

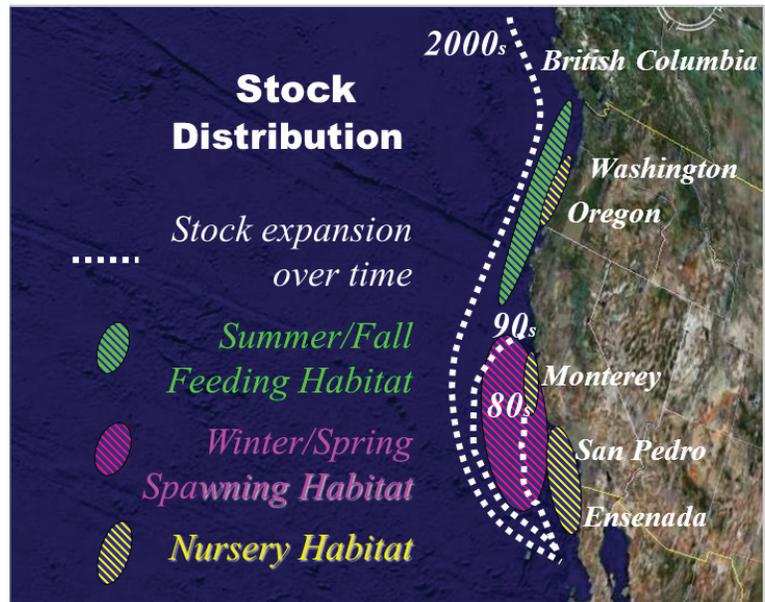
Overview of the Pacific Sardine Fishery



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Pacific sardine is subject to conservation and management under the Coastal Pelagic Species (CPS) Fishery Management Plan (FMP). Other species included in the FMP are northern anchovy, Pacific mackerel, jack mackerel, market squid, and krill (for which fishing is prohibited). Although the CPS fishery is a multi-species fishery, Pacific sardine is currently the primary finfish targeted by the U.S. west coast small purse seine/roundhaul fleet that makes up the harvesting segment of the CPS fishery.

The Pacific sardine fishery off the west coast of North America has been economically important since the early part of the 20th century. The Pacific sardine fishery developed in response to demand for food during World War I. Delivery of sardines to processing facilities (landings) increased from 1916 to 1936 and supported the largest fishery in the Western Hemisphere during the 1930s and 1940s. The fishery declined in the late 1940s and remained at extremely low/collapsed levels through the 1970s. In 1986, the State of California lifted an 18-year moratorium on sardine harvest on the basis of data indicating that the spawning biomass had returned to fishable levels. In January 2000, management authority for the U.S. Pacific sardine fishery was transferred to the Pacific Fishery Management Council when the CPS FMP was adopted. Around the same time that the FMP was being developed (the mid-1990s), the Pacific sardine stock expanded its range northward to the Pacific Northwest, prompting the start of state-managed fisheries off Oregon and Washington. A fishery for Pacific sardine has operated off Oregon and Washington since 1999.



Northern sub-stock of Pacific sardine expansion over time and its current distribution and habitat use.

Today the U.S. fishery consists of fishermen and processors generally located among six ports in three main fishing areas: southern California (San Pedro/Terminal Island and Ventura), central California (Monterey and Moss Landing), and Pacific Northwest (Astoria, Oregon, and Westport, Washington). Fishing takes place near these ports, with essentially no fishing taking place between San Francisco and the Columbia River/Astoria, Oregon. The northern and southern areas of this fishery have different temporal characteristics. Historically, Pacific sardine landings in the southern area have occurred throughout the year, with most landings occurring in the winter months (December–March), whereas landings into Oregon and Washington have occurred throughout the summer and into early fall. However, due to

restrictive harvest limits over the past few years, landings in both regions have been grouped toward the start of each fishery allocation period (see below for allocation period details).

Under the CPS FMP, the CPS fishery is administratively divided into a “limited entry” fishery (i.e., requiring federal permits in order to participate) south of 39°N latitude (i.e., Pt. Arena, California), and an “open access fishery” (i.e., not requiring federal permits) north of 39°N latitude. However, the states of Oregon and Washington both have specific restrictions limiting the number of vessels in their respective fisheries. The CPS limited entry fleet currently consists of 65 permits and 58 vessels. In Oregon and Washington, fishermen must have individual state harvest permits to fish for Pacific sardine, with each state capping the number of permits at 25. In 2011, 30 vessels participated in the federal limited entry program, and 17 and seven vessels participated in the Oregon and Washington programs, respectively.

