California MLPA Master Plan Science Advisory Team
Draft List of Some Key Species Likely to Benefit from MPAs as Drafted by the Species Likely to Benefit Work Group

September 11, 2007

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The following list is a draft list of some key species likely to benefit from MPAs in the MLPA North Central Coast Study Region. The workgroup notes that this list requires input from the full MLPA Master Plan Science Advisory Team (SAT) and will undergo further revisions.

Some of the notations in the list include an X in the column for “most likely to benefit” indicating that these species may gain significant benefits from MPAs. Following SAT input some of these may be removed or others added. Additionally, a strikethrough indicates that these are species that are either not found in the study region or are extremely limited in their abundance within the study region; these will be removed from the list with SAT concurrence.

All SAT members should review this list carefully for species within your range of expertise and be prepared to discuss during the September 17 SAT meeting. Please be prepared to identify any errors or areas needing further research, and to provide input on those identified as “most likely to benefit.”

Key:

* most likely to benefit

italics: should this be on the list? (explanation in comments)

bold: data added or changed from CC version

new addition		most likely to benefit	Primary Bottom type	Shallow depth (m)	Deepest Depth (m)	sm-mod adult home range (<20 km)	Currently mod-large take	Historic mod-large take	Low Pop. Estimate (<40% unfished)	Size structure shifted toward sm indiv	vulnerable life history	life stage to benefit (e.g., spawning, nursery area)	habitat impacted (by human activity)	Ecologically Important (keystone or habitat forming)	Comments
	Invertebrates														
	abalone, black		Rock	0	6	1	0	1	1	1	1	0	1	0	Only benefit in areas absent of sea otters
	abalone, red*	X	Rock	0	61	1	**1**	1	1	1	1	0	0	0	short-lived, non-feeding larval stage, Only benefit in areas absent of sea otters
X	barnacles, gooseneck		Rock	**0**	**1**	**1**	**1**	**ND**	**ND**	**ND**	**0**	**0**	**1**	**1**	habitat forming, some intertidal take
	~~clam, Pismo~~		~~Sand~~	~~0~~	~~25~~	~~1~~	~~0~~	~~1~~	~~0~~	~~1~~	~~1~~	~~0~~	~~0~~	~~0~~	~~very slow growing adults, long lived, 50 years, Only benefit in areas absent of sea otters~~
	clam, littleneck* (tomales bay cockle)	X	Coarse Sand	0	0	1	**1**	**1**	ND	**1**	0	0	1	0	Manila littleneck clam is particularly abundant in San Francisco Bay and other estuaries to the north in the intertidal*
X	clam, geoduck		sandy mud	**0**	**110**	**1**	**ND**	**ND**	**ND**	**ND**	**0**	**0**		**0**	rare but occasionally found in Tomales bay, long lived
X	clam, gaper		sandy mud	**0**	**30**	**1**	**1**	**1**	**ND**	**ND**	**0**	**0**		**0**	
X	clam, washington		sand/ mud	**0**	**5**	**1**	**1**	**1**	**ND**	**ND**	**0**	**0**		**0**	
	corals		Rock	12	152	1	0	0	ND	ND	1	0	1	1	Possible impacts from trawling or other bottom contact
	crab, brown rock		Both	0	101	1	1	1	ND	ND	0	0	0	0	Only benefit in areas absent of sea otters
	crab, Dungeness		Sand	0	230	0	1	1	ND	0	0	0	0	0	Due to management regime, no size shift
	crab, red rock		Both	0	229	1	1	1	ND	ND	0	0	0	0	Only benefit in areas absent of sea otters
	crab, sand		Sand	0	0	1	0	0	ND	ND	0	0	0	0	
	gorgonians (deep)		*Rock*	*12*	*152*	*1*	*0*	*0*	*ND*	*ND*	*1*	*0*	*1*	*1*	*Possible impacts from trawling or other bottom contact*
	limpets* (esp. lattia)	X	Rock	0	30	1	**1**	0	ND	1	0	0	1	1	rec harvest, removal impacts other species
	mussels, native (M. californianus)		Rock	0	40	1	0	0	ND	ND	0	0	1	1	removal impacts other species
	octopus spp.														
	oyster, native														
	prawn, spot		sand	46	488	1	1	1	ND	ND	0	0	0	0	
	scallop, rock		Rock	0	30	1	ND	ND	ND	ND	1	0	0	0	Evidence of positive impact in So. Cal reserves
	sea cucumbers														
	~~sea hares~~		~~Both~~	~~0~~	~~18~~	~~1~~	~~0~~	~~0~~	~~ND~~	~~ND~~	~~0~~	~~0~~	~~0~~	~~0~~	
	sea pens		Sand	8	91	1	0	0	ND	ND	1	0	1	1	Possible impacts from trawling or other bottom contact
	sea stars		Both	0	183	1	0	0	ND	ND	0	0	1	1	Keystone species in intertidal
	shrimp, ghost		Sand	0	0	1	1	0	ND	ND	0	0	1	0	fish bait
	shrimp, **blue** mud		Sand	0	0	1	**1**	**ND**	ND	ND	0	0	1	0	
	snail, moon		Sand	0	152	1	0	0	ND	ND	0	0	1	0	
	snail, turban*	X	Rock	0	76	1	0	0	ND	ND	0	0	1	0	
	sponges		Rock	0	610	1	0	0	ND	ND	1	0	1	1	Possible impacts from trawling or other bottom contact
	squid, market		Pelagic /Sand	0	0	0	1	1	0	ND	0	0	0	1	Both forage species and predators on small fishes; vulnerable to large-scale changes in the environment driven by El Nino Southern Oscillation events**
	urchin, purple		Both	0	92	1	0	0	**0**	ND	0	0	0	1	Only benefit in areas absent of sea otters, removal impacts other species
	urchin, red*	X	Both	0	90	1	1	**0**	0	ND	0	0	0	1	Only benefit in areas absent of sea otters, removal impacts other species
	worms		Both	0	183	1	0	0	ND	ND	0	0	1	0	
	worms, phragmatopoma		Both			1	0	0	0	ND	0	0	1	1	reef building polychaete
	Plant and Algae														
	eel grass		Sand	0	3	1	0	0	1	0	1	0	1	1	important but will an MPA protect? Biggest threats are sedimentation and nutrient loading. What about disturbance from boats?
	kelp, bull		Rock	0	18	1	0	0	0	0	**1**	0	0	1	potential for harvest
	~~kelp, giant~~		~~Rock~~	~~6~~	~~37~~	~~1~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~rarely found in the study region~~
	other intertidal algal species		Rock	0	0	1	0	0	0	0	1	0	1	1	will only benefit in no-transit areas (reduce trampling)
	rock weeds		Rock	0	0	1	0	0	0	0	1	0	1	1	will only benefit in no-transit areas (reduce trampling)
	sea palm		Rock	0	0	1	0	0	0	0	1	0	1	0	possibly double protection will reduce poaching
X	surf grass		Rock	**0**		**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	important but will an MPA protect? Biggest threats are sedimentation and nutrient loading.

