

EVALUATIONS OF BENEFITS TO MARINE MAMMALS FROM PROPOSED MARINE PROTECTED AREAS IN THE MLPA NORTH CENTRAL STUDY REGION, CALIFORNIA

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The objective of this evaluation is to assess what benefits associated with goals 1, 2 and 4 of the California Marine Life Protection Act (MLPA) are achieved by the proposals as they apply to marine mammals in the MLPA North Central Coast Study Region (NCCSR). Proposed marine protected areas (MPAs) are evaluated for potential benefits, specifically for pinnipeds. Pinnipeds, which include seals and sea lions, are a subset of marine mammals that congregate onshore at traditional locations to rest at “haul out sites” and breed at “rookeries”. These terrestrial sites fall within the intertidal or supratidal zone on the mainland and on islands. The terrestrial sites include a range of habitats on mainland coast and islands which include such substrates as hard rock, cobble and sand. Cetaceans are not included in these analyses because they generally range widely at a scale larger than would benefit from coastal MPAs. Gray whales, for example, might migrate through MPAs along the coast, but likely do not reside within any MPA for more than a few days, and therefore, would fall into the category of species that are likely to benefit but not most likely to benefit. The range of sea otters extends just to Half Moon Bay, within the south region, but there are no concentrations of otters within this subregion.

Pinnipeds would benefit from the placement of MPAs because of a reduction of disturbance from human activities on or adjacent to rookeries or haul out sites. Although MPAs do not restrict human access or vessel transit, the restrictions on allowable activities within MPAs are likely to result in fewer extractive users that access these areas. Vessel traffic, including motorized and non-motorized, can cause significant levels of disturbance to marine mammals (e.g., Allen et al. 1985, Suryan and Harvey 1999, Thompson et al. 2001, Grigg et al. 2004, Johnson and Acevedo-Gutierrez 2007). Vessel noise, such as from loud engines and generators, caused many disturbances to pinnipeds at the Farallon Islands in the past (PRBO Conservation Science and USFWS, unpubl. data). Disturbances can lead to reductions in productivity or site abandonment. Disturbances at foraging areas can disrupt feeding activities and cause animals to leave the area, further reducing feeding and leading to additional energy expenditures.

METHODS

Evaluations follow the methods described in “Methods Used to Evaluate MPA Proposals in the North Central Coast Study Region March 31, 2008”. The evaluation includes analyzing the potential benefits to: 1) breeding areas, 2) resting areas, and 3) foraging areas of marine mammals. The foraging component is applied only to harbor seal rookeries, as these animals forage close to breeding areas and are most likely to benefit from MPAs. We also assess the benefits of “special closure areas” that were included as part of the North Central Coast Regional Stakeholder Group (NCCRSG) proposals to reduce disturbance to some marine bird and mammal colonies by restricting access to the area surrounding the colony. The special closures were designed to create buffered areas around natural features such as islands or headlands at either a 300ft or 1000ft distance. Special closures would restrict human access to discreet areas, thus activities such as kayaking, whale watching, and fishing, would be prohibited inside special closures either seasonally or year-round.

As with the previous round of analyses, no rankings of level of benefit (e.g., high, medium, low, none) have been given because the variability in population sizes between species makes categorizations too

subjective and potentially misleading. Additionally, assessing the benefit provided to pinnipeds by MPAs of different protection levels is not easily comparable due to data limitations for pinnipeds, and due to varied activities associated with lower levels of protection, (ranging from salmon fishing to abalone harvesting from shore). The analyses, therefore, include only those pinniped haul out sites and rookeries that fall within the very high protection zone (state marine reserves or SMRs) and do not include MPAs with lower levels of protection. This selection assumes that most potential activities that might affect pinnipeds would be reduced by the SMR status. We recognize, however, that protection of an area as a SMR does not address all potential sources of human activities. We also recognize that lower levels of protection could also provide some measure of protection. These analyses, therefore, provide a summary of the added value to pinnipeds that would be achieved at the highest levels of protection under each proposal.

Population in this evaluation refers to the number of animals that use a site for breeding or resting. A haul out site is a location where seals come onshore to rest. A rookery is where seals come onshore to give birth, raise their young, and breed. Many sites serve as both haul outs and rookeries. A “hot spot” is an area where there is a major rookery or haul out area with high abundance and/or high diversity of species. For either rookery or haul out site, hot spots are identified that fall within each of the MPAs for each of the proposals.

BREEDING COLONIES

For rookeries, the four species most likely to benefit from MPAs include: Steller sea lions, northern fur seals, northern elephant seals, and harbor seals. These species are sensitive to disturbance from human activities when breeding.

Numbers of breeding pinnipeds within each subregion are shown in Table 1. Evaluations include numbers of species (species diversity), numbers of pinnipeds, and percentages of subregional populations breeding within each MPA proposal and for the entire subregional array (Table 3). In this document, percentages cited are the percentages of the subregional populations only.

