California MLPA Master Plan Science Advisory Team
Draft Supporting Text for Approved Levels of Protection
MLPA South Coast Study Region

Revised June 16, 2009

Clams (all methods of hand harvest):

Direct impacts – Take of clams (numerous species) is unlikely to permanently alter habitat in the dynamic soft-bottom environments where harvest takes place.

Clams are relatively sedentary animals with limited adult home ranges, thus their local abundance is likely to be altered by take relative to a state marine reserve (SMR).

Indirect impacts – Clam digging may alter the behavior of local shorebirds and marine mammals, and could kill non-target infaunal species, including improperly placed sublegal clams. Though clams are an important food source for a variety of fishes and elasmobranchs, hand harvest is unlikely to have a large impact on community structure, since it only occurs in the intertidal zone, thereby leaving a large proportion of the clam population unharvested.

Level of protection: **Moderate**

Marine algae other than giant and bull kelp (hand harvest):

Direct impacts – Take of marine algae (all species except *Macrocystis pyrifera* and *Nereocystis luetkeana*) is unlikely to significantly alter habitat created by the geologic substrate. However, because marine algae provide structure and habitat for a wide variety of species, their removal alters the type and abundance of habitat available for hundreds of other species.

Several species of intertidal and subtidal algae may be taken by hand harvest in the South Coast Study Region. Since all species are sessile and their reproductive propagules travel short distances, their local abundance is likely to be altered by take relative to an SMR.

Indirect impacts – Marine algae provide structure and habitat for a rich and unique community of organisms. Therefore, its removal has the potential to change community structure substantially.

Level of protection: **Low**

Swordfish (harpoon):

Direct impacts – Take of swordfish (*Xiphias gladius*) by harpoon will not alter habitat.

Swordfish are a highly mobile pelagic species found in tropical and temperate waters worldwide. Their wide-ranging habits mean their local abundance is unlikely to be altered by take relative to an SMR.

Indirect impacts – Harpooning swordfish requires fishermen to make visual contact with the target, therefore associated catch is extremely low.

Level of protection: **High**

Halibut (spear):

Direct impacts – California halibut (*Paralichthys californicus*) are a moderately mobile species that inhabits a wide range of habitats in California. Although the movement patterns of halibut are not fully understood, several studies indicate that young (mostly sub-legal sized) California halibut stay within 2-5 km of their tagging release site for months or years, while some move hundreds of km within that same time period (Domeier and Chun 1995, Posner and Lavenberg 1999) There is also information to suggest that larger halibut may be more mobile than small. Because the mobility of adult halibut is not well known, it is unclear whether their abundance will be altered by take relative to an SMR. Spearfishing for halibut is unlikely to disturb habitat.

Indirect impacts – Though associated catch through spearfishing is likely to be extremely low, removal of halibut could have indirect impacts on community structure. Halibut are important predators in the benthic ecosystem, and although they are moderately mobile, any reduction in their abundance could alter local trophic interactions.

Level of protection: **Moderate-High**

Halibut (hook and line):

Direct impacts – California halibut (*Paralichthys californicus*) are a moderately mobile species that inhabits a wide range of habitats in California. Although the movement patterns of halibut are not fully understood, several studies indicate that young (mostly sub-legal sized) California halibut stay within 2-5 km of their tagging release site for months or years, while some move hundreds of km within that same time period (Domeier and Chun 1995, Posner and Lavenberg 1999) There is also information to suggest that larger halibut may be more mobile than small.

Because the mobility of adult halibut is not well known, it is unclear whether their abundance will be altered by take relative to an SMR. However, associated catch includes demersal sharks, skates and rays, other flatfish, and a variety of reef fish including rockfish, lingcod, and cabezon. There is also a substantial likelihood of associated catch of barred sandbass (Appendix XX). Many of these species, including barred sandbass, would otherwise be protected by MPAs. Fishing for halibut with hook

and line gear (including longlines) involves bottom contact but causes little habitat disturbance.

Indirect impacts – Halibut are important predators in the benthic ecosystem, feeding on a variety of schooling fish and benthic organisms (Cailliet et al. 2000) . Although they are moderately mobile, any reduction in their abundance could alter local trophic interactions.

Level of protection: **Moderate-Low**

Jumbo squid (hook and line):

Direct impacts – Jumbo squid, also known as Humboldt squid (*Dosidicus gigas*), are a highly mobile species. Their abundance is unlikely to be altered by take relative to an SMR, and fishing for jumbo squid using hook and line is unlikely to disturb habitat.

Indirect impacts – Take of jumbo squid is unlikely to change local community structure, given their high mobility. Associated catch is very low when fishing for jumbo squid, since squid jigs do not readily catch other species.

Level of protection: **High**

Mussels (hand harvest):

Direct impacts – Take of mussels (*Mytilus californianus* and *M. galloprovincialis*) by hand is unlikely to directly damage the rocky substrate to which they attach. However, mussels are a functionally sessile species, so their local abundance is likely to be altered by take relative to an SMR.

