9. Protection of Marine Birds and Mammals

Status of this chapter: The SAT has approved of the evaluation methods in this chapter. New amendments are identified in underline (additions) and strikeout (deletions).

Marine protected areas (MPAs) may benefit marine birds and mammals by 1) reducing bycatch, 2) protecting their forage base and 3)~~by~~ potentially reducing human disturbance at~~to~~ roosting ~~and~~/ haul-out sites~~,~~ and breeding colonies/ ~~or~~ rookeries. To evaluate the protection afforded by proposed MPAs to birds and mammals the SAT does the following:

- identifies proposed MPAs or special closures[1] that contribute to protection of birds and mammals
- identifies focal species likely to benefit from MPAs and for which data are available
- estimates the proportion (of total numbers of individuals) of breeding bird/mammal at colonies and rookeries potentially benefiting by proposed MPAs
- estimates the proportion of nearby foraging areas protected by MPAs, defined by evaluating protection of buffered areas around colonies
- estimates the number of neritic foraging 'hot spots' protected by MPAs, defined by at-sea densities of marine birds and mammals
- estimates the proportion of estuarine and coastal beach inhabitants protected by MPAs

This evaluation focuses on pinnipeds (seals and sea lions), nearshore delphinids (e.g. coastal bottlenose dolphin), sea otters and birds, including seabirds, shorebirds, and waterfowl[2]. Population, as used in this evaluation, refers to the number of animals that use a site for breeding or resting. Evaluations are focused on the five bioregions identified by the SAT. Evaluations include numbers of species (species diversity), numbers of individual birds or mammals, and percentages of bioregional populations breeding within individual proposed MPAs and within all proposed MPAs. Species evaluated are limited to those identified as likely to benefit from MPAs and special closures with an emphasis on species identified as most likely to benefit.

The SAT evaluation for marine birds and mammals focuses on:

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[1] Special closures are not MPAs, but could restrict access to discrete areas to prevent human disturbance to colonies, rookeries, haul-outs, and roosts. Special closures may be included in future rounds of the marine birds and mammals evaluations if included in MPA proposals; they would be evaluated with regard to marine birds and mammals using similar methods as used for MPAs.

[2] Cetaceans are included only in foraging analyses (i.e., 3 and 4), because there is limited data about fine-scale use patterns for these species and it is unknown whether they would directly or measurably benefit from the size of MPAs being defined, given their relatively large-scale movements.

1. Protection of seabird breeding colonies and pinniped rookeries based on population size, location and species composition

This analysis examines whether MPAs and special closures proposals will benefit the species identified as likely to benefit. Evaluations are based on the numbers of animals in the MLPA South Coast Study Region, and the proportion within each bioregion, and within the proposed MPA or special closure area. For each colony within a proposed protection area, the SAT considers the likely effect of the specific protections or regulations identified (e.g. no-entry zones) that would reduce human disturbance, and whether the MPA or special closure area affects significant numbers of animals. Special closure areas will provide maximum benefit by minimizing disturbance caused by boats, irrespective of vessel type. MPAs that restrict fishing or other activities in waters surrounding colonies would provide less benefit than no-entry zones but likely would provide a benefit by reducing the numbers of boats approaching and lingering near colonies. Possible benefits of reduced disturbance include increased bird/mammal productivity, colony/population size, and species diversity (Carney & Sydeman 1999) (Rojek et al 2007).

Data used for these assessments comes from the National Oceanic and Atmospheric Administration (NOAA)/U.S. Fish and Wildlife Service (USF&WS) bird colony database[3], from pinniped data compiled from Mark Lowry and Sharon Melin (NOAA Fisheries), and other sources. The SAT evaluates total numbers of seabirds and pinnipeds, and the proportion breeding by species for each bioregion, and for all species combined, within each proposed MPA or special closure. The sizes of special closures vary, but usually range between 300 and 1000 feet.

2. Marine bird and ~~pinniped~~ mammal resting (roost/haulout/raft) locations based on population size, location and species composition

Many marine birds and pinnipeds require areas close to foraging locations where they can safely come to shore to rest, sleep, dry (i.e., cormorants, pelicans), or molt (some pinnipeds). Frequent disturbance at resting sites results in high levels of energy expenditure that can lead to poor body condition and/or cause animals to abandon the area (Carney & Sydeman 1999) (Rojek et al 2007).