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new addition	most likely to benefit	Primary Bottom type	Shallow depth (m)	Deepest Depth (m)	sm-mod adult home range (<20 km)	Currently mod-large take	Historic mod-large take	Low Pop. Estimate (<40% unfished)	Size structure shifted toward sm indiv	vulnerable life history	life stage to benefit (e.g., spawning, nursery area)	habitat impacted (by human activity)	Ecologically Important (keystone or habitat forming)	Comments
	Fishes													
	bocaccio*	X	Rock	0	481	0	1	1	1	1	1	0	0	1	Top predator; adults with low movement. declining lengths in central CA CPFV (Mason 1998)
	cabezon*	X	Rock	0	110	1	1	1	0	ND	0	0	0	0	
X	cod, pacific		Sand	0	881	0	1	1	0	ND	0	1	0	0	spawning aggregations
	croaker, white		*Sand*	*0*	*238*	*0*	*1*	*0*	*ND*	*ND*	*0*	*0*	*0*	*0*	*are these abundant enough to be fished in the region?*
	eel, monkeyface*	X	Rock	0	24	1	1	1	ND	ND	1	0	1	0	homing; tidepools; large TL; potential local depletion
	eel, wolf*	X	Rock	0	226	1	0	0	ND	ND	0	1	0	0	sedentary;mate-for-life? Large size, potential forage increase without urchin harvest
	flounder, starry*	X	Sand	**1**	600	ND	1	1	0	ND	0	0	1	0	estuarine nurseries, don't appear to move much (Love 1991)
	greenling, kelp*	X	Rock	0	130	1	1	1	ND	ND	0	0	0	0	
X	greenling, rock*	X	Rock	**0**	**80**	**1**	**1**	**1**	**ND**	**ND**	**0**	**0**	**0**	**0**	rec catch from piers
	hagfish, Pacific		Sand/ Rock	16	966	0	0	1	ND	ND	0	0	0	0	
	halibut, California		Sand	0	281	0	1	1	0	ND	0	1	0	0	nursery and spawning aggregations
X	halibut, Pacific		Sand/ Rock	**6**	**1100**	**0**	**1**	**1**	**ND**	**ND**	**0**	**1**	**0**	**0**	rare but caught incidentally and marketed - young recruit to shallow waters
X	herring, Pacific*	X	Both	**0**	**302**	**0**	**0**	**1**	**ND**	**ND**	**1**	**1**	**1**	**0**	spawning aggregations in estuaries, populations subject to environmental fluctuations
	lingcod*	X	Rock	0	475	1	1	1	1	ND	0	1	0	0	reproductive aggregations
X	longjaw mudsucker		sand	0	10	1	1	0	0	ND	0	0	1	0	fished for bait, highly territorial in estuaries
	ray, bat*	X	Sand/ Rock	0	108	0	1	0	ND	ND	1	1	1	1	aggregate to spawn and breed inshore. Top predator. Digging in sand has profound impact on invertebrate community.
	rockfish, aurora		*Sand/ Rock*	*81*	*893*	*ND*	*1*	*1*	*ND*	*ND*	*1*	*0*	*0*	*0*	*mostly deeper than state waters*
	*rockfish, bank**	*X*	*Rock*	*31*	*454*	*ND*	*1*	*1*	*ND*	*1*	*1*	*0*	*0*	*0*	*declines in pop size and age/length in fishery preferred depth mostly deeper than state waters*
	rockfish, black*	X	Rock	0	366	1	1	1	1	1	1	0	0	0	Per Steve Ralston, CA population likely below 40%
	rockfish, black-and-yellow*	X	Rock	0	37	1	1	1	ND	ND	1	0	0	0	
