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## Biodiversity: Fishery Management

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## 3.4 Fishery Management

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Since 1950, California's commercial fisheries have produced in the top ten by value and in the top five by weight of all coastal states (NMFS 2014). The Port of Los Angeles, the primary fishing port for Santa Monica Bay, is consistently the top producing port in California by weight and value (NOEP 2012). The Bay also supports a thriving recreational fishing industry. Los Angeles County is home to approximately 70,000 sport fishermen and generates approximately 7% of all sport-fishing related GDP for the state (CDFW 2015). Overall fishing (recreational and commercial) contributes approximately \$53.5 million in wages and \$122 million in GDP, generates 1,550 jobs, and supports approximately 150 businesses (National Ocean Economics Program 2012). It is therefore important to ensure that the fish populations that support these activities are healthy and well managed.

Inside Santa Monica Bay, top commercially caught species (by weight) include important prey species such as market squid and pacific sardine, kelp forest inhabitants such as red sea urchin and spiny lobster, and deep-water species such as hagfish and thornyheads ([Table 3.4-1](#)). In addition, California halibut (*Paralichthys californicus*) and sea hares (*Aplysia* spp.; see photo) are in the top ten by value, but not by weight. Commercial fishing activity is heaviest off the northern Malibu coast, around Palos Verdes, and in the middle of the Bay at Short Bank ([Figure 3.4-1](#)).

The most lucrative of these fisheries (those that command the highest price per pound based on 2013 data) are California spiny lobster (\$19/lb) and sea hare (\$11/lb). Spiny lobster are sold live and mostly shipped to Asia; sea hares are not consumed but are instead sold for use in neurobiological research.

On the other end of the spectrum are the coastal pelagic species (CPS): market squid, Pacific sardine, northern anchovy, Pacific mackerel, and jack mackerel. These species command a relatively low price per pound (\$0.9 - \$0.32) but are caught in extremely high volume (nearly 35 million pounds annually). Fishermen are paid by the ton for these particular fish. Despite their low price per pound, this fishery is the most valuable in the state. Market squid alone is the second most valuable statewide (behind the Dungeness crab, *Cancer magister*) and is the largest by weight. Pacific sardine is the 8<sup>th</sup> most valuable fishery statewide and is the 2<sup>nd</sup> largest by weight. Los Angeles area fishing ports are the top producers of CPS in the state, with landings coming from nearby fishing grounds north of Point Dume and offshore of the Redondo Canyon. Market squid is typically exported to Asia and Europe, although some of it also remains in the US (Porzio and Brady 2006). Pacific sardine is typically canned, but is also turned into fish meal and fish oil products (Protasio 2011). California barracuda also command a relatively low price per pound at market, fetching around \$0.70/lb. As it is a warmer water species, it is surprising to find

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that California barracuda are in the top 10 of fish caught in Santa Monica Bay during a predominately cold water cycle<sup>2</sup>.

**Table 3.4-1. Top 10 commercial fisheries by weight in Santa Monica Bay from 2008-2013.** Santa Monica Bay includes fishing blocks 678, 679, 680, 681, 701, 702, 703, 704 (no data from 2008-2011), 719, 720, and 721 (see [Figure 3.4-1](#) for more details). *Data Source: California Department of Fish and Wildlife Commercial Fisheries Information System, accessed July 2014.*

Common Name	Scientific Name	Annual Avg (lbs)
Market squid	<i>Doryteuthis opalescens</i> *	24,589,215
Pacific sardine	<i>Sardinops sagax</i>	9,256,444
Other coastal pelagic species	†	960,882
Red sea urchin	<i>Mesocentrotus franciscanus</i> ‡	833,338
California spiny lobster	<i>Panulirus interruptus</i>	107,253
Rock crab (brown, red, and yellow)	§	99,489
Thornyheads (long and short spine)	<i>Sebastolobus alascanus</i> and <i>S. altivelis</i>	54,843
Hagfish (slime eel)	<i>Eptatretus stoutii</i>	30,364
California barracuda	<i>Sphyræna argentea</i>	23,875
Sea cucumbers	<i>Parastichopus spp.</i>	22,822
All other species	----	120,492
<b>Total</b>	-----	36,099,017

\* Syn. *Loligo opalescens*

† Northern anchovy (*Engraulis mordax*), Pacific mackerel (*Scomber japonicus*), and jack mackerel (*Trachurus symmetricus*).

‡ Syn. *Strongylocentrotus franciscanus* (Kober and Bernardi, 2013).