The methods the SAT uses to assess roosting areas and haulout sites are similar to those used for colonies/rookeries. For seabirds, the SAT uses data on major Brown Pelican roosts, which also serve as a surrogate for other species. For pelicans, major roosts have been categorized as those typically containing: 1) 100-500 birds; 2) 500-1,000 birds; and 3) > 1,000 birds. For pinnipeds, total numbers and the proportion in each bioregion are calculated for each species and for all species combined, and sites used by each species are evaluated based on these proportions. For sea otters, their presence will be reported in this analysis

[3] Original data is from Carter 1980 and Sowles 2000. These data were then updated in 2004 with information mostly in Baja California from Wolfe SG 2002 using the same format.

when proposed MPAs include within their boundaries kelp beds known to be frequently used by otters.~~haulout sites are evaluated based on these proportions.~~

3. Marine bird and pinniped near-colony/rookery foraging concentrations based on population size, location, and species composition

As upper-trophic-level predators, seabirds and marine mammals require an abundance of resources for survival and reproduction. With long life expectancies (>20 years), low annual productivity, and high site fidelity, these animals are subject to population level impacts from reduced prey supplies or disturbance at foraging areas. High levels of disturbance at foraging areas can cause increased energy expenditure leading to poor body condition; this can be especially detrimental for species with long migration routes, which may not have sufficient energy reserves to complete migration. Thus, protection of important prey species and foraging areas could have benefits, especially to species with limited foraging distributions.

For breeding species, the SAT will focus on five seabird and one marine mammal species most likely to benefit based on limited foraging ranges. For birds, this analysis focuses on the Pelagic Cormorant, Brandt's Cormorant, Pigeon Guillemot, California Least Tern, and Bald Eagle. For pinnipeds, this analysis focuses on the harbor seal. These species mainly forage in nearshore waters within a few miles of colonies. However, other species are likely to benefit (e.g. Double-crested Cormorant, Forster's Tern, Caspian Tern, Black Skimmer, Guadalupe fur seal, northern fur seal~~, long-beaked common dolphin~~ and coastal bottlenose dolphin).

Evaluations of benefits to marine birds and mammals near colonies are based on whether or not proposed regulations may benefit forage species (Table 9-1) or foraging habitats, how much foraging area will be protected near breeding areas, and how many animals stand to benefit. Zones extending three miles alongshore and to three miles offshore (the main foraging range of these species when breeding) from breeding colonies/rookeries are used to examine the numbers of birds/mammals utilizing the area within the proposed MPA.

4. Marine bird and mammal neritic foraging based on location, bird density, and species composition

There are many hydrographic features within the neritic zone of state waters that will concentrate the prey of many marine birds and mammals. Retention areas and thermal fronts adjacent to upwelling centers and river plumes are known to concentrate prey. These areas are often referred to as 'hot spots', or areas of high trophic transfer, as they provide essential foraging opportunities to upper trophic level predators. While the types of prey typically found at hot spots are highly mobile (e.g. anchovies, squid, and krill), they will benefit from MPAs protecting hot spots as they have a high probability of being concentrated in these areas. Any protection given to hot spots will ultimately translate into added marine bird and mammal protection. A composite map of at-sea densities for the following 11 ~~species~~ seabirds and 2 marine mammals will be plotted over proposed MPAs to determine the number of species and densities likely to benefit: Western Grebe, Sooty Shearwater, Brown Pelican, Brandt's Cormorant, Red Phalarope, Heermann's Gull, California Gull, Western Gull, Black-legged Kittiwake, Caspian Tern, ~~and~~ Cassin's Auklet, coastal bottlenose dolphin, and California sea

lion. At-sea seabird and sea lion distributions from Mason et al. (2007) and coastal bottlenose dolphin encounter rates collected by the Channel Islands National Marine Sanctuary will be used for these analyses. Additionally, at-sea densities or encounter rates of coastal bottlenose dolphin will be plotted over proposed MPAs to evaluate potential benefits. Data available from the Channel Islands National Marine Sanctuary (CINMS) will be used for evaluation.

5. Estuarine and coastal beach protection for resident and migrant shorebirds and waterfowl

The SAT evaluates whether proposed MPAs provide protection to the inhabitants of estuarine areas. There are many human activities, including hunting, that take place within estuaries and have adverse effects on shorebird and waterfowl populations. Estuaries provide critical resting and foraging habitat for resident and migrant birds. However, with the loss of estuarine habitat in southern California over recent decades, coastal beach habitat has become increasingly important to displaced populations (J. Dugan pers. comm.). Protecting both estuarine and coastal beach habitat, even if limited to below mean high tide, will have direct benefit to these populations. The best available data for this analysis come from Audubon Christmas Bird Counts. Christmas Bird Counts are collected through a standardized citizen-science-based program coordinated by the National Audubon Society. Data are collected annually by volunteer groups throughout the nation. Each group defines an approximately 25 km radius circle and collects data within this circle during a selected 24 hour period, with all groups nationwide completing data collection within a few weeks of 25 December. For the SAT analysis, data from Audubon Christmas Bird Counts will be plotted over proposed MPAs to determine the abundance and number of species likely to benefitFor this analysis, four habitat types have been identified: estuary, tidal flat, coastal marsh and coastal beach. The analysis will investigate the amount of available habitat protected within MPAs for each bioregion.