	rockfish, blackgill		*Rock*	*88*	*768*	*ND*	*1*	*1*	*0*	*ND*	*1*	*0*	*0*	*0*	*mostly deeper than state waters*
	rockfish, blue*	X	Rock	0	549	0	1	1	0	1	1	0	0	1	filter barnacle larvae (Gaines and Roughgarden)
	~~rockfish, bronzespotted~~		~~rock~~	~~75~~	~~413~~	~~1~~	~~1~~	~~1~~	~~ND~~	~~ND~~	~~1~~	~~0~~	~~0~~	~~0~~	
	rockfish, brown*	X	Rock	0	146	1	1	1	ND	0	1	0	0	0	locally important in places like SF Bay since 1850
	rockfish, calico*	X	Rock	0	305	1	0	0	ND	ND	1	0	0	0	
	*rockfish, canary**	*X*	*Rock*	*0*	*439*	*0*	*0*	*1*	*1*	*1*	*1*	*0*	*0*	*0*	*declining lengths in central CA CPFV (Mason 1998) preferred depth mostly deeper than state waters*
	*rockfish, chilipepper**	*X*	*rock*	*0*	*491*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*0*	*0*	*declining lengths in central CA CPFV (Mason 1998), preferred depth mostly deeper than state waters*
	rockfish, china*	X	rock	3	128	1	1	1	ND	ND	1	0	0	0	
	rockfish, copper*	X	Rock	0	185	1	1	1	ND	1	1	0	0	0	
	*rockfish, cowcod**	*X*	*Rock*	*40*	*491*	*1*	*0*	*1*	*1*	*ND*	*1*	*0*	*0*	*1*	*preferred depth mostly deeper than state waters*
	*rockfish, darkblotched**	*X*	*Both*	*29*	*910*	*1*	*1*	*1*	*1*	*ND*	*1*	*0*	*0*	*0*	*mostly deeper than state waters*
	rockfish, flag*	X	Rock	30	418	1	1	1	ND	ND	1	0	0	0	
	rockfish, gopher*	X	Rock	0	86	1	1	1	0	ND	1	0	0	0	
	rockfish, grass*	X	Rock	0	46	1	1	1	ND	ND	1	0	0	0	
	*rockfish, greenblotched**	*X*	*Rock*	*55*	*491*	*1*	*1*	*1*	*ND*	*ND*	*1*	*0*	*0*	*0*	*preferred depth mostly deeper than state waters*
	rockfish, greenspotted*	X	Both	30	379	1	1	1	ND	ND	1	0	0	0	
	*rockfish, greenstriped**	*X*	*Sand/Interface*	*12*	*1145*	*1*	*1*	*1*	*ND*	*ND*	*1*	*0*	*0*	*0*	*preferred depth mostly deeper than state waters*
	rockfish, kelp*	X	Rock	0	58	1	1	1	ND	ND	1	0	0	0	
	~~rockfish, longspine thornyhead~~		~~Sand~~	~~201~~	~~1756~~	~~0~~	~~1~~	~~1~~	~~0~~	~~ND~~	~~0~~	~~0~~	~~0~~	~~0~~	~~deeper than state waters~~
	rockfish, olive*	X	Rock	0	172	1	1	1	ND	1	1	0	0	0	
	*rockfish, pink**	*X*	*Rock*	*46*	*366*	*1*	*0*	*0*	*ND*	*ND*	*1*	*0*	*0*	*0*	*preferred depth mostly deeper than state waters*
	rockfish, quillback*	X	rock	5	274	1	1	1	ND	ND	1	0	0	0	
	rockfish, redbanded		*Rock*	*49*	*1145*	*ND*	*1*	*1*	*ND*	*ND*	*1*	*0*	*0*	*0*	*preferred depth mostly deeper than state waters*
	rockfish, rosethorn		*Both*	*59*	*1145*	*1*	*1*	*1*	*ND*	*ND*	*1*	*0*	*0*	*0*	*preferred depth mostly deeper than state waters*
	rockfish, rosy*	X	Rock	7	263	1	1	1	ND	ND	1	0	0	0	
	rockfish, shortspine thornyhead		*Sand/ Rock*	*17*	*1524*	*0*	*1*	*1*	*0*	*ND*	*0*	*0*	*0*	*0*	*preferred range mostly deeper than state waters Juveniles, in particular, are often found on rocks.*