These analyses draw on information from the following data and/or sources: rookery survey data in the draft NOAA Biogeographic Assessment for the National Marine Sanctuaries (NOAA 2007), Mark Lowry from NOAA Fisheries, a report by Bonnell et al. 1983. In addition, the U.S. Fish and Wildlife Service provided the California Department of Fish and Game with unpublished data for the Farallon Islands, which was converted to GIS data.

HAUL OUT SITES

Data used for analyses of haul out sites were from survey data in the draft NOAA Biogeographic Assessment for National Marine Sanctuaries, Mark Lowry from NOAA Fisheries (pers. com.), Bonnell et al. 1983, and data provided by the U.S. Fish and Wildlife Service for the Farallon Islands to the California Department of Fish and Game Marine Region GIS staff. For haul out sites, species likely to benefit from MPAs include California sea lions, Steller sea lions, northern elephant seals, and harbor seals. Fur seals are not included because they are mostly at sea during the non-breeding season and range widely along the continental shelf.

Numbers of pinnipeds within each subregion are shown in Table 2. Evaluations include numbers of species (species diversity), numbers of pinnipeds, and percentages of subregional haul-out populations breeding within each MPA proposal and for entire proposal arrays (Table 4). In this document, percentages cited are the percentages of the subregional populations.

Data used for analyses of haul out sites were from survey data in the draft NOAA Biogeographic Assessment for National Marine Sanctuaries, Mark Lowry from NOAA Fisheries (pers. com.), Bonnell et al. 1983. In addition, the U.S. Fish and Wildlife Service provided the California Department of Fish and Game with unpublished data for the Farallon Islands, which was converted to GIS data.

FORAGING AREAS

Harbor seals are the only focal species most likely to benefit from increases to forage base. In nearshore areas, harbor seals forage near their haul out or rookery sites, and may repeatedly visit specific foraging areas (Jones 1981, Harvey and Torok 1994, Harvey et al. 1995, Thompson et al. 1998, Grigg 2008). Harbor seals forage on whatever is locally abundant, and they feed over a variety of habitats where they pursue rockfish, anchovies, squid, and a several other prey.

Other marine mammal species were not considered because their foraging ranges are broad and often in pelagic waters beyond the 3-mile state limit. For example, Steller sea lion females that are nursing pups at the South Farallon Islands rookeries likely forage for multiple days and mainly beyond the 3 mile limit, averaging 15 miles on foraging trips. Northern elephant seals and northern fur seals forage over deep waters far offshore (Loughlin et al. 1987, Le Boeuf and Laws 1994).

To evaluate proposed MPAs, GIS software was used to create buffers along three miles of coast and to one mile offshore from rookeries in the North and South evaluation subregions; this was thought to encompass most of the harbor seal's foraging range. Three miles-by-one mile buffers were overlaid with proposed MPAs and the area of overlap determined. The proportions of the foraging range overlapping proposed MPAs were then weighted based on the proportion of the subregional population. The numbers provided in Table 13 are unitless values.

RESULTS

Five species of pinnipeds occur in the North Central Coast Study Region (NCCSR) (Steller sea lion, California sea lion, northern elephant seal, harbor seal, and northern fur seal), most of which breed at the Farallon Islands. The total number of mammals counted at rookeries within the north central coast study region is 9296 and is broken down by species in Table 1. The total number of pinnipeds counted on haul out areas in the study region is 17,887 and is broken down by species in Table 2. Harbor seals are the most abundant and wide spread species on the mainland and will be the species most likely to benefit from MPAs. Harbor seal numbers are equally divided between the north and south regions during the non-breeding season, but few harbor seals occur on the Farallon Islands. During the breeding season, harbor seals are more abundant in the southern region, using remote haul out sites to breed such as at Double Point and Drakes and Limantour Esteros. Although California sea lions do not breed in the area except for a few animals on the South Farallon Islands, large numbers of non-breeders occur on the Farallon Islands, at Point Reyes Headland and Bodega Rock, and at several sites in the North Subregion. Northern elephant seals occur only at the Farallon Islands and Point Reyes Headland. Steller sea lions, a federal threatened species, breed mostly on the Farallon Islands, but a small group also breeds in the

north subregion on islets just north of Fort Ross. They also haul out in small numbers at Fish Rocks in the north subregion and around Pillar Point in the south subregion.

The Farallon Islands and Point Reyes Headland are both highly significant to many species of marine mammals, including pinnipeds. At the Farallon Islands, five species of pinniped with several thousand animals haul out, and four species breed there, although the number of breeding animals is modest. The site is the only rookery for northern fur seals between the California Channel Islands and Alaska. The National Marine Fisheries Service (NMFS) recognizes the site as a rookery and critical habitat for Steller sea lions, the only one in the north central coast study region. A moderate sized elephant seal rookery occurs on the South Farallon Islands and accounts for around 100 pups per year; however, several hundred to over 1000 use the site as a haul out during other times of year. Several species of cetacean also are regularly reported foraging around the Farallon Islands including Humpback and Blue whales, Dall’s porpoise (PRBO unpubl. data).