6. Protection of Southern sea otter concentrations

There are two locations within the SCSR that are consistently used by Southern sea otters: San Nicolas Island and the north mainland coast between Point Conception and Goleta Point. San Nicolas Island hosts the only sea otter breeding population in the SCSR while the mainland site provides foraging and resting habitat for non-breeding males. This analysis will be qualitative, recognizing proposed MPAs that capture either of the two locations used by otters.

The focus of all analyses will be on Special Closure Areas (SCAs)special closures and Sstate Mmarine Rreserves (SMRs), with the recognition that SCAsspecial closures will provide greater protection than SMRs. However, the SAT recognizes some activities have greater impacts than others and Sstate Mmarine Cconservation Aareas (SMCAs) permitting certain activities should be considered independently during each analysis. Mills et al. (2005) provide summaries of fisheries activities with potential impacts to marine bird populations. Table 9.2 defines which activities an SMCA can allow and still be considered for a given analysis. For analyses of breeding and resting sites, the ultimate goal is to reduce all human activities within an area and only SCAsspecial closures and SMRs will be considered for these analyses. For

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the near-colony foraging analysis, SMCAs allowing activities that have potential for bycatch, compete for prey resources, or alter prey habitat will not be analyzed. For the neritic foraging 'hot spots' analysis, SMCAs allowing activities that have potential for bycatch will not be analyzed. And for the estuaries/coastal beach analysis, SMCAs allowing activities close to shore that have potential for bycatch, compete for prey resources, or alter prey habitat will not be analyzed. Finally, fisheries interactions with marine mammals have been less studied than those with seabirds. Given the lack of information on the impacts of specific activities, only Sspecial Cclosure Areas and State Marine Reserves will be included in the marine mammal analyses.

Table 9-1. Known Important Prey Items of Bald Eagle, Brandt's Cormorant, California Least Tern, Pelagic Cormorant, Pigeon Guillemot, Harbor Seal, California Sea Lion, and Coastal Bottlenose Dolphin in Southern California.

Note: Most fish taken by seabirds are in the juvenile stage.

Species	Prey	Preferred Foraging Habitat
Bald Eagle	**Fish** Rockfish *Sebastes* spp. Surfperch (Embiotocidae) Pile Perch *Damalichthys vacca* Cabezon *Scorpaenichthys marmoratus* Midshipman *Porichthys* spp. California sheephead *Semicossyphus pulcher* Pricklebacks (Stichaeidae) Bocaccio *Sebastes paucispinis* Halfmoon *Medialuna californiensis* White seabass *Atractoscion nobilis* Topsmelt *Atherinops affinis* **Invertebrates** California mussel *Mytilus californianus* Other bivalves, limpets Sea urchin *Strongylocentrotus* spp. **Marine birds** Eared Grebe *Podiceps nigicollis* Sooty Shearwater *Puffinus griseus* Cormorants *Phalacrocorax* spp. California Gull *Larus californicus* Common Murre *Uria aalge* Rhinoceros Auklet *Cerorhinca monocerata* Cassin's Auklet *Ptychoramphus aleuticus* Waterfowl (ducks, scoters, mergansers)	

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Species	Prey	Preferred Foraging Habitat
Brandt's Cormorant	**Fish** Short-belly rockfish *Sebastes jordani* Yellowtail rockfish *Sebastes flavidus* Other rockfish *Sebastes* spp. Pacific sandlance *Ammodytes hexapterus* Plainfin midshipman *Porichthys notatus* Speckled sanddab *Citharichthys stigmaeus* White seaperch *Phanerodon furcatus* Northern anchovy *Engraulis mordax* Pacific herring *Clupea pallasi* Pacific staghorn sculpin *Leptocottus armatus* *Hemilepidotus* spp. (Cottidae) Other sculpins (Cottidae) Pacific tomcod *Microgadus proximus* Northern Pacific hake *Merluccius productus* Shiner perch *Cymatogaster aggregata* Pacific tomcod *Microgadus proximus* Spotted cusk-eel *Chilara taylori* Butter sole Isopsetta isolepis Rex sole *Glyptocephalus zachirus* English sole *Parophrys vetulus* **Invertebrates** Market squid *Loligo opalescens*	Soft bottom
California Least Tern	**Fish** California killifish (*Fundulus parvipinnis*) Sculpins (Cottidae) Surfperch (Embiotocidae) Silverside smelt (Atherinidae) Anchovy (*Anchoa sp.*) Northern Anchovy (*Engraulis mordax*) Pacific Saury (*Cololabis saira*) – not in good years Cabezon (*Scorpaenichthys marmoratus*) Rockfish (*Sebastes sp.*)	Estuarine/lagoons and nearshore coastal
Pelagic Cormorant	**Fish** Short-belly rockfish *Sebastes jordani* Yellowtail rockfish *Sebastes flavidus* Other rockfish *Sebastes* spp.	Submerged reefs