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	rockfish, speckled*	X	Rock	30	366	1	1	1	ND	ND	1	0	0	0	
	rockfish, splitnose		*sand*	*80*	*894*	*0*	*1*	*1*	*ND*	*ND*	*1*	*0*	*0*	*0*	*mostly deeper than state waters*
	rockfish, squarespot*	X	Rock	18	305	1	1	0	0	ND	1	0	0	0	
	rockfish, starry*	X	Rock	15	274	1	1	1	ND	ND	1	0	0	0	
	rockfish, treefish*	X	Rock	0	98	1	1	1	ND	ND	1	0	0	0	
	rockfish, vermilion*	X	Rock	0	439	1	1	1	0	1	1	0	0	0	southern CA declines in length (Love et al.)
	*rockfish, widow**	*X*	*Rock*	*0*	*800*	*0*	*0*	*1*	*1*	*ND*	*1*	*1*	*0*	*0*	*preferred range mostly deeper than state waters - known to aggregate around pinnacles/seamounts*
	*rockfish, yelloweye**	*X*	*Rock*	*15*	*549*	*1*	*0*	*1*	*1*	*ND*	*1*	*0*	*0*	*1*	*preferred range mostly deeper than state waters - Top predator.*
	*rockfish, yellowtail**	*X*	*rock*	*0*	*549*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*0*	*0*	*preferred range mostly deeper than state waters - declining lengths in central CA CPFV (Mason 1998)*
~~X~~	~~*sablefish*~~		~~*sand*~~	~~*180*~~	~~*920*~~										~~*perhaps juveniles that live in shallower water can benefit from MPAs*~~?
	sanddab, Pacific		Sand	0	549	0	1	1	0	ND	0	0	0	0	rec catch
X	seabass, giant		Rock	6	46	1	0	1	1	1	1	0	0	0	already protected but some incidental catch and gear can kill even those thrown back
X	seabass, white		Both	**0**	**120**	**ND**	**1**	**1**	**ND**	**ND**		**1**	**1**	**0**	seagrass beds as nursery grounds
X	shark, broadnose sevengill		Sand	0	136	0	1	1	ND	ND	0	1	1	0	estuarine nurseries, rec and some commercial catch (Ebert, 2003)
	shark, brown smoothhound		Sand	0	281	0	1	0	ND	ND	1	1	1	0	inshore nursery, rec and some commercial in estuaries?
	shark, leopard		Sand	0	157	0	1	0	ND	ND	1	1	1	0	estuarine pupping and nursery grounds. Very common in kelp beds, often up in water column in kelp beds at night.
X	shark, pacific angel		Both	**3**	**183**	**1**	**0**	**1**	**ND**	**ND**	**1**	**0**	**0**	**0**	low fecundity, relatively sedentary (Ebert 2003)
	skate, big		Sand	2	800	0	**1**	0	ND	ND	1	0	0	0	low fecundity, rec catch and bycatch, wing meat sold (Ebert 2003)
	skate, California		Sand	13	1600	0	**1**	0	ND	ND	1	0	0	0	rec catch and bycatch wing meat sold (Ebert 2003)
	skate, longnose		Sand	9	1069	0	0	0	ND	ND	1	0	0	0	low fecundity
	smelt, surf*	X	Sand	0	9	0	1	1	ND	ND	0	1	1	0	spawn in surfzone, distinct local spawning populations
	smelt, top-		Sand	0	26	ND	1	1	ND	ND	0	1	1	0	eggs laid on plants in backwater
	sole, Dover		Sand	2	1372	0	1	1	0	ND	0	0	0	0	nursery and spawning nearshore, otherwise a deeper water spp.
	sole, English*	X	Sand	0	549	**1**	1	1	0	ND	0	0	0	0	limited movement (Love 1991)
	sole, petrale		*Sand*	*0*	*549*	*0*	*1*	*1*	*1*	*ND*	*0*	*0*	*0*	*0*	*preferred range is mostly deeper than state waters*
	sole, rex		*Sand*	*0*	*1145*	*0*	*1*	*1*	*0*	*ND*	*0*	*0*	*0*	*0*	*preferred range is mostly deeper than state waters*
X	sole, rock*	X	rock	**0**	**579**	**1**	**1**	**1**	**0**	**ND**	**1**	**0**	**0**	**0**	variable recruitment based on oceanographic factors, small range of adult movement (Love 1991)
	sole, sand		Sand	0	325	ND	1	1	ND	ND	0	1	0	0	juveniles in estuaries
	~~sole, slender~~		~~Sand~~	~~9~~	~~1145~~	~~0~~	~~0~~	~~0~~	~~ND~~	~~ND~~	~~0~~	~~0~~	~~0~~	~~0~~	
	~~surfperch, barred~~		~~Sand~~	~~0~~	~~73~~	~~1~~	~~1~~	~~1~~	~~ND~~	~~ND~~	~~1~~	~~0~~	~~0~~	~~0~~	~~piers;jetties;sandy beaches, rarely caught north of Santa Cruz~~
	surfperch, black*	X	Rock	0	46	1	1	1	ND	ND	1	0	1	0	piers; jetties; estuaries; kelp; low fecundity
	surfperch, pile*	X	Rock	0	90	1	1	1	ND	ND	1	0	0	0	piers; jetties; estuaries; kelp. Low fecundity
	surfperch, rainbow*	X	Rock	0	50	ND	0	0	ND	ND	1	0	1	0	harbors; eelgrass. some evidence they move inshore and offshore, movements are not known; low fecundity.
	surfperch, rubberlip*	X	Rock	0	50	ND	1	1	ND	ND	1	0	1	0	piers; jetties; kelp. Low fecundity
	surfperch, shiner*	X	Both	0	146	ND	1	1	ND	ND	0	0	1	0	estuaries; kelpbeds
	surfperch, striped*	X	Rock	0	50	0	1	1	ND	ND	0	0	1	0	piers; jetties; estuaries; kelp
	surfperch, walleye*	X	Both	0	182	1	1	1	ND	ND	0	0	0	0	sandy beaches; piers
	surfperch, white*	X	Both	0	70	1	1	1	ND	ND	0	0	1	0	estuaries
X	turbot, C-O		Sand	**0**	**300**	**0**	**1**	**1**					**0**	**0**	
X	turbot, diamond		Sand	**0**	**46**	**0**	**1**	**1**					**1**	**0**	often found in estuaries and brackish water
X	turbot, thornyhead		Sand	**9**	**201**	**0**	**1**	**1**					**0**	**0**	