Indirect impacts – Mussels create important biogenic habitat for a huge variety of species (Suchanek 1992, Lohse 1993), and are an important prey item for numerous rocky shore predators. Their removal significantly alters the species community at that given location.

Level of protection: **Low**

Squid (pelagic seine, dip-net, crowder):

Direct impacts – Market squid (*Loligo opalescens*) are a highly mobile pelagic species that is unlikely to benefit directly from MPAs within state waters. Fishing for squid with pelagic seine gear targets the species during the vulnerable spawning period; however squid grow quickly and spawn only once, making the population less vulnerable to spawning-targeted fishing than other species. Dip-nets and crowders do not contact the bottom, and although pelagic seine gear rarely touches the seafloor, it causes little or no direct habitat damage. Landings of non-target species are low and made up almost

entirely of other highly-mobile schooling fish (Appendix XX), thus the direct impacts of the fishing activity on the resident ecosystem are expected to be low.

Indirect impacts – As noted above, squid are highly mobile species and squid fishing gear has very low incidental catch of other highly mobile species, so the indirect impacts of the fishing activity on the resident ecosystem are expected to be low.

Level of protection: **High**

Rock crabs (trap):

Direct impacts – Take of rock crabs (*Cancer antennarius*, *C. productus*, and *C. anthonyi*) by trap is unlikely to damage habitat, though traps do contact the bottom.

Rock crabs are important predators and scavengers in the benthic marine ecosystem of southern California. A tagging study from central California showed them to have low mobility as adults; almost half of the recovered tagged crabs were found at their original release site up to 18 months after release, and 7 km was the maximum distance any crab traveled (Carroll 1982). Additionally, data from southern California shows that in Santa Monica Bay, which is closed to crab fishing, crabs are larger, size frequencies are broader, and experimental catch rates are higher than in areas open to crab fishing (Leet et al. 2001). These studies indicate that rock crab abundance is likely to be altered by take relative to an SMR.

Indirect impacts – Rock crabs play an important ecosystem role as scavengers and predators, and are prey for a variety of other predators. Thus their removal from the ecosystem is likely to impact community structure.

Level of protection: **Moderate-Low**

Coastal pelagic finfish and bonito (seine, dip-net, crowder):

Direct impacts – Coastal pelagic finfish[1] and bonito (*Sarda chiliensis*) are highly mobile pelagic species that are unlikely to benefit directly from MPAs within state waters. Dip-nets and crowders do not contact the bottom, and though pelagic seine gear rarely touches the seafloor, it causes little or no direct habitat damage. Landings of non-target species are low and comprised almost entirely of other highly mobile schooling fish (Appendix XX), therefore the direct impacts of the fishing activity on the resident ecosystem are expected to be low.

[1] The term "coastal pelagic finfish" includes: northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasi*), jack mackerel (*Trachurus symmetricus*), Pacific mackerel (*Scomber japonicus*), Pacific sardine (*Sardinops sagax*).

Indirect impacts – Coastal pelagic finfish and bonito feed on a variety of planktonic organisms and smaller fish. Since these schooling species and their prey are highly mobile, and incidental catch is low and comprised mainly of other highly mobile species, the indirect ecosystem impacts of take are predicted to be low.

Level of protection: **High**

Cabezon, rockfish, and lingcod (hook and line or spear):

Direct impacts – Cabezon (*Scorpaenichthys marmoratus*), rockfish (many species, *Sebastes* spp.), and lingcod (*Ophiodon elongatus*) are important members of rocky reef communities. They have low adult mobility, thus their abundance is likely to be altered by catch relative to an SMR. Associated catch for any of these species could include other reef fishes with low mobility. Fishing for these species with spear does not involve bottom contact, though fishing with hook and line gear (including longlines) could involve bottom contact but causes little habitat disturbance. It is important to note that a level of protection was determined for cabezon, rockfish, and lingcod individually. Since all three received the same level of protection for the same reasons, they are being presented here as a group.

Indirect impacts – Cabezon, rockfish, and lingcod are important predators in rocky reef ecosystems. Decreasing their abundance through take could have strong indirect impacts on rocky reef trophic systems.

Level of protection: **Moderate-Low**

Kellet's whelk (trap):

Direct impacts – Kellet's whelk (*Kelletia kelletii*) is an important benthic predator in rocky reefs, kelp forests, and soft bottom communities. Though little data are available, the morphology of adult Kellet's whelks indicates they have low mobility, so their abundance is likely to be altered by catch relative to an SMR. It should be noted that Kellet's whelk is not a targeted fishery at this time; the species is legally taken as incidental catch in crab traps. However, a fishery is developing and members of the South Coast Regional Stakeholder Group have proposed MPAs that specifically allow the take of Kellet's whelk. Crab traps that currently trap Kellet's whelk contact the habitat, but cause little damage.

Indirect impacts – Kellet's whelk is an important predator, particularly on herbivorous snails and other grazers. Therefore removal of the species from a given location could indirectly affect a number of other species in the ecosystem, particularly algae including kelps.

Level of protection: **Moderate-Low**

References:

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