At Point Reyes Headland, four species of pinniped occur with several thousand animals. Two species breed at Point Reyes: harbor seals and elephant seals. The elephant seal rookery at Point Reyes is the largest pinniped rookery in the north central coast study region, with around 2000 seals. Steller sea lions bred there up through the 1970s but their numbers have declined along with the general contraction of their range. Several hundred, mostly male, California sea lions occur there while migrating north and south during the non breeding season.

Table 1. Numbers of **breeding** pinnipeds of four species within each of the three bioregions of the NCCSR.

Subregion	No. Species	Total	Hot spots	Steller sea lion	Fur seal	Elephant seal	Harbor seal
North	2	2237	8	43	0	0	2194
South	2	6525	6	0	0	2000	4525
Farallon Islands	4	534	2	244	100	100	90
Total	4	9296	16	287	100	2100	6809

Table 2. Number of pinnipeds occurring at **haul out sites** within each of the three bioregions of the NCCSR.

Subregion	No. Species	Total	Steller sea lion	Cal sea lion	Elephant seal	Harbor seal
North	3	7157	125	2191	0	4841
South	4	7440	36	1075	2000	4329
Farallon Islands	5	3290	200	2000	1000	90
Total	5	17887	361	5266	3000	9260

Sixteen “hot spots” are distributed throughout the region (Table 12, Appendix 1). These sites are characterized by diverse and/or abundant species. Examples include the North and South Farallon Islands, Fish Rocks, Fort Ross Reef, Bodega Rock, Point Reyes Headland, and Pillar Point. Several hot

spots such as the Farallon Islands and Point Reyes Headland fell within the boundaries of MPAs in each of the proposals. Some hot spots did not fall within any proposed MPA SMR boundaries such as Fish Rocks, Fort Ross Reef, Bodega Rock, Double Point, Drakes Estero, or Tomales Point (Bird Rock). Bodega Rock and Tomales Point are examples of sites that are adjacent to harbors which would likely preclude inclusion in an MPA of any category. Double Point was assigned SMCA status by two of the proposals but did not fall within a special closure area, although Stormy Stack special closure is adjacent to Double Point. All of the proposals recommended that the Drakes Estero SMCA be given full SMR protection when the mariculture leases/reservation of use expires in 2012. Fish Rocks and Fort Ross Reef did not fall within MPAs of any category. All proposals included Southeast Farallon Islands and North Farallon Islands within SMRs. In the north region, there was consistency in inclusion of Point Arena, and some part of the Black Point area, and Bodega Head. The Russian River was identified in 2 of 3 proposals. Of these locations, pinniped rookeries are mostly within the Black Point area and the Russian River. In the south region there was consistency in the selection of Point Reyes Headland, Limantour Estero, and the Fitzgerald Marine Reserve.

In summary, there were several areas of agreement amongst the proposals. All proposals included MPAs at north and south Farallon Islands and Point Reyes Headland. These three sites are the most significant to marine mammals in the study area, and consequently, a large percentage of marine mammal species and number of animals benefited under the high level of protection (SMR) designation. Other areas which benefited marine mammals and which received coverage by all three proposals include the Stewarts Point-Black Point Area, Limantour Estero, and Fitzgerald Marine Reserve-Pillar Point area. None of the proposals submitted a SMR or SMCA at the location of a small Steller sea lion rookery just north of Fort Ross. All three proposals have MPAs that would cover 100% of the pinniped haul out sites and rookeries at the Farallon Islands, and around 40-50% at the south region. Primary differences between the proposals occurred in the north region, ranging from 7-34% of the area protected as SMRs.

PROPOSAL 1-3

The total number of marine mammals at rookeries within all proposed SMRs is 4,404 (47.4% for the entire study area) and at haul out sites is 8198 (45.8% for the entire study area), and is broken down by species in Tables 3 and 4. Nearly half of the breeding animals are elephant seals at the Farallon Islands and Point Reyes Headland (approximately 2,100 animals), and the other half is made up of mostly harbor seals distributed throughout the regions.

Proposed SMRs in the north subregion include 34% of the pinniped rookeries, and 11% of all haul out sites in that subregion. The proposed SMRs in the south subregion include 48% of the pinniped rookery numbers, and 56% of the haul out numbers for the south subregion. Proposed SMRs in the Farallon Islands subregion include 100% of the pinniped rookery and haul out numbers in that subregion.

There are 5 special closure areas identified in this proposal that include marine mammal sites, none of which occur in the north region (Table 11). All of the special closures except Pescadero are identified as a "hot spot" for pinnipeds. The Farallon Islands and Point Reyes Headlands are significant hot spots with large and diverse pinniped colonies and haul out sites. California sea lions haul out intermittently at Stormy Stack, but the main harbor seal colony near Stormy Stack at Double Point does not fall within this special closure. Proposal 1-3 includes a total of 9 marine mammal "hot spots" of which 7 are within

the boundaries of proposed SMRs, such as north and south Farallon Islands, Black Point Area, Russian River, Point Reyes Headland Reserve, Limantour Estero, and Fitzgerald Marine Reserve (Table 12).