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	Seabirds (breeding)														
X	*auklet, Cassin's*		*Sand/ mud*	*0*		*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*potential for forage base increa* se, potential human disturbance reduction, California species of special concern.
	auklet, rhinoceros		*Sand/ mud*	*0*	*91*	*0*	*1*	*0*	*1*	*1*	*1*	*0*	*1*	*0*	*potential for forage base increase, potential human disturbance reduction*
	cormorant, B~~r~~brandt's*	X	Sand/ mud	0	15	0	0	0	0	0	1	1	1	1	potential for forage base increase, potential human disturbance reduction. Feeds mainly on small schooling fish (e.g., juv. rockfish, anchovy, etc.) in coastal waters.
	cormorant, double-crested*	X	Sand/ mud	0	15	0	0	0	0	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction. Feeds mainly on small schooling fish in coastal estuaries.
	cormorant, pelagic*	X	Rock	0	15	1	0	0	0	0	1	1	1	1	potential for forage base increase, potential human disturbance reduction. Feeds mainly on small fish (e.g., juv. rockfish, cottids,) and mysid shrimp in nearshore waters near breeding colonies. Sensitive to reductions in prey.
X	oystercatcher, black	X	Rock	0	0	0	0	0	1	0	1	1	1	?	potential for forage base increase, Potential human disturbance reduction. Feeds on intertidal molluscs on coastal rocks, reefs.
	guillemot, pigeon*	X	Rock	0	30	1	0	0	0	0	1	1	1	1	potential for forage base increase, potential human disturbance reduction. Feed on small fish (juv. Rockfish, cottids, sanddabs) in nearshore waters near colonies. Sensitive to reductions in prey.
X	gull, western		Sand, mud, rock	0		0	0	0	0	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction
	murrelet, marbled*	X	Sand, mud	0	30	0	0	0	1	0	1	1	1	0	Significant decline in California population,potential for forage base increase, potential human disturbance reduction. Feed on small fish and zooplankton in nearshore waters. Restricted distribution. Federally threatened, state endangered
	murre, common*	X	Sand, mud	0	183	0	0	1	0	0	1	1	1	1	potential for forage base increase, potential human disturbance reduction. Has been impacted in past as fisheries bycatch (gill-net). Recently, some take in rockfish hook-and-line around Farallon Islands.
X	storm-petrel, ashy ~~storm~~		NA	0		0	0	0	1	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction, restricted distribution, population declining
~~X~~	~~storm-petrel, fork-tailed storm~~		~~NA~~	~~0~~		~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~1~~	~~1~~	~~0~~	~~potential for forage base increase, potential human disturbance reduction.~~ (Mainly in Northern study area, McChesney)
X	storm-petrel, L~~l~~each's ~~storm~~		NA	0								1			potential for forage base increase, potential human disturbance reduction
X	puffin, tufted			0		0	0	0	1	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction, population highly reduced, CA species of special concern
	tern, least		Sand, mud	0	0	0	0	0	1	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction, federally and state endangered