§ Brown rock crab (*Romaleon antennarium*, syn. *Cancer antennarius*, *C. antennarium*), red rock crab (*C. productus*), yellow rock crab (*Metacarcinus anthonyi*, syn. *C. anthonyi*)

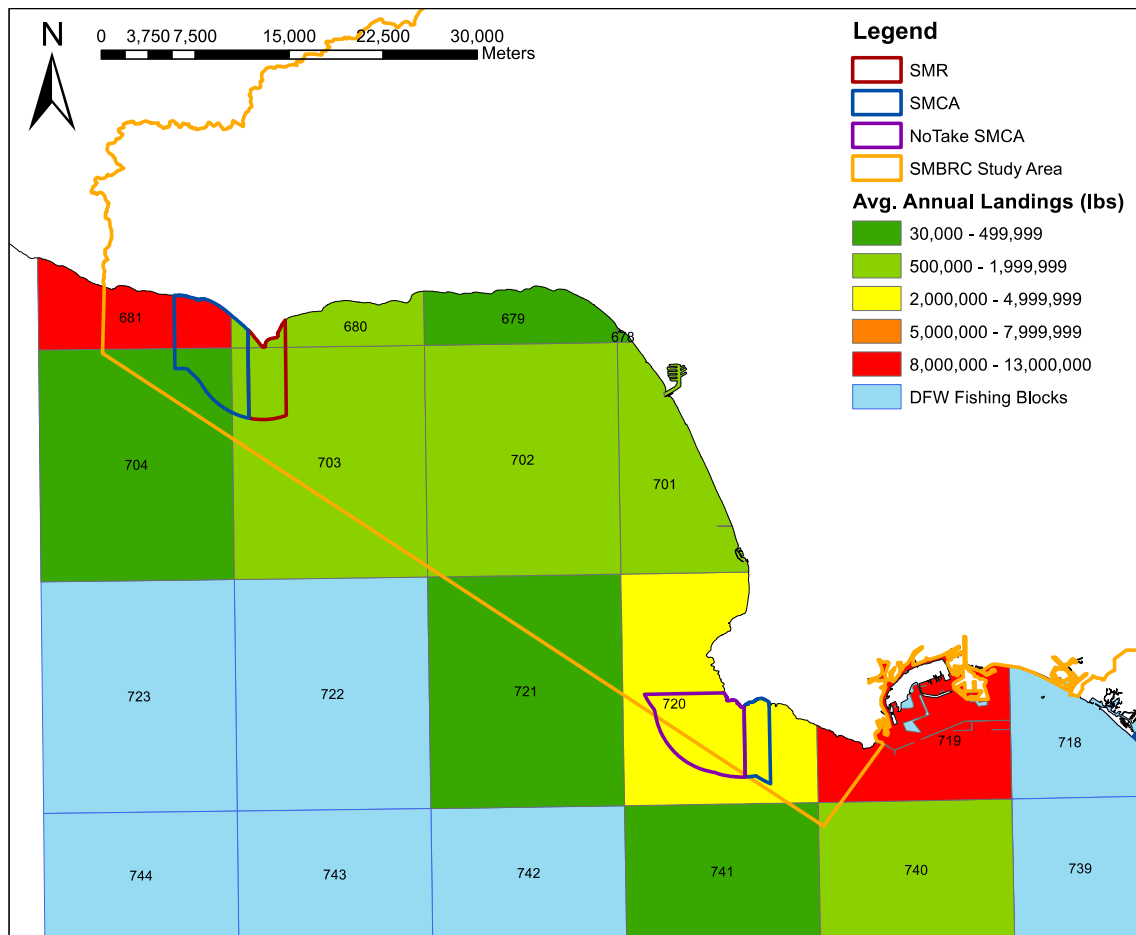
Other Santa Monica Bay seafood exports are sea cucumbers and hagfish. Sea cucumbers are primarily shipped to Asia for consumption, although a small portion is sold in local Asian markets (Rogers-Bennett and Ono 2007). Hagfish are predominantly sold to Korean buyers for their skins and for human consumption (Tanaka 2008).

The remaining seafood products are primarily sold locally. Rock crab are typically sold live in local fresh fish markets (Parker 2002). Red sea urchins are processed and sold to sushi restaurants locally and abroad as *uni*. California halibut are sold to local fish markets and restaurants; live halibut fetch a higher price than when they are sold whole or filleted (Tanaka 2011). Thornyheads can be found in local grocery stores and restaurants under the name ‘channel rockfish’ (Roberts and Stevens 2009).

<sup>2</sup> Data Source: NOAA Pacific Decadal Oscillation index.

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**Figure 3.4-1. Average annual commercial landings by weight from 2008 to 2013 in Santa Monica Bay.** MPAs took effect January 1, 2012. Santa Monica Bay includes fishing blocks 678, 679, 680, 681, 701, 702, 703, 704 (no data from 2008-2011), 719, 720, and 721. *Data Source: California Department of Fish and Wildlife Commercial Fisheries Information System, accessed July 2014.*

