cape Mendocino SMR	0.30	0.57	0.18	0.28
Ten Mile Estuary SMCA[b]	<.01	<.01	0.00	<.01
Vizcaino SMCA[a]	3.63	0.76	0.61	0.80
Sapphire 1				
Albion River Estuary SMCA[a]	0.00	<.01	0.00	<.01
Big River Estuary SMP[a]	0.01	0.01	<.01	0.01
MacKerricher SMCA[a]	0.00	0.02	0.00	0.04
Mattole Canyon Offshore SMR	0.03	0.02	0.00	0.00
Navarro River Estuary SMCA[b]	<.01	<.01	0.00	<.01
Petrolia Lighthouse SMR	0.00	0.03	0.00	0.00
Point Cabrillo SMCA[a]	0.04	0.04	<.01	0.05
Pyramid Point SMCA[a]	0.10	0.13	0.00	0.20
Pyramid Point SMR	0.60	0.78	0.00	1.20
Reading Rock SMCA[a]	0.04	<.01	0.02	<.01
Reading Rock SMR	0.25	0.01	0.14	0.01
South Cape Mendocino SMR	0.32	0.62	0.20	0.31
Ten Mile Estuary	<.01	<.01	0.00	<.01

Special Closure Name	BRCO	PECO	COMU	PIGU
Sapphire 1 - Special Closures				
Castle Rock Special Closure	0.01	<.01	0.03	<.01
Southwest Seal Rock Special Closure	0.00	<.01	0.00	<.01
Steamboat Rock Special Closure	<.01	<.01	<.01	<.01
Sugarloaf Island Special Closure	<.01	<.01	<.01	<.01
Vizcaino Rock Special Closure (seasonal)	<.01	<.01	<.01	<.01

MPA Name	BRCO	PECO	COMU	PIGU	Special Closure Name	BRCO	PECO	COMU	PIGU
SMCA[b]									
Ten Mile SMCA[a]	0.04	0.06	0.00	0.04					
Ten Mile SMR	0.11	0.16	0.00	0.11					
Vizcaino SMCA[a]	3.74	0.78	0.63	0.83					
Wilson Rock SMCA[a]	0.45	0.49	1.42	0.44					
Sapphire 2					Sapphire 2 - Special Closures				
Big River Estuary SMP[a]	0.01	0.01	<.01	0.01	Castle Rock Special Closure (seasonal)	0.01	<.01	0.03	<.01
Mattole Canyon Offshore SMR	0.03	0.02	0.00	0.00	Steamboat Rock Special Closure	<.01	<.01	<.01	<.01
Petrolia Lighthouse SMCA[b]	0.00	0.03	0.00	0.00	Sugarloaf Island Special Closure	<.01	<.01	<.01	<.01
Point Cabrillo SMCA[a]	0.04	0.04	<.01	0.05					
Pyramid Point SMCA[b]	0.70	0.90	0.00	1.39					
Reading Rock SMCA[a]	0.30	0.02	0.17	0.02					
South Cape Mendocino SMR	0.32	0.62	0.20	0.31					
Ten Mile Estuary SMCA	<.01	<.01	0.00	<.01					
Ten Mile SMCA[a]	0.04	0.06	0.00	0.04					
Ten Mile SMR	0.11	0.16	0.00	0.11					
Vizcaino SMCA[a]	2.07	0.34	0.35	0.30					
Wilson Rock SMCA[a]	0.45	0.49	1.42	0.44					

Note: MPAs and special closures not shown did not contribute to nearshore foraging area for any of these species.
[a] *Not included in Table 8 because benefits to seabirds are reduced by allowed take activities.*
[b] *May or may not contribute benefits to seabirds based on unidentified proposed tribal uses.*

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
Ruby 1 - w/o tribal use SMCAs	0.89	1.59	0.18	1.52
Ruby 1 - w/tribal use SMCAs	1.03	1.83	0.18	1.78
Ruby 1 - special closures	0.04	0.02	0.05	0.02
Ruby 2 - w/o tribal use SMCAs	0.82	1.25	0.18	1.28
Ruby 2 - w/tribal use SMCAs	0.82	1.25	0.18	1.28
Ruby 2 - special closures	0.01	0.01	0.01	0.00
Sapphire 1 - w/o tribal use SMCAs	1.32	1.63	0.34	1.63
Sapphire 1 - w/tribal use SMCAs	1.32	1.64	0.34	1.64
Sapphire 1 - special closures	0.02	0.01	0.03	0.01
Sapphire 2 - w/o tribal use SMCAs	0.46	0.81	0.20	0.42
Sapphire 2 - w/tribal use SMCAs	1.16	1.74	0.20	1.82
Sapphire 2 - special closures	0.02	0.01	0.03	0.01