Key:

* most likely to benefit

italics: should this be on the list? (explanation in comments)

bold: data added or changed from CC version

new addition		most likely to benefit	Primary Bottom type	Shallow depth (m)	Deepest Depth (m)	sm-mod adult home range (<20 km)	Currently mod-large take	Historic mod-large take	Low Pop. Estimate (<40% unfished)	Size structure shifted toward sm indiv	vulnerable life history	life stage to benefit (e.g., spawning, nursery area)	habitat impacted (by human activity)	Ecologically Important (keystone or habitat forming)	Comments
	Seabird (Migrant)														
0	~~albatross, black-footed~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction~~ (occurs mainly beyond state waters, McChesney)
	~~fulmar, northern~~			~~0~~	~~2~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~ (occurs mainly beyond state waters, McChesney)
	~~grebe spp.~~			~~0~~	~~9~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~
X	*loon, Pacific*		*Sand, mud*	*0*	*15*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*potential for forage base increase, potential human disturbance reduction*
X	grebe, Western/Clark's*	X	Sand, mud			0	0	0	0	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction. Mainly fall-spring. Feed on small fish in coastal waters, estuaries.
X	*grebe, eared*	*X*	*Sand, mud*			*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*0*	*potential for forage base increase, potential human disturbance reduction. Mainly fall-spring. Feed on small fish in coastal waters, estuaries.*
X	*shearwater, sooty*		*NA*	*0*		*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*0*	*potential forage base increase. Spring-fall. Feeds on small schooling fish (e.g., juv. rockfish, anchovies, etc.) and krill over shelf and slope waters. Declining. (highly mobile when present, McChesney)*
	pelican, brown		Sand, mud	0	3	0	0	0	1	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction, federally and state endangered~~downlisting under consideration~~
X	brant	X	Sand	0	3	0	0	0	1	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction. Eelgrass specialist. Winters in coastal estuaries. Declined in California due to loss of eelgrass habitat.
X	scaup, lesser*	X	Sand, mud	0		0	0	0	0	0	1	1	1	0	Potential for forage base increase, potential for forage base increase, potential human disturbance reduction. Coastal estuaries important wintering habitat. Feeds on benthic invertebrates (molluscs, worms) and small fish.
X	goldeneye, common		Sand, mud	0		0	0	0	0	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction. Winters in coastal estuaries. Feeds on benthic invertebrates (molluscs, worms)and small fish.
X	bufflehead*	X	Sand, mud	0		0	0	0	0	0	1	1	1	0	potential for forage base increase, potential human disturbance reduction. Winters in coastal estuaries. Feeds on benthic invertebrates and small fish.
X	scoter, surf*	X	Sand, mud	0	3	0	0	0	0	0	1	0	0	0	potential for forage base increase, potential human disturbance reduction, declining. Migrant and winter in nearshore coastal waters and estuaries. Feeds on benthic invertebrates (molluscs, worms) and small fish.
X	plover, snowy*	X	Sand	0	0	1	0	0	1	0	1	1	1		Potential human disturbance reduction. Nests and feeds on sandy beaches, dunes. Very sensitive to human disturbance. Federally threatened.
X	plover, black-bellied		Mud, sand, rock	0	0	1	0	0	0	0	1	1	1		Potential human disturbance reduction. Migrant and winter. Feeds on intertidal inverterbrates on mudlfats, reefs.
X	godwit, marbled*	X	Sand, mud	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Coastal estuaries important habitat spring-fall. Feeds on benthic invertebrates in intertidal mudflats.
X	willet*	X	Sand, mud	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Coastal estuaries important habitat spring-fall. Feeds on benthic invertebrates in intertidal mudflats.