The foraging areas for harbor seals within the proposal are largest around the Point Reyes Headland, followed by Fitzgerald Marine Reserve (Table 13). Despite the large number of SMRs, the harbor seal populations within each are mostly small.

PROPOSAL 2-XA

The total number of marine mammals at rookeries within all proposed SMRs is 3,677 (39.6% of the entire study area) and at haul out sites is 7,700 (43.1% of the entire study area), and is broken down by species (Tables 5 and 6). More than half of the breeding animals are elephant seals at the Farallon Islands and Point Reyes Headland (approximately 2,100 animals), and the other half are made up of mostly harbor seals distributed throughout the region.

Proposed SMRs in the north subregion include 14% of the pinniped rookeries, and 7% of all haul out sites in that subregion. The proposed SMRs in the south subregion include 43% of the pinniped rookery numbers, and 52% of the haul out numbers for the south subregion. Proposed SMRs in the Farallon Islands subregion include 100% of the pinniped rookery and haul out numbers in that subregion.

There are 4 special closure areas identified in this proposal that include marine mammal sites, none of which occur in the north region (Table 11). All of these special closures are identified as “hot spot” for pinnipeds. The Farallon Islands and Point Reyes Headlands are significant hot spots with large and diverse pinniped colonies. California sea lions haul out intermittently at Stormy Stack, but the main harbor seal colony near Stormy Stack at Double Point does not fall within this special closure. Proposal 2-XA includes a total of 8 marine mammal “hot spots” of which 6 are within the boundaries of proposed SMRs, such as north and south Farallon Islands, Black Point Area, Point Reyes Headland Reserve, Limantour Estero, and Montara (Table 12).

The foraging areas for harbor seals within the proposal are largest around the Point Reyes Headland, followed by Black Point Area (Table 13). Despite the large number of SMRs, the harbor seal populations within each are small for the most part.

PROPOSAL 4

The total number of marine mammals at rookeries within all proposed SMRs is 4312 (46.4% of pinnipeds in the study area) and at haul out sites is 8312 (46.5% of pinnipeds in the study area), and is broken down by species (Tables 7 and 8). Nearly half of the breeding animals are elephant seals at the Farallon Islands and Point Reyes Headland (@2,100), and the other half is made up of mostly harbor seals distributed throughout the region.

Proposed SMRs in the north subregion include 29% of the pinniped rookeries, and 14% of all haul out sites in that subregion. The proposed SMRs in the south subregion include 48% of the pinniped rookery numbers, and 54% of the haul out numbers for the south subregion. Proposed SMRs in the Farallon Islands subregion include 100% of the pinniped rookery and haul out numbers in that subregion.

Four of the seven special closure areas identified in this proposal include marine mammal sites. None of these occur in the north region (Table 11). All four of these special closures are identified as “hot spots” for pinnipeds. The Farallon Islands and Point Reyes Headlands are significant hot spots with large and diverse pinniped colonies. California sea lions haul out intermittently at Stormy Stack, but the main harbor seal colony near Stormy Stack at Double Point does not fall within this special closure. Proposal 4 includes a total of 9 marine mammal “hot spots” of which 7 are within the boundaries of proposed SMRs, such as north and south Farallon Islands, Black Point Area, Russian River, Point Reyes Headland Reserve, Limantour Estero, and Fitzgerald Marine Reserve (Table 12).

The foraging areas for harbor seals within the proposal are largest around the Point Reyes Headland, followed by Fitzgerald Marine Reserve (Table 13). Despite the large number of SMRs, the harbor seal populations within each are small

Table 3a. Proposal 1-3 marine mammal haul out sites within state marine reserves (SMR) and state marine conservation areas (SMCA)

	MPA Type	# Species	# Cal. sea lions	% Cal sea lions	# Steller sea lion	% Steller sea lion	# Elephant seals	% Elephant seals	# Harbor seal	% Harbor seals	Total # for subregion	Total % for subregion
North subregion												
Point Arena SMR	SMR	1	0	0.0%	0	0.0%	0		130	2.6%	130	1.8%
Saunders Reef SMCA	SMCA	1	0	0.0%	0	0.0%	0		22	0.4%	22	0.3%
Rocky Point to Horseshoe Pt SMR	SMR	2	0	0.0%	2	1.6%	0		274	5.6%	276	3.8%
Russian River SMR	SMR	2	4	0.2%	0	0.0%	0		353	7.2%	357	5%
Bodega Head SMR	SMR	1	0	0.0%	0	0.0%	0		17	0.3%	17	0.2%
Bodega Head SMCA	SMCA	1	0	0.0%	0	0.0%	0		11	0.2%	11	0.1%
South subregion												
Drakes Estero SMCA	SMCA	1	0		0		0		743	17%	743	10%
Drakes and Limantour Estero SMR	SMR	1	0		0		0		509	12%	509	7%
Point Reyes SMR	SMR	4	763	71%	20	56%	2000	100%	400	9%	3183	43%
Double Point SMCA	SMCA	2	100	9.3%	0	0%	0	0%	924	21%	1024	14%
Duxbury Reef SMCA	SMCA	1	0	0.0%	0	0%	0	0%	218	5%	218	3%
Montara SMCA	SMCA	1	0	0.0%	0	0%	0	0%	26	0.6%	26	0.3%
Fitzgerald SMR	SMR	3	86	8.0%	12	33%	0	0%	338	8%	436	6%
Farallon Islands subregion												
South East Farallon Islands SMR	SMR	4	1900	100%	171	100%	1000	100%	90	100%	3161	100%
North Farallon Islands SMR	SMR	2	100	100%	29	100%	0		0		129	100%

