



Photo: Dungeness crab; DFW Environmental Scientist, C. Juhasz



NORTH COAST FISHERY SPOTLIGHT: DUNGENESS CRAB

The commercial Dungeness crab fishery is one of the oldest, most lucrative and iconic fisheries in the North Coast of California. Demand for Dungeness crab skyrocketed in the mid-1800s when people began to flock to the San Francisco Bay Area during the gold rush. The State Legislature has regulated most aspects of the commercial fishery since the late 1890s. While the Fish and Game Commission (FGC) has limited oversight over the commercial fishery, it does regulate the state's recreational fishery. The California Department of Fish and Wildlife (DFW) is responsible for the management of both the commercial and recreational fisheries.



Photo: Dungeness crab trap; DFW Environmental Scientist, C. Juhasz

COMMERCIAL REGULATIONS

- In 1897, the first Dungeness crab [commercial fishery regulation](#) passed by the Legislature prohibited the take and sale of female crabs.
- In the early 1900s, a season closure and size limit were both instituted, rounding out what is known as the "3-S principle"; sex, size, and season.
- In the mid-1990s, the Legislature enacted a limited entry permit system that restricted new permits from being created and has resulted in reducing the total number of vessels in the fishery over time as permits are lost to attrition.
- Since 1965, only male crabs greater than 15.9 centimeters (6.25 inches) across the widest part of their carapace may be commercially taken during non-mating and non-molting times of the year.

COMMERCIAL FISHERY MANAGEMENT

The California commercial fishery operates in waters from Morro Bay north to the Oregon border, and is split between central and northern management areas, demarcated by the Sonoma-Mendocino county line. The commercial season in the central management area opens November 15 and continues through June 30. In the northern management area, the season opens conditionally on December 1 and continues through July 15, provided the crab meat in post-molt males has adequately filled out in the newly formed shell. **If crab meat quality is not adequate, managers will delay the season opener until crabs are ready to harvest (see page 4 “Harmful Algal Blooms”).**

Management efforts to open the season in the northern management area are coordinated between California, Oregon, and Washington through the Coastal Dungeness Crab Tri-State Committee, overseen by the Pacific States Marine Fisheries Commission. **All three states carry out a crab meat quality test to ensure that crabs are ready for harvest by the target opening date, and will delay the season opener if they are not.** If season delays are imminent, a “fair start” statute dictates that a person who began fishing in another area may not harvest Dungeness crab within the northern management area until 30 days after the delayed season opens.

Dungeness crab are fished using baited traps, also called pots. Crabs enter the trap through one-way, wire tunnels that are wide enough to accommodate legal-sized males. **Traps must contain at least two escape ports to allow smaller females and sub-legal males to leave the trap.** Traps are equipped with a self-destruct device, in case the trap is lost, with the intention of giving the crabs a chance to escape.

A trap limit program was put in place starting in the 2013/14 season. With the goal of improving the long-term sustainability of the fishery, the overall trap effort by the fleet was capped at a maximum of 500 traps per-vessel per-season. **Vessels are permitted for a maximum allotment of traps based on their total California landings over a five-season window. The topmost tier allows for a maximum of 500 traps per-vessel per-season, with a maximum of 175 traps per-vessel per-season in the lowermost tier.** To comply with the trap limit program, fishermen are required to mark each trap buoy with a DFW-issued tag that identifies their vessel permit number.



Photo: Dungeness crab traps; DFW Environmental Scientist, C. J. Jones

In 2008, the legislature passed a statute mandating the formation of the Dungeness Crab Task Force (Task Force) as a grassroots, collaborative approach to managing the Dungeness crab fishery. The Ocean Protection Council administers the Task Force, which is composed of fishermen, crab processors, and non-voting representatives from state agencies and non-governmental organizations. The Task Force makes recommendations primarily on commercial management measures such as trap limits, harvest allocation, season opener changes, and fleet size reduction to help inform the Legislature’s Joint Committee on Fisheries and Aquaculture, the FGC, and DFW regarding management activities surrounding the [commercial and recreational fisheries.](#)