X	dowitcher, short-billed		Mud, sand	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Coastal estuaries important habitat spring-fall. Feeds on benthic invertebrates in intertidal mudflats.
X	dowitcher, long-billed		Mud, sand	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Coastal estuaries important habitat spring-fall. Feeds on benthic invertebrates in intertidal mudflats.
X	turnstone, ruddy*	X	Rock, sand	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Feeds on rocky intertidal invertebrates on coastal reefs, rocks, gravel beaches.
X	turnstone, black*	X	Rock	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Feeds on rocky intertidal invertebrates on coastal reefs, rocks.

Key:

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new addition		most likely to benefit	Primary Bottom type	Shallow depth (m)	Deepest Depth (m)	sm-mod adult home range (<20 km)	Currently mod-large take	Historic mod-large take	Low Pop. Estimate (<40% unfished)	Size structure shifted toward sm indiv	vulnerable life history	life stage to benefit (e.g., spawning, nursery area)	habitat impacted (by human activity)	Ecologically Important (keystone or habitat forming)	Comments
X	surfbird*	X	Rock	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Feeds on rocky intertidal invertebrates exclusively on coastal reefs, rocks.
X	dunlin*	X	mud, sand	0	1	0	0	0	0	0	1	1	1	0	Potential human disturbance reduction. Coastal estuaries important habitat spring-fall. Feeds on benthic invertebrates in intertidal mudflats.
X	sandpiper, western	X	mud, sand	0	0	0	0	0	0	0	0	0	1	0	Potential human disturbance reduction. Coastal estuaries important habitat spring-fall. Feeds on benthic invertebrates in intertidal mudflats.
X	*gull, glaucous-winged*			*0*		*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*potential for forage base increase, potential human disturbance reduction (highly mobile when present in winter, McChesney)*
X	*gull, Heermann's*			*0*		*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*potential for forage base increase, potential human disturbance reduction (highly mobile when present in summer-winter, McChesney)*
X	*gull, herring*			*0*		*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*potential for forage base increase, potential human disturbance reduction (highly mobile when present in winter, McChesney)*
~~X~~	~~gull, sabine's~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction.~~ (occurs mainly beyond state waters McChesney)
~~X~~	~~Jaeger spp.~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction.~~ (occurs mainly beyond state waters McChesney)
~~X~~	~~kittiwake, black-legged~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction.~~ (occurs mainly beyond state waters McChesney)
	~~Loon spp.~~			~~0~~	~~15~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~
~~X~~	~~petrel, Murphy's~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction.~~ (occurs mainly beyond state waters McChesney)
	~~phalarope spp.~~			~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~ (migrant mostly beyond state waters feed on zooplankton (eg. Copepods), McChesney)
	~~scoter spp.~~			~~0~~	~~3~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~
	~~shearwater spp.~~			~~0~~	~~9~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~
~~X~~	~~shearwater, black-vented~~			~~0~~		~~0~~	~~0~~	~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase, potential human disturbance reduction.~~ (Sporadic in occurrence in north central CA, McChesney)
~~X~~	~~skua, south polar~~			~~0~~											~~potential for forage base increase, potential human disturbance reduction.~~ (occurs mainly beyond state waters McChesney)
~~X~~	~~tern, arctic~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction.~~ (occurs mainly beyond state waters McChesney)
X	*tern, elegant*			*0*								*0*			*potential for forage base increase, potential human disturbance reduction. Summer-fall. Feeds on small schooling fish (e.g., anchovies) in nearshore waters, estuaries.*