Table 3b. Proposal 1-3 Subregional summary of marine mammal **haul outs** within state marine reserves (SMR)

Subregion	MPA Type	#Species	# Cal sea lion	% Ca sea lion	# Steller sea lion	% Steller sea lion	# Elephant seal	% Elephant seal	# Harbor seal	% Harbor seal	Total # subregion	Total % subregion
NCCSR North	SMR	3	4	0.2%	2	1.6%			774	15.9%	780	10.9%
NCCSR South	SMR	4	849	79%	32	88.8%	2000	100%	1247	28.8%	4128	55.4%
NCCSR Farallon Islands	SMR	4	2000	100%	200	100%	1000	100%	90	100%	3290	100%

Table 4a. Proposal 1-3 marine mammal **rookery sites** within state marine reserves (SMR) and state marine conservation areas (SMCA)

Proposal 1-3	MPA Type	# Harbor seal	% Harbor seals	# Steller sea lion	% Steller sea lion	# Elephant seals	% Elephant seals	# Fur seals	% Fur seals	Total # for subregion	Total % for subregion
North subregion											
Point Arena SMR	SMR	130	5.90%							130	5.80%
Rocky Point to Horseshoe Point SMR	SMR	319	14.50%	0	0%					319	14.30%
Russian River SMR	SMR	318	14.50%	0	0%					318	14.20%
Saunders Reef SMCA	SMCA	0	0%	0						0	0%
South subregion											
Double Point SMCA	SMCA	924	20.40%	0						924	14%
Drakes Estero SMCA	SMCA	743	16.40%	0						743	11.40%
Drakes and Limantour Estero SMR	SMR	509	11.20%	0						509	7.80%
Fitzgerald SMR	SMR	299	6.60%	0	0%					299	4.60%
Point Reyes SMR	SMR	295	6.50%	0	0%	2000	100%			2295	35%
Farallon Islands subregion											
North Farallon Islands SMR	SMR	0	0.00%	29	11.90%	0	0%	0	0.00%	29	5.40%
South East Farallon Islands SMR	SMR	90	100%	215	88.10%	100	100%	100	100%	505	95%

Table 4b. Proposal 1-3 subregional summary of marine mammal **rookeries** within state marine reserves (SMR)

Subregion	MPA Type	# Harbor seals	% Harbor seals	# Steller sea lion	% Steller sea lion	# Fur seal	% Fur seal	# Elephant seal	% Elephant seal	Total # subregion	Total % subregion
NCCSR Farallon Islands	SMR	90	100%	244	100%	100	100%	100	100%	534	100%
NCCSR North	SMR	767	35%	0	0%					767	34%
NCCSR South	SMR	1103	24%	0	0%			2000	100%	3103	48%

Table 5a. Proposal 2-XA marine mammal haul out sites within state marine reserves (SMR) and state marine conservation areas (SMCA)

Proposal 2-XA	MPA type	# Species	# Cal. sea lion	% Cal. sea lion	# Steller sea lion	% Steller sea lion	# Elephant seals	% Elephant seals	# Harbor seal	% Harbor seals	Total # for subregion	Total % for subregion
North subregion												
Pt Arena SMR	SMR	1	0	0%	0	0%	0		130	2.7%	130	1.8%
Black Point SMR	SMR	1	0	0%	0	0%	0		375	8%	375	5%
Russian River SMCA	SMCA	2	4	0.2%	0	0%	0		353	7.3%	357	5%
Bodega Head SMR	SMR	1	0	0%	0	0%	0		17	0.4%	17	0.2%
Bodega Head SMCA	SMCA	1	0	0%	0	0%	0		11	0.2%	11	0.2%
South subregion												
Pt Reyes Headland SMR	SMR	4	763	71%	20	56%	2000	100%	400	9.2%	3183	42.8%
Drakes Estero SMCA	SMCA	1	0		0		0		743	17%	743	10%
Estero de Limantour SMR	SMR	1	0		0		0		509	11%	509	7%
Montara SMR	SMR	3	14	1.3%	11	31%	0	0%	171	4%	196	2.6%
Pillar Point SMCA	SMCA	3	72	7%	1	2.8%	0	0%	167	4%	240	3.2%
Farallon subregion												
North & South Farallon Is. SMR	SMR	4	2000	100.0%	200	100.0%	1000	100%	90	100%	3290	100%