The primary harvest target for the Pacific sardine fishery is based on the result of a harvest guideline (HG) formula specified in the FMP:

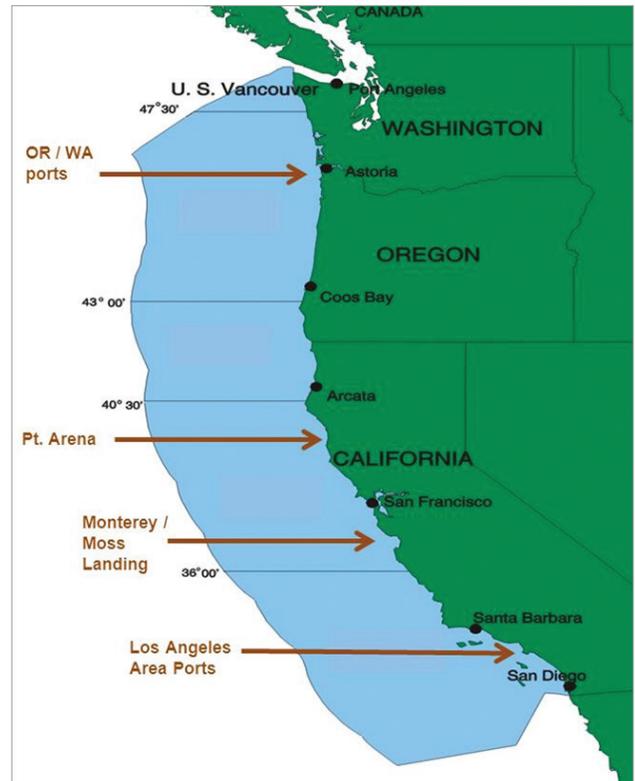
$$\text{HARVEST GUIDELINE} = (\text{BIOMASS} - \text{CUTOFF}) * \text{FRACTION} * \text{DISTRIBUTION}$$

- **BIOMASS:** The estimated stock biomass of Pacific sardine age one and above for the year.
- **CUTOFF:** The biomass level below which no commercial fishery is allowed. This level is defined as 150,000 mt in the FMP.
- **DISTRIBUTION:** The average portion of the Pacific sardine biomass estimated in the EEZ off the Pacific coast. The FMP as has set this at 87%.
- **FRACTION:** The harvest fraction is the percentage of the biomass above 150,000 mt that may be harvested. This value can vary between 5% and 15%.

Example: 2012 HG = (988,385 mt - 150,000 mt) x 15% x 87% = 109,409 mt

The intent of the HG formula is to protect the sardine resource from overharvest while allowing for fishing opportunity. It is designed to continuously reduce the exploitation rate as biomass declines and to allow for increased harvest potential if environmental conditions are favorable to recruitment of the species and biomass increases. Annual quotas (e.g., annual catch limits, harvest guidelines, etc.) for Pacific sardine are based on formulas incorporating current/annual biomass estimates. The Pacific sardine season begins on January 1 and ends on December 31 of each year. In 2006, the adoption of Amendment 11 to the CPS FMP established the current allocation scheme for the Pacific sardine HG:

- On January 1, 35 percent of the HG is allocated coastwide.
- On July 1, 40 percent of the HG, plus any portion not harvested during the initial allocation period, is reallocated coastwide.
- On September 15, the remaining 25 percent, plus any portion not harvested during earlier allocation periods, is reallocated.