LANDINGS AND EX-VESSEL REVENUE

Reported landings for both the central and northern management areas have been recorded since the 1915/16 season. The northern management area generally yields greater landings than the central management area. Dungeness crab populations typically exhibit natural fluctuations in abundance, where they aggregate, and time of molting, due to shifts in oceanographic conditions. **The cyclical nature of crab populations, as well as changes in fishing effort, can drive variations in landings and ex-vessel revenue (price per pound paid to fishermen upon landing of catch) from season to season.**

DFW compiled and analyzed reported commercial receipt data from the 2005/06 commercial fishing season through the 2015/16 commercial seasons to examine fishery trends over time within the North Coast MPA region. The North Coast MPA region encompasses California's jurisdictional ocean waters (0-3 nautical miles [nm] from shore, including offshore rocks) from the California-Oregon border to Alder Creek near Point Arena in Mendocino County.

The North Coast MPA region experienced several notable events from the 2005/06 through the 2015/16 fishing seasons that demonstrate the cyclical nature of Dungeness crab populations described above. The 2005/06, 2011/12, and 2012/13 seasons all saw higher than usual catch, despite season opener delays due to soft-shell crab quality, with landings that totaled over 15 million pounds of crab each season (Figure 1). **Combined with higher than average median price-per-pound, the fishery earned \$29 million (2005/06), \$51 million (2011/12), and \$42 million (2012/13) in ex-vessel revenue.** Reported landings and ex-vessel revenue sharply decreased in the following three seasons, with 2015/16 reporting the lowest total landings since 2005 (Table 1) and revenue at less than \$12 million.

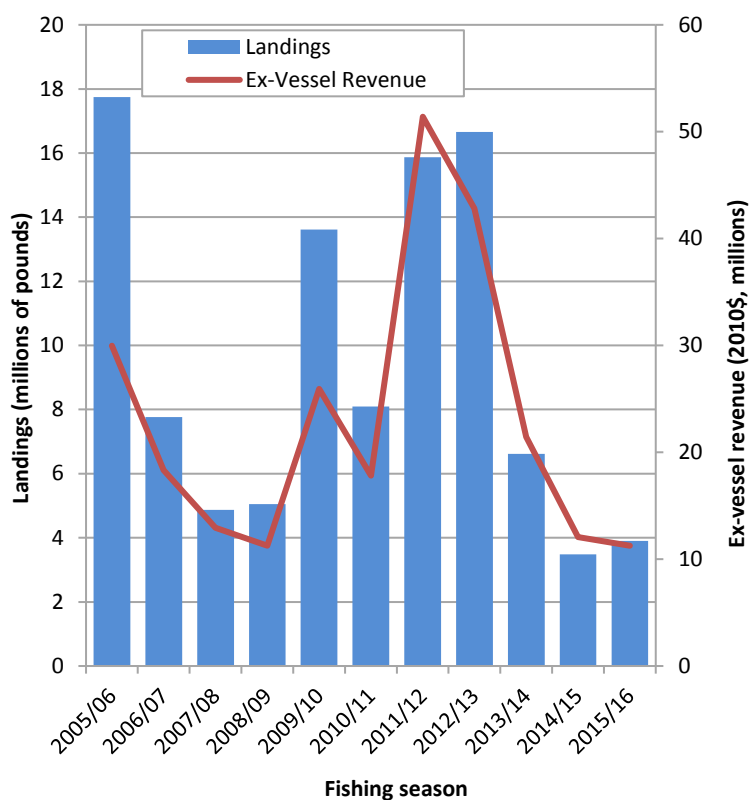


Figure 1. Total reported landings and ex-vessel revenue from 2005/06-2015/16 fishing seasons for the Dungeness crab commercial fishery caught in the North Coast MPA region. The 2005/06, 2011/12, and 2012/13 season starts were delayed due to soft-shell crab quality. The 2015/16 season opener was severely delayed due to dangerous domoic acid concentrations in crab. Data source (extracted June 2017): California Fisheries Information System.