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Species	Prey	Preferred Foraging Habitat
	Sculpins (Cottidae) *Coryphopterus nicholsii* *Chilara taylori* **Invertebrates** Shrimp *Spirontocaris* sp.	
Pigeon Guillemot	**Fish** Rockfish *Sebastes* spp. Pacific sanddab *Citharichthys sordidus* Blennies (Clinidae) Sculpins (Cottidae) Gunnels (Pholidae) Spotted cusk-eel *Chilara taylori* **Invertebrates** Red octopus *Octopus rufescens*	Submerged reefs
Harbor seal	**Fish** Rockfish *Sebastes* spp. Pacific sandlance *Ammodytes hexapterus* Plainfin midshipman *Porichthys notatus* Speckled sanddab *Citharichthys stigmaeus* Northern anchovy *Engraulis mordax* Pacific herring *Clupea pallasi* Pacific staghorn sculpin *Leptocottus armatus* *Hemilepidotus* spp. (Cottidae) Other sculpins (Cottidae) Pacific tomcod *Microgadus proximus* Northern Pacific hake *Merluccius productus* Shiner perch *Cymatogaster aggregata* Spotted cusk-eel *Chilara taylori* Butter sole *Isopsetta isolepis* Rex sole *Glyptocephalus zachirus* English sole *Parophrys vetulus* Salmonid Lamprey Hagfish Walleye pollock Starry flounder, *Platichthys stellatus* Pile perch, *Rhacochilus (Damalilicthys) vacca* **Invertebrates**	

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Species	Prey	Preferred Foraging Habitat
	shrimp *Spirontocaris* spp. Market squid *Loligo opalescens* Octopoda spp. Crustacea Bivalve mollusk	
California sea lion	**Fish** Northern anchovy Pacific whiting Jack mackerel Rockfish spp. Pacific (chub) mackerel Blacksmith Senorita Plainfin midshipman **Invertebrates** Market squid Octopus spp. Squid spp. Pelagic red crab	
Coastal bottlenose dolphin	**Fish** Croaker spp., Family Sciaenidae Barracuda, *Sphyraena argentea* Jack mackerel, *Trachurus symmetricus* **Invertebrates** Market squid, *Loligo opalescens*	

Sources for Table 9-1: Data on seabird prey items from Ainley, D.G., C.S. Strong, T.M. Penniman, and R.J. Boekelheide. 1990. The feeding ecology of Farallon seabirds. Pp. 51-127 in (D.G. Ainley and R.J. Boekelheide, eds.), *Seabirds of the Farallon Islands: Ecology, Dynamics, and Structure of an Upwelling-system Community*. Stanford University Press, Stanford, California. Data on Bald Eagle prey items, limited to marine prey items only, from Erlandson, J.M., T.C. Rick, P.W. Collins, and D.A. Guthrie. 2007. Archaeological implications of a bald eagle nesting site at Ferrelo Point, San Miguel Island, California. *Journal of Archaeological Science* 34: 255-271; and Sharpe, P.B. 2002. Restoration and Management of Bald Eagles on Santa Catalina Island, California, 2002. Report prepared for the U.S. Fish and Wildlife Service, Sacramento, Ca. November, 2002. Data on California Least Tern prey items from Robinette, D. 2003. *Partitioning of food resources by four sympatric terns (Aves: Laridae) breeding in southern California*. Master's Thesis. California State University, Long Beach; Robinette, D. and J. Howar. 2008. Monitoring and management of the California Least Tern colony at Purisima Point, Vandenberg Air Force Base, 2007. Unpublished Report, PRBO Conservation Science, Petaluma, CA. Data on harbor seal prey items from Harvey JT, Helm R, Morejohn G. (1995) Food habits of harbor seals inhabiting Elkhorn Slough, California. *Calif. Fish and Game*. 81:1-9; Antonelis, G.A. and C.H. Fiscus. 1980. The Pinnipeds of the California Current. *CalCOFI Rep.*, Vol. XXI. Data on California sea lion prey items from Lowry MS, BS Stewart, CB Heath, PK Yochem, and JM Francis. 1991. Seasonal and annual variability in the diet of California sea lions Zalophus californianus at San Nicolas Island, California, 1981-1986. *Fishery Bulletin*, U.S. 89:331-336.