Table 5b. Proposal 2-XA subregional summary of marine mammal **haul outs** within state marine reserves (SMR)

Subregion	MPA type	# Species	# Cal sea lion	% Ca sea lion	# Steller sea lion	% Steller sea lion	# Elephant seal	% Elephant seal	# Harbor seal	% Harbor seal	Total # subregion	Total % sub region
NCCSR Farallon Is	SMR	4	2000	100%	200	100%	1000	100%	90	100%	3290	100%
NCCSR North	SMR	1	0	0%	0	0%	0		522	11%	522	7%
NCCSR South	SMR	4	777	72%	31	86%	2000	100%	1080	25%	3888	52%

Table 6a. Proposal 2-XA marine mammal **rookery sites** within state marine reserves (SMR) and state marine conservation areas (SMCA)

Proposal 2-XA	MPA Type	# Harbor seal	Harbor seals	# Steller sea lion	% Steller sea lion	# Elephant seals	% Elephant seals	# Fur seals	% Fur seals	Total # for subregion	Total % for subregion
North subregion											
Black Point SMR	SMR	312	14.0%	0	0.0%					312	14%
Russian River SMCA	SMCA	318	14.5%	0	0.0%					318	14%
South subregion											
Estero de Limantour SMR	SMR	509	11%	0						509	7.8%
Drakes Estero SMCA	SMCA	743	16.4%	0						743	11.4%
Pt Reyes Headlands SMR	SMR	295	6.5%	0		2000	100%			2295	35%
Montara SMR	SMR	27	0.6%	0						27	0.4%
Pillar Point SMCA	SMCA	143	3.2%	0						143	2.2%
Farallon Islands subregion											
North Farallon SMR	SMR	0	0%	29	11.9%	0	0%	0	0%	29	5.4%
SE Farallon SMR	SMR	90	100%	215	88.1%	100	100%	100	100%	505	95%

Table 6b. Proposal 2-XA subregional summary of marine mammal **rookeries** within state marine reserves (SMR)

Subregion	MPA Type	# Harbor seals	% Harbor seals	# Steller sea lion	% Steller sea lion	# Fur seal	% Fur seal	# Elephant seal	% Elephant seal	Total # subregion	Total % subregion
NCCSR North	SMR	312	14.2%	0	0%	0		0		312	14%
NCCSR South	SMR	831	18.4%	0		0		2000	100%	2831	43.4%
NCCSR Farallon Islands	SMR	90	100.0%	244	100%	100	100%	100	100%	534	100%

Table 7a. Proposal 4 marine mammal **haul out sites** within state marine reserves (SMR) and state marine conservation areas (SMCA)

Proposal 4	MPA Type	# Species	# Cal. sea lions	% Cal. sea lions	# Steller sea lion	% Steller sea lion	# Elephant seals	% Elephant seals	# Harbor seal	% Harbor seals	Total # for subregion	Total % for subregion
North subregion												
Point Arena SMR	SMR	1	0	0.0%	0	0.0%			130	2.7%	130	1.8%
Saunders Reef SMCA	SMCA	1	0	0.0%	0	0.0%			22	0.5%	22	0.3%
Del Mar Landing SMR	SMR	1	0	0.0%	0	0.0%			174	3.6%	174	2.4%
Stewarts Point SMR	SMR	2	0	0.0%	2	1.6%			294	6.1%	296	4.1%
Salt Point SMP	SMP	1	0	0.0%	0	0.0%			174	3.6%	174	2.4%
Russian River Estuary SMR	SMR	2	4	0.2%	0	0.0%			353	7.3%	357	5.0%
Bodega SMR	SMR	1	0	0.0%	0	0.0%			28	0.6%	28	0.4%
South subregion												
Drakes Estero SMCA	SMCA	1	0		0				743	17.2%	743	11%
Drakes Estero SMR	SMR	1	0	0.0%	0	0.0%			509	11.8%	509	7%
Point Reyes SMR	SMR	4	763	71%	20	56%	2000	100%	400	9.2%	3183	43%
Double Point SMCA	SMCA	2	100	9.3%	0	0.0%			924	21.3%	1024	14%
Duxbury SMCA	SMCA	1	0	0.0%	0	0.0%			25	0.6%	25	0.3%
Agate Beach Intertidal SMCA	SMCA	1	0	0.0%	0	0.0%			193	4.5%	193	2.6%
Devil's Slide SMCA	SMCA	1	0	0.0%	0	0.0%			131	3.0%	131	1.8%
Fitzgerald SMR	SMR	3	86	8.0%	12	33%			233	5.4%	331	4.4%
San Gregorio SMR	SMR	2	12	1.1%	0	0.0%			2	0.0%	14	0.2%
Farallon subregion												
Farallon SMR	SMR	4	2000	100.0%	200	100.0%	1000	100%	90	100%	3290	100%