Table 9. Comparison between draft MPA proposals of diversity, area protected and mean number of birds contained in neritic foraging hot spots that overlap with proposed MPAs and special closures

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	-	-
			Ruby 1			
Pyramid Point SMCA[b]	17	1.09	49.17	-	28.33	-
Pyramid Point SMR	17	4.87	218.32	36.02	126.12	-
False Klamath Cove SMCA[a]	16	5.83	-	42.5	-	-
Reading Rock Nearshore SMCA[a]	18	3.18	476.74	-	129.99	575.52
Reading Rock Offshore SMCA[a]	18	5.76	1807.88	-	261.51	824.52
Vizcaino SMCA[a]	15	26.81	-	208.78	-	2929.66
Ten Mile SMCA[b]	14	4.53	-	-	-	564.73
Ten Mile SMR	14	4.53	-	-	-	630.54
MacKerricher SMCA[a]	13	0.56	-	10.54	-	-
			Ruby 2			
Pyramid Point SMCA[a]	17	2.26	99.86	17.1	58.17	-
Pyramid Point SMR	17	5.99	186.96	71.23	139.07	-
Reading Rock Nearshore SMCA[a]	18	2.97	316.73	-	117.76	566.63
Reading Rock Offshore SMCA[a]	18	4.43	870.46	-	186.8	754.25
Vizcaino SMCA[a]	15	26.81	-	208.78	-	2929.61
			Sapphire 1			
Pyramid Point SMCA[a]	17	2.58	114.38	19.41	66.49	-
Pyramid Point SMR	17	7.37	248.14	81.46	174.52	-
Wilson Rock SMCA[a]	16	6.89	-	48.64	-	-
Reading Rock SMCA[a]	18	7.61	4672.14	-	408.45	561.86
Vizcaino SMCA[a]	15	27.3	-	210.25	-	3019.61
Ten Mile SMCA[a]	14	3.75	-	-	-	467.43
Ten Mile SMR	14	2.78	-	-	-	359.15
MacKerricher SMCA[a]	13	3.76	-	73.49	-	-
			Sapphire 2			
Pyramid Point SMCA[b]	17	9.81	356.57	99.77	237.49	-

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			
Wilson Rock SMCA[a]	16	6.89	-	48.64	-	-
Reading Rock SMCA[a]	18	7.61	4673.08	-	408.32	560.75
Vizcaino SMCA[a]	15	15.1	-	122.22	-	1087.25
Ten Mile SMCA[b]	14	3.74	-	-	-	466.1
Ten Mile SMR	14	2.78	-	-	-	359.15
Ruby 1 - Special Closures						
False Klamath Rock Special Closure	16	0.07	-	0.88	-	-
Flatiron Rock Special Closure	13	0.08	-	1.83	-	6.93
Green Rock Special Closure	11	0.06	-	0.75	-	10.4
Rockport Rocks Special Closure	8	0.01	-	-	-	2.36
Vizcaino Rock Special Closure (seasonal)	8	0.01	-	-	-	1.54
Ruby 2 - Special Closures						
False Klamath Rock Special Closure	16	0.07	-	0.88	-	-
Vizcaino Rock Special Closure (seasonal)	8	0.01	-	-	-	1.54
Sapphire 1 - Special Closures						
Vizcaino Rock Special Closure (seasonal)	8	0.01	-	-	-	1.54
Sapphire 2 - Special Closures						
None	-	-	-	-	-	-

Note: MPAs and special closures not shown did not contribute to neritic foraging hot spot area for any of these species.
[a] *Not included in Table 10 because benefits to seabirds are reduced by allowed take activities.*
[b] *May or may not contribute benefits to seabirds based on unidentified proposed tribal uses.*

Table 10. Comparison of draft MPA proposals with allowed uses to total neritic foraging hot spot area protections for 4 species groups of 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	-	-	-	-	-	-
Ruby 1 - w/o tribal use SMCAs	17	9.40	218.32	36.02	126.12	630.54