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Data on coastal bottlenose dolphin prey items from Schwartz, M. L., A. A. Hohn, H. J. Bernard, S.J. Chivers, and K. M. Peltier. 1992. Stomach contents of beach-cast cetaceans collected along the San Diego County coast of California, 1972-1991. *NMFS-SWFSC- Administrative Report* LJ-92-18. 33pp.

Table 9.2: Proposed of Activities T~~t~~hat W~~w~~ill Q~~q~~ualify (~~yes~~YES) or D~~d~~isqualify (~~no~~NO) an SMCA for I~~i~~nclusion in E~~e~~ach S~~s~~eabird A~~a~~nalysis.

Activity	Breeding Colony Analysis	Roost Analysis	Near-colony Foraging Analysis	Neritic Foraging Analysis	Estuary / Beach Analysis
Lobster (trap, hoop net)	NO	NO	NO	YES	YES
Lobster (scuba)	NO	NO	YES	YES	YES
Barred sand bass (H&L)	NO	NO	NO	NO	NO
Barred sand bass (spear)	NO	NO	NO	YES	YES
Kelp bass (H&L)	NO	NO	NO	NO	NO
Kelp bass (spear)	NO	NO	NO	YES	YES
Sheephead (H&L, trap)	NO	NO	NO	NO	NO
Sheephead (spear)	NO	NO	NO	YES	YES
Spotted sand bass (H&L)	NO	NO	NO	NO	NO
Spot prawn (trap)	NO	NO	NO	YES	NO
Sea cucumber (scuba/hookah)	NO	NO	YES	YES	YES
Grunion (hand take)	NO	NO	YES	YES	NO
Pelagic finfish, white seabass, and bonito (spear)	NO	NO	NO	YES	YES
Pelagic finfish, white seabass, and bonito (H&L) >50m depth	NO	NO	NO	NO	YES
Pelagic finfish, white seabass, and bonito (H&L) 50>30m depth using surface gear on mainland	NO	NO	NO	NO	YES
Pelagic finfish, white seabass, and bonito (H&L) <30m depth on mainland and <50m depth at islands	NO	NO	NO	NO	NO
Rock scallop (scuba)	NO	NO	NO	YES	YES
Urchin (scuba/hookah)	NO	NO	NO	YES	NO
Coastal pelagic finfish and bonito (seine, dip-net, crowder)	NO	NO	NO	NO	YES
Squid (seine, dip-net, crowder)	NO	NO	NO	NO	NO
Lingcod (H&L)	NO	NO	NO	NO	NO

Lingcod (spear)	NO	NO	NO	YES	YES
Rockfish (H&L)	NO	NO	NO	NO	NO
Rockfish (spear)	NO	NO	NO	YES	YES
Cabezon (H&L)	NO	NO	NO	NO	NO
Cabezon (spear)	NO	NO	NO	YES	YES
Halibut (H&L)	NO	NO	NO	NO	NO
Halibut (spear)	NO	NO	NO	YES	YES
Rock crab (trap)	NO	NO	NO	YES	NO
Mussels (hand harvest)	NO	NO	YES	YES	NO
Jumbo squid (squid jigs/ drift)	NO	NO	NO	NO	YES
Swordfish (harpoon)	NO	NO	YES	NO	YES
Kellet's whelk (trap)	NO	NO	NO	YES	NO
Giant kelp (hand harvest)	NO	NO	NO	YES	NO
Giant kelp (mechanical harvest)	NO	NO	NO	YES	NO
Clams (hand harvest)	NO	NO	YES	YES	NO
Catch and release (H&L barbless single hooks, and artificial lures only) in shallow <10m water or using surface gear	NO	NO	NO	NO	NO
Catch and release (H&L) in open coast environments >10m depth	NO	NO	NO	NO	YES
Shore-based finfish (H&L)	NO	NO	NO	NO	NO
Pier-based fishing (H&L, hoop net)	NO	NO	NO	NO	NO
Marine algae other than giant and bull kelp (hand harvest)	NO	NO	NO	YES	NO

Sources for Chapter 9

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