Table 7b. Proposal 4 subregional summary of marine mammal **haul outs** within state marine reserves (SMR)

Subregion	MPA Type	# Species	# Cal sea lion	% Cal sea lion	# Steller sea lion	% Steller sea lion	# Elephant seal	% Elephant seal	# Harbor seal	% Harbor seal	Total # subregion	Total % subregion
NCCSR North	SMR	3	4	0.18%	2	1.60%	0		979	20.2%	985	14%
NCCSR South	SMR	4	861	80%	32	89%	2000	100%	1144	26.4%	4037	54%
NCCSR Farallon Islands	SMR	4	2000	100%	200	100%	1000	100%	90	100%	3290	100%

Table 8a. Proposal 4 marine mammal **rookery sites** within state marine reserves (SMR) and state marine conservation areas (SMCA)

Proposal 4	MPA Type	# Harbor seal	% Harbor seals	# Steller sea lion	% Steller sea lion	# Elephant seals	% Elephant seals	# Fur seals	% Fur seals	Total # for subregion	Total % for subregion
North subregion											
Russian River Estuary SMR	SMR	318	15%	0	0.0%					318	14.2%
Salt Point SMP	SMP	136	6.2%	0	0.0%					136	6.1%
Saunders Reef SMCA	SMCA	0	0.0%	0	0.0%					0	0.0%
Stewarts Point SMR	SMR	319	15%	0	0.0%					319	14.3%
South subregion											
Drakes Estero SMCA	SMCA	743	16.4%	0						743	11.4%
Drakes Estero SMR	SMR	509	11.2%	0						509	8%
Point Reyes SMR	SMR	295	6.5%	0				2000	100%	2295	35.2%
Double Point SMCA	SMCA	924	20.4%	0					0.0%	924	14.2%
Fitzgerald SMR	SMR	337	7.4%	0					0.0%	337	5.2%
Farallon subregion											
North Farallon SMR	SMR	0	0.0%	29	11.9%	0	0.0%	0	0.0%	29	5.4%
SE Farallon SMR	SMR	90	100%	215	88.1%	100	100%	100	100%	505	95%

Table 8b. Proposal 4 subregional summary of marine mammal **rookeries** within state marine reserves (SMR)

Subregion	MPA Type	# Harbor seals	% Harbor seals	# Steller sea lion	% Steller sea lion	# Fur seal	% Fur seal	# Elephant seal	% Elephant seal	Total # subregion	Total % subregion
NCCSR Farallon Islands	SMR	90	100%	244	100.0%	100	100%	100	100%	534	100.0%
NCCSR North	SMR	637	29%	0	0.0%					637	29%
NCCSR South	SMR	1141	25%	0	0%			2000	100.0%	3141	48%

Table 9. Comparison between proposals of numbers and percentages of pinnipeds **breeding** within proposed MPAs with the highest level of protection (SMR) in each subregion, North Central Coast Study Region. A harsh mark (-) means that the species does not breed in the region.¹

	No. Species	Total Pinnipeds	Total Pinn Pct	Harbor Seal	Harbor Seal Pct	Steller Sea Lion	Steller Sea Lion Pct	Fur Seal	Fur Seal Pct	Elephant Seal	Elephant Seal Pct
North subregion											
Proposal 1-3	1	767	34%	767	35%	0	0%	-	-	-	-
Proposal 2-XA	1	312	14%	312	14%	0	0%	-	-	-	-
Proposal 4	1	637	29%	637	29%	0	0%	-	-	-	-
South subregion											
Proposal 1-3	2	3103	48%	1103	24%	-	-	-	-	2000	100%
Proposal 2-XA	2	2831	43%	831	18%	-	-	-	-	2000	100%
Proposal 4	2	3141	48%	1141	25%	-	-	-	-	2000	100%
Farallon subregion											
Proposal 1-3	4	534	100%	90	100%	244	100%	100	100%	100	100%
Proposal 2-XA	4	534	100%	90	100%	244	100%	100	100%	100	100%
Proposal 4	4	534	100%	90	100%	244	100%	100	100%	100	100%

Table 10. Comparison between proposals of numbers and percentages of pinnipeds at **haul out sites** within proposed MPAs with the highest level of protection (SMR) in each subregion, North Central Coast Study Region. A harsh mark (-) means that the species does not haul out in the region.¹ Fur seals are not included because they are mostly at sea during the non-breeding season.