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	Marine mammals														
	~~dolphin, short-beaked common~~		~~Sand, mud~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~potential for forage base increase~~ . (mainly occur from MB south, McChesney)
	porpoise, harbor		Sand, mud	0	0	1	0	1	0	0	0	0	0	0	potential for forage base increase, potential human disturbance reduction. Has been impacted in past as fisheries bycatch (gill-net).
X	porpoise, Dall's			0		0	0	0	0	0	0	0	0	0	potential for forage base increase, potential human disturbance reduction.
X	dolphin, Risso's		Sand, mud	0		0	0	0	0	0	0	0	0	0	potential for forage base increase, potential human disturbance reduction. Feeds mainly on squid,fish.
X	sea lion, California		Sand, mud	0		0	0	1	0	0	0	0	1	0	potential for forage base increase, potential human disturbance reduction
	sea lion, Steller*	X	Sand, mud	0		0	0	1	1	0	0	1	1	1	Ano Nuevo North-central California population has declined, potential for forage base increase, potent'l human disturb. reduction; federally threatened
	sea otter, southern*	X	Rock	0		0	0	1	1	0	0	0	1	1	Resident in nearshore waters, esp. kelp beds. Feeds on benthic invertebrates, fish. Potential for forage base increase, potential human disturbance reduction. Formerly more abundant and widespread. Federally threatened. Has been impacted in past as fisheries bycatch (gill-net).
~~X~~	~~seal, guadalupe fur~~			~~0~~								~~0~~			~~potential for forage base increase, potential human disturbance reduction; locals are rare and are more commonly found off of Mexico; listed as a federally threatened species~~. (too rare to benefit, McChesney)
	seal, harbor*	X	Mud, sand	0	0	0	0	1	0	0	0	1	1	1	potential for forage base increase, potential human disturbance reduction
~~X~~	~~seal, northern elephant~~			~~0~~								~~1~~			~~potential for forage base increase, potential human disturbance reduction~~. (forage beyond state waters, not highly sensitive to human disturbances at colonies, McChesney)
X	seal, northern fur		NA	0		0	0	1	1	0	1	1	0	0	potential for forage base increase, potential human disturbance reduction. Recently recolonized Farallon Islands after 100+ year absence. (forage beyond state waters, McChesney)
	whale, gray		Sand, mud	0		0	0	1	0	0	1	0	0	0	~~potential for forage base increase.~~ Potential for human disturbance reduction. (feed mainly in arctic ocean, McChesney)
X	whale, blue		Sand, mud	0		0	0	1	1	0	1	0	0	0	Potential for human disturbance reduction. California has world's largest population. Federally endangered.
X	whale, humpback		Sand, mud	0		0	0	1	1	0	1	0	0	0	Potential for forage base increase; potential for human disturbance reduction. Federally endangered.

Seabirds Ref: Seabirds by Peter Pyle: pubs.usgs.gov/circ/c1198/chapters/150-161_Seabirds.pdf and Nat'l Geo Field Guide Birds of N.America

Marine mammals Ref: Farallones Marine Sanctuary Assocation http://www.farallones.org/findings/index.php and Marine Mammal Center http://www.marinemammalcenter.org/l

Southern Otter breeding range:http://www.baynature.com/v07n03/v07n03_etg.html

Inverts Ref: http://www.mbayaq.org/efc/living_species, etc.

*Ref: http://72.14.253.104/search?q=cache:Lwn-nRiZce8J:www.dfg.ca.gov/Mrd/status/littleneck_clams.pdf+%22littleneck+clams%22+range&hl=en&ct=clnk&cd=2&gl=us&client

**Ref: http://www.blueoceaninstitute.org/seafood/species/122.htm