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			
Ruby 1 - w/tribal use SMCAs	17	15.02	267.49	36.02	154.45	1195.27
Ruby 1 - special closures	16	0.23	-	3.46	-	21.24
Ruby 2 - w/o tribal use SMCAs	17	5.99	186.96	71.23	139.07	-
Ruby 2 - w/tribal use SMCAs	17	5.99	186.96	71.23	139.07	-
Ruby 2 - special closures	16	0.08	-	0.88	-	1.54
Sapphire 1 - w/o tribal use SMCAs	17	10.15	248.14	81.46	174.52	359.15
Sapphire 1 - w/tribal use SMCAs	17	10.15	248.14	81.46	174.52	359.15
Sapphire 1 - special closures	8	.01	-	-	-	1.54
Sapphire 2 - w/o tribal use SMCAs	17	2.78	-	-	-	359.15
Sapphire 2 - w/tribal use SMCAs	17	16.33	356.57	99.77	237.49	359.15
Sapphire 2 - special closures	-	-	-	-	-	-

Table 11. Comparison of draft MPA proposals 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)								
Ruby 1								
Stone Lagoon SMRMA	100.00%	4	low	low	N/A	low	low	N/A
North Humboldt Bay SMRMA	11.50%	5	medium	high	low	low	medium	N/A
South Humboldt Bay SMRMA	25.68%	6	medium	high	high	high	high	high
Ruby 2								
South Humboldt Bay SMRMA	5.94%	6	medium	high	high	high	high	high
Sapphire 1								
North Humboldt Bay SMRMA	11.63%	5	medium	high	low	low	medium	N/A
South Humboldt Bay SMRMA	22.11%	6	medium	high	high	high	high	high
Sapphire 2								
South Humboldt Bay SMRMA	5.94%	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 and propose tribal uses.

Table 12. Comparison of draft MPA proposals of shorebirds in Humboldt Bay in proposed MPAs

MPA Name	# of Moni-toring Sites	Arcata Bay western shore included?	Marbled Godwit high density sites included?			Diversity of shorebirds at monitoring sites (total species)	Density of shorebirds at monitoring sites (daily high count/length of tide line in meters)
			Samoa Bridge	Eureka Slough	Elk River Mouth		
Proposal 0 (None in Proposal 0)							
Ruby 1							
North Humboldt Bay SMRMA	3	Yes	No	No	No	11, 10, 10	0.33, 0.50, 2.42
South Humboldt Bay SMRMA	2	No	No	No	No	12, 10	1.37, 0.50
Ruby 2							
South Humboldt Bay SMRMA	1	No	No	No	No	12	1.37
Sapphire 1							
North Humboldt Bay SMRMA	3	Yes	No	No	No	11, 10, 10	0.33, 0.50, 2.42
South Humboldt Bay SMRMA	1	No	No	No	No	12	1.37
Sapphire 2							
South Humboldt Bay SMRMA	1	No	No	No	No	12	1.37

Note: All state marine recreational management areas (SMRMAs) allow waterfowl hunting and propose tribal uses.

Table 13. Comparison of draft MPA proposals to total contributions of coastal habitats used by shorebirds and waterfowl

Draft MPA Proposal	Coastal Beach (miles)	Coastal Marsh (miles)	Coastal Marsh (sq. miles)	Tidal Flats (miles)	Humboldt Eelgrass (sq. miles)	Estuary (sq. miles)
Proposal 0	0.00	0.00	0.00	0.00	0.00	0.00
Ruby 1 – w/o tribal use SMCAs	4.28	0.00	0.00	0.00	0.00	0.00
Ruby 1 - w/ tribal use SMCAs	17.87	2.30	0.05	0.00	0.00	0.19
Ruby 2 - w/o tribal use SMCAs	4.30	0.00	0.00	0.00	0.00	0.00
Ruby 2 - w/ tribal use SMCAs	4.70	2.30	0.05	0.00	0.00	0.19
Sapphire 1 - w/o tribal use SMCAs	7.66	0.00	0.00	0.00	0.00	0.00
Sapphire 1 - w/ tribal use SMCAs	9.34	2.94	0.06	0.33	0.00	0.28
Sapphire 2 - w/o tribal use SMCAs	6.04	0.00	0.00	0.00	0.00	0.00
Sapphire 2 - w/ tribal use SMCAs	11.50	2.30	0.05	0.00	0.00	0.19

Note: MPAs that did not include these habitats or did not meet criteria to benefit seabirds are not included in totals.