Name	No. Species	Total Pinnipeds	Total Pinn Pct	California Sea Lion	California Sea Lion Pct	Steller Sea Lion	Steller Sea Lion Pct	Elephant Seal	Elephant Seal Pct	Harbor Seal	Harbor Seal Pct
North subregion											
Proposal 1-3	3	780	11%	4	1%	2	2%	-	-	774	16%
Proposal 2-XA	1	522	7%	0	0%	0	0%	-	-	522	11%
Proposal 4	3	985	14%	4	1%	2	2%	-	-	979	20%
South subregion											
Proposal 1-3	4	4128	55%	849	79%	32	89%	2000	100%	1247	29%
Proposal 2-XA	4	3888	52%	777	72%	31	86%	2000	100%	1080	25%
Proposal 4	4	4037	54%	861	81%	32	89%	2000	100%	1144	26%
Farallon subregion											
Proposal 1-3	4	3290	100%	2000	100%	200	100%	1000	100%	90	100%
Proposal 2-XA	4	3290	100%	2000	100%	200	100%	1000	100%	90	100%
Proposal 4	4	3290	100%	2000	100%	200	100%	1000	100%	90	100%

Table 11. Special closures that include marine mammal haul out or rookery sites

Special Closure location	Proposal 1-3	Proposal 2-XA	Proposal 4
North subregion			
South subregion			
Point Reyes	1000 ft 4 species		1000 ft 4 species
Stormy Stack	300 ft 1 species	300 ft 1 species	300 ft 1 species
Pescadero	300 ft 1 species		
Farallon Islands subregion			
North Farallon Islands	300 & 1000 ft 2 species	300 ft 2 species	300 & 1000 ft 2 species
South Farallon Islands	300 ft 5 species	300 ft 5 species	300 ft 5 species

Table 12. Hot spots for pinnipeds in the North Central Coast Study Region included within the boundaries of MPA proposals.

Hot Spot	Proposal 1-3	Proposal 2-XA	Proposal 4
North subregion			
Fish Rocks			
Black Point Area	SMR	SMR	SMR
Fort Ross Reef/Rocks			
Russian Gulch			
Russian River	SMR	SMRMA	SMR
Bodega Rock			
Tomales Bay – Clam Island			
Tomales Point-Bird Rock			
South subregion			
Point Reyes	SMR	SMR	SMR
Drakes Bay	SMCA	SMCA	SMCA
Limantour Estero	SMR	SMR	SMR
Double Point	SMCA		SMCA
Bolinas Lagoon			
Fitzgerald Marine Reserve	SMR	SMR	SMR
Cowell Ranch – Miramonte Pt			
Farallon Islands subregion			
North Farallon Islands	SMR	SMR	SMR
South Farallon Islands	SMR	SMR	SMR

Table 13. Proposals weighted contributions to foraging areas for harbor seals within each proposed MPA. MPAs not shown did not contribute to foraging area (**These data have not been error checked and may change**).

MPA Name	Harbor Seal
Proposal 1-3	
Point Arena SMR	0.06
Rocky Point to Horseshoe Point SMR	1.36
Russian River SMR	0.08
Bodega Head SMR	0.1
Drakes and Limantour Estero SMR	0.78
Point Reyes SMR	13.65
Fitzgerald SMR	4.83
Proposal 2-XA	
Pt Arena SMR	0.06
Black Point SMR	8.22
Bodega Head SMR	0.09
Estero de Limantour SMR	0.63
Montara SMR	2.07
Pt Reyes Headlands SMR	13.56
Proposal 4	
Point Arena SMR	0.06
Stewarts Point SMR	2.41
Del Mar Landing SMR	0.13
Russian River SMR	0.08
Bodega SMR	0.13
Drakes Estero SMR	0.78
Point Reyes SMR	13.7
Fitzgerald SMR	4.57

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Appendix 1. List of “hot spots” for marine mammals in the north central California region. Hot spot designation is based on species diversity and/or abundance of a species at a specific location.

Hot Spot	SubRegion
North Farallon	Farallon Islands
South Farallon	Farallon Islands
Cowell Ranch	South
Fitzgerald Marine Reserve	South
Bolinas Lagoon	South
Double Point	South
Drakes Bay	South
Point Reyes Headland	South
Tomales Point/Bird Rock	North
Bodega Rock	North
Tomales Bay-Clam/Seal Is	North
Russian River	North
Russian Gulch	North
Fort Ross Reef/Rocks	North
Black Point Area	North
Fish Rocks	North

Appendix 2. Known important prey items of harbor seal in California.

<p>Fish Rockfish <i>Sebastes</i> spp. Pacific sandlance <i>Ammodytes hexapterus</i> Plainfin midshipman <i>Porichthys notatus</i> Speckled sanddab <i>Citharichthys stigmaeus</i> Northern anchovy <i>Engraulis mordax</i> Pacific herring <i>Clupea pallasii</i> Jack smelt <i>Atherinopsis californiensis</i> Pacific staghorn sculpin <i>Leptocottus armatus</i> Sculpin spp. (Cottidae) Pacific tomcod <i>Microgadus proximus</i> Pacific hake <i>Merluccius productus</i> Shiner perch <i>Cymatogaster aggregata</i> Spotted cusk-eel <i>Chilara taylori</i> <i>Pleuronectid</i> spp. (Flatfish) Salmon spp. Lamprey <i>Lampetra tridentata</i> Hagfish <i>Myxine glutinosa</i></p> <p>Invertebrates Mysid shrimp <i>Spirontocaris</i> sp. Market squid <i>Loligo opalescens</i> Octopus spp. nearshore</p>
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