Photo: Dungeness crab; DFW/Marine Applied Research and Exploration

TABLE 1. Reported Dungeness crab commercial total landings (number), landings by weight (pounds), price-per-pound (median), and ex-vessel revenue (2010\$) from seasons 2005/06 through 2015/16, within the North Coast MPA region. Data source (extracted June 2017): California Fisheries Information System.

SEASON	TOTAL LANDINGS	LANDINGS BY WEIGHT	PRICE-PER-POUND	EX-VESSEL REVENUE
2005/06	5,808	17,751,586	\$1.65	\$29,987,168
2006/07	4,645	7,773,917	\$2.20	\$18,323,449
2007/08	3,684	4,872,618	\$2.80	\$12,946,943
2008/09	3,991	5,054,109	\$2.50	\$11,263,584
2009/10	5,041	13,615,816	\$1.75	\$25,933,786
2010/11	4,616	8,092,853	\$2.40	\$17,826,525
2011/12	4,970	15,873,184	\$3.30	\$51,405,841
2012/13	5,451	16,669,218	\$2.85	\$42,814,065
2013/14	4,721	6,628,182	\$3.75	\$21,446,575
2014/15	2,816	3,484,745	\$4.50	\$12,079,821
2015/16	1,933	3,901,852	\$3.25	\$11,273,329

DID YOU KNOW?

Harmful Algal Blooms

An unusually persistent warm water mass deemed the “North Pacific Marine Heatwave” spread throughout much of the eastern Pacific Ocean from 2014 through 2016. Coupled with a strong El Niño in 2015, the heatwave led to a massive harmful algal bloom, which produced historic levels of a neurotoxin called domoic acid. Domoic acid enters the marine food web through filter feeding organisms like mussels and clams. The California Department of Public Health leads monitoring efforts for biotoxins in the marine environment, and detected dangerous levels of domoic acid built up in Dungeness crab meat and viscera prior to the 2015/16 season opener, deeming the crab unsafe for human consumption. As a result, the season was delayed in much of the state, and the season in the northern management area was only open from mid-May until mid-July. This marked the first delay in the fishery’s history caused by high domoic acid concentrations in crab. Researchers predict that harmful algal blooms in California waters may increase in both frequency and severity in a future facing climate change.

Fast Facts

- Dungeness crab are the most abundant crab in California
- They mate between February and June, and the male holds the female in an embrace up to seven days before mating
- Large females can produce up to two million eggs each year
- Dungeness crabs can live up to ten years
- They generally feed on clams and other soft sediment organisms
- It takes between three and five years for a crab to grow to the legal commercial take size of 6.25 inches



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DUNGENESS CRAB AND MARINE PROTECTED AREAS

Due to their economic and cultural importance to the state, Dungeness crab were identified as a species of interest during the design of California's statewide marine protected area (MPA) network. **Because Dungeness crabs are mobile throughout many of their life history stages, a single MPA may not benefit crab populations, but a network of MPAs that encompasses the many habitats Dungeness crabs utilize could.**

Larval crabs spend many months offshore in the pelagic environment until they settle into soft bottom habitats nearshore. Juvenile crabs often use eelgrass beds inside bays and estuaries as important nursery habitat, and typically migrate as adult crabs to sandy or muddy coastal habitats offshore. **Thirteen of the 20 North Coast MPAs contain soft bottom or estuarine habitat that could harbor and protect adult and juvenile Dungeness crab.**



Photo: Dungeness crab; DFW retiree, K. Joe

Acknowledgements

Author

Sara Worden, DFW, Marine Region
Sara.Worden@wildlife.ca.gov

Contributor

Christy Juhasz, DFW, Marine Region

Document Design

Amanda Van Diggelen, DFW, Marine Region

About this Document

This document provides supplemental information to the [North Coast State of the Region](#) report. The State of the Region report provides a synopsis of the ecological, biological, oceanographic, and socioeconomic conditions in the North Coast MPA region near the time of MPA implementation in December 2012.

Explore California's MPAs at CDFW's MPA webpage
<https://www.wildlife.ca.gov/Conservation/Marine/MPAs>