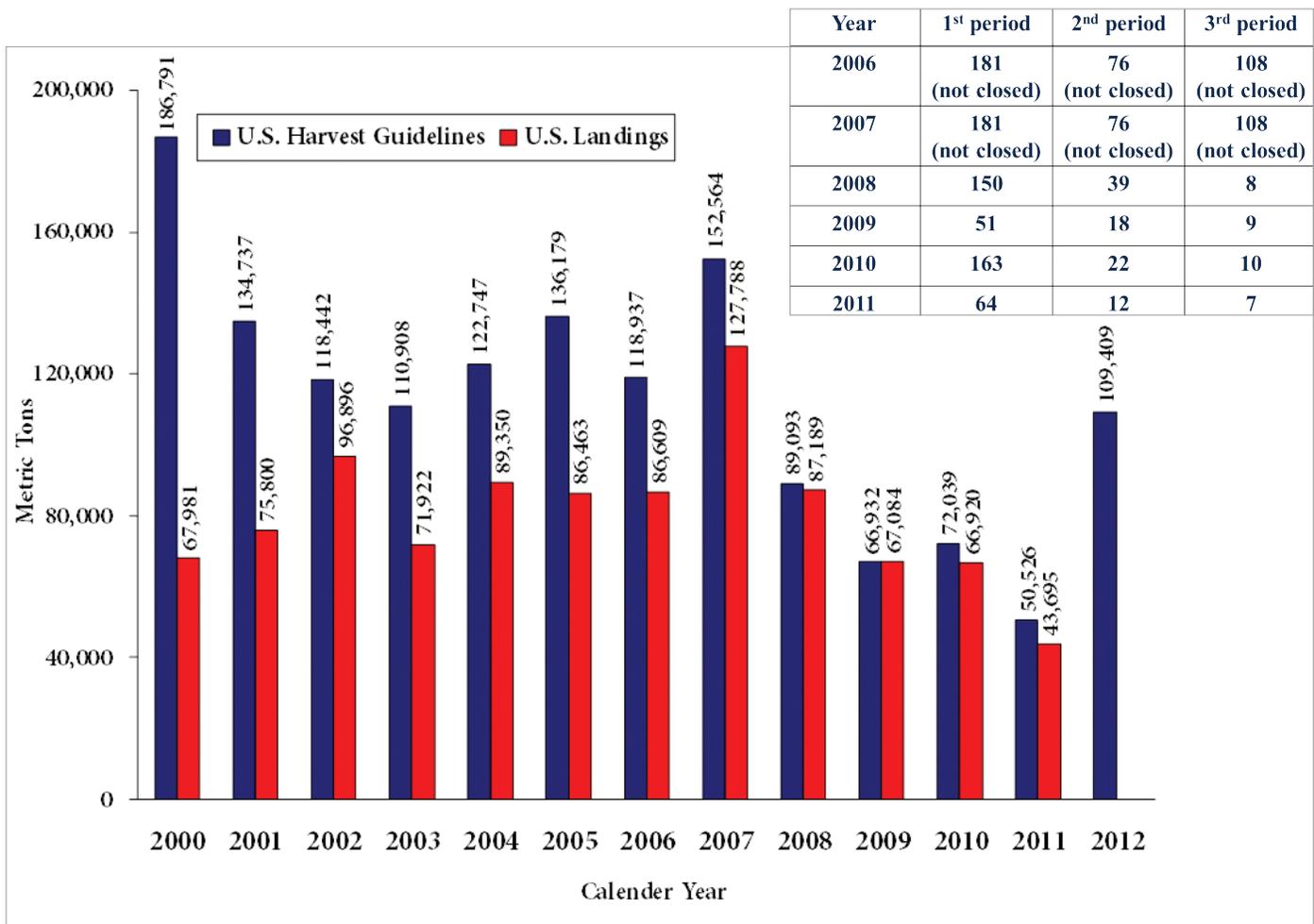


Main fishing areas and primary ports of the U.S. Pacific sardine industry.



Because the different fishing areas operate on very different schedules, these seasonal allocations were intended to help ensure that everyone received a reasonable fishing opportunity. This purely temporal/seasonal allocation scheme was a departure from the previous two allocation schemes that also included a spatial component, with the quota also being divided between the northern and southern areas of the fishery.

Between 2000 and 2008 the total annual harvest allocation (i.e., harvest guideline) averaged 130,000 mt with average annual landings, accumulated across the three main areas of the fishery, of approximately 87,000 mt. But because of reduced biomass estimates the annual HG averaged 63,000 mt between 2008 and 2011, and the fishery reached fully utilization. These reduced HGs led to very early closures in all three allocation periods, particularly in the second and third periods when the fishery reached their allocation totals in only 10 to 20 days.



The U.S. harvest guideline and landings of Pacific sardine for the years 2000-2012 (bottom) with the number of fishing days by allocation period for the years 2006-2011 (top right).