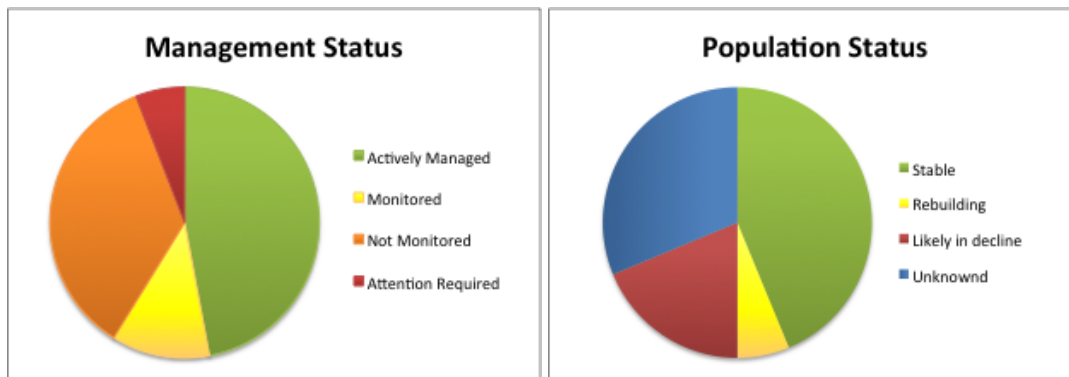


Interestingly, most of the top fisheries in Santa Monica Bay are managed by the State of California. These are market squid, spiny lobster, red sea urchins, rock crab (three species), sea cucumbers, California halibut, sea hares, and hagfish. The federal government manages thornyheads, pacific sardine, and the other coastal pelagic species. Market squid is part of the federal Coastal Pelagic Species fishery management plan, however the entire fishery occurs in California so the state manages this species.

Of these top fisheries, 16 species in total, eight have had recent stock assessments and are managed according to a fishery management plan (FMP) or have an FMP in process; two are monitored without a stock assessment (i.e. CPUE and length-weight composition of landings, all fishery-dependent data) and managed either according to a management plan or standalone management measures (i.e. size, gear, and season restrictions); six are managed in some way without any significant data collection (i.e. using seasons and gear restrictions); and one species requires attention in that despite restricting take to scientific collection, substantial numbers are caught commercially ([Figure 3.4-2](#)).

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**Figure 3.4-2. The status of management (left) and populations (right) for the top commercial fisheries in Santa Monica Bay from 2008-2013.** Actively Managed means management is informed by regular stock assessments. Monitored means management occurs, but without the aid of a stock assessment. Not Monitored means some management measures are in place, but data about the stock is not collected or analyzed. Action Required means that management and fishing activity are out of sync. *Data Sources: Ally, Miller & Wertz 2001; Hill et al. 2014; Kalvass et al. 2002; Lopuch 2008; Maunder et al. 2011; Neilson 2011; PFMC 2011; Parker 2002; Porzio & Brady 2006; Rogers-Bennett & Ono 2007; Stephens & Taylor 2013.*



All four of the federally managed species have had recent stock assessments and have FMPs. As a result, the stocks tend to be managed in a way so as to prevent overfishing on a collapsed stock and to encourage rebuilding. The recent management action in 2015, undertaken for the sardine fishery, provides an excellent example. Sardine populations are known to vary dramatically with environmental conditions; the annual stock assessment in advance of the 2015 season showed poorer recruitment than anticipated, so the fishery was closed to prevent overfishing.

Unfortunately, the state does not have the same resources to spend on fishery management that the federal government does. As a result, very few of the state-managed species have had stock assessments. Spiny lobster and California halibut are the only two that have, and while a spiny lobster management plan is under development, one for California halibut has not yet begun. A few more species are monitored, but many of the other important fisheries in Santa Monica Bay are not, and some, like sea hare, have very little data collected about them at all. Because of the lack of data, the state-managed fisheries are more prone to decline. In fact, all three of the top species in the Bay are likely in decline; moreover, all five of the species whose status are unknown, and three of the seven species identified as stable, are managed by the state ([Figure 3.4-2](#)).

Data used to make fishery management decisions are either fishery dependent or fishery independent. Fishery dependent data are acquired through fishing activities and speak to what is being caught by different sectors of the fishery. These data include the weight and species of fish caught and catch per unit effort, and can be used to determine the impact the fishery has on the population. Fishery independent data are data acquired from research activities, such as SCUBA surveys, research traps, and research trawl programs. These data can be used to determine the status of the fish population. Both types are needed for fishery management. However, because fishery independent data is more expensive to collect, it is not always available. In California, the California Department of Fish and Wildlife (CDFW) collects fishery

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dependent data from commercial fishermen, commercial passenger fishing vessels, and recreational fishermen. Most of these data are self-reported. While many reports are accurate, some are subject to human introduced error, such as lazily reporting the same fishing location regardless of where fishing was occurring, purposefully misreporting, or low response rates when responding is voluntary. In the case of the California Recreational Fishing Survey, this also includes mistrust of the surveyor, which can result in refusal to participate. Recreational data is particularly limited in that whole groups of fishermen (such as free divers) are frequently missed, and extrapolation of the small sample size can lead to misleading conclusions.

CDFW has been making progress on developing FMPs for priority stocks statewide, and the network of MPAs established on January 1, 2012 may help buffer against errors in fishery management (see Section 3.3.3 for more on MPAs). However, without reliable data on the life history of these species and the fisheries that target them, efforts to manage these populations will be frustrating at best. To this end, the Santa Monica Bay National Estuary Program supported an effort by the Marina del Rey Anglers to develop a citizen science tool for collecting and reporting "Essential Fishery Information" about California halibut in order to inform a planned revision the stock assessment for this species. More efforts like this are needed to ensure reliable streams of data to support effective fishery management.

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