



## PACIFIC STATES MARINE FISHERIES COMMISSION

### DUNGENESS CRAB REPORT 2014

Dungeness crabs range from the eastern Aleutian Islands, Alaska, to perhaps Santa Barbara; however, the species is considered rare south of Point Conception. Temperature apparently determines the distribution, and the 38° to 65° F surface isotherms are considered the limits of the range. The geographic range of the species probably depends more on the restricted thermal tolerance range of larvae than of adults. Optimal temperatures for larval growth and development are 50° to 57° F.

This species has a preference for sandy to sandy-mud bottoms but may be found on almost any bottom type. Dungeness crabs may range from the intertidal zone to a depth of at least 750 feet, but are not abundant beyond 300 feet.

California Department of Fish and Wildlife (CDFW) surveys indicate the combined San Francisco and Fort Bragg populations are not as large as the population extending from Eureka into Oregon. Little or no intermixing occurs. Tagging studies have also demonstrated random movement by both sexes. At times, an inshore or offshore migration is observed, but most movement is restricted to less than 10 miles. Travel up to 100 miles has been noted for individual males, but female movements seem much more limited.

Female molting and mating occur from February through June. Male crabs are able to sense when females are about to molt (presumably through detection of pheromones released by females) and carry such females in a protective pre-mating embrace for several days until the molt. Hard shelled males then mate with the freshly molted, soft-shelled females. Sperm deposited by males are stored in a spermatheca inside the female. Fertilization of eggs takes place when internally-developing eggs are extruded between October and December.

Thereafter, eggs are carried beneath the abdominal flap of the female. The smallest females carry about 500,000 eggs and the largest from 1.5 to 2 million. Freshly molted females carry larger numbers of eggs than do gravid females that have missed a molt. "Skip-molt" females that have extruded eggs but have not molted recently must rely on stored sperm for fertilization of their eggs. Females may store viable sperm for at least 2.5 years. The eggs range in diameter from 0.016 to 0.024 inches and are bright

orange after extrusion, becoming progressively darker as they develop. Hatching occurs between November and February.

The newly hatched larvae pass through five zoeal and one megalops stage before metamorphosing into the adult form. Larval development is inversely related to water temperature, and in central California 105 to 125 days are required to complete the larval stages. Zoeae are hypothesized to complete the larval stages. Zoeae are hypothesized to have an offshore movement regulated by factors such as depth, temperature, salinity and ocean currents. They are found near the surface at night and as deep as 80 feet in daytime. Megalopae are transported to nearshore waters beginning in April. Metamorphosis occurs from April to June.

Growth is accomplished in steps through a series of discrete molts. Dungeness crabs of both sexes molt an average of six times during their first year and attain an average width of one inch. Six more molts are required to reach sexual maturity at the end of their second year, when they are approximately four inches across. Once maturity is reached, growth of females then slows as compared to males. Females molt at most once per year after reaching maturity and rarely exceed the legal size of males. Maximum female size is about seven inches. Male crabs usually molt twice during their third year and once per year thereafter. The average size of males three, four and five years of age is about six, seven and eight inches, respectively. Males may undergo a total of 16 molts during a lifetime, reaching a maximum size of nine inches and age of six to eight years.

Dungeness crabs are opportunistic feeders not limited by abundance or scarcity of a particular prey. Clams, fish, isopods and amphipods are preferred, and cannibalism is prevalent among all age groups. Predators on the various life stages of Dungeness crabs, especially pelagic larvae and small juveniles, include octopuses, larger crabs and as many as 28 species of fish, including Coho and Chinook salmon, flatfishes, lingcod, cabezon and various rockfish.

Although many crustacean fisheries throughout the world have been overexploited and are now at low abundance levels compared to historic levels, Dungeness crab populations off northern California, Oregon and Washington have produced landings that have fluctuated around a fairly stable long-term mean for more than 30 years.

### **About the Dungeness Crab Fishery:**

Dungeness crab have been landed commercially on the West Coast of the United States since 1848 when San Francisco fishermen began the fishery. The current foundation for regulation in the fishery, size, sex, and season was established 100 years ago. Crabbers of the early 1900's were limited to 6 inch and larger male crabs with a closed season in the fall. Flash forward to present day and West Coast Dungeness crab landings are stronger than anytime in history with regulations nearly identical to those in place in 1905. The Pacific Ocean fishery for Dungeness crab (Cancer Magister) is administered in the State waters of California, Oregon, and Washington and the exclusive economic zone adjacent to those States. A related tribal fishery is

conducted under court order (United States vs. Washington, D.C. No. CV–70-0913) in the ocean areas designated by regulation as trial ‘usual and accustomed’ (U&A) areas.

Conservation and management regulations are implemented and enforced by the three States and the tribal governments. These regulations include limits on the size and sex of crab that can be legally harvested, season opening and closing dates, and-in the case of tribal fisheries – areas and periods of time when harvesting is limited to tribal fishermen. All three States have enacted laws which limit entry into the crab fishery and which prohibit non-permitted vessels from landing crab in the State. A Memorandum of Agreement is in effect among the three States which require cooperation in setting size, sex, and season limits. Although the crab population is cyclical, substantial harvests have been sustained for decades. There is no evidence to demonstrate that management under State regulation has resulted in conservation problems for the Dungeness crab fishery.

Because a portion of the fishery occurs in the exclusive economic zone, the States are limited in their ability to enforce regulations against vessels registered under the laws of the other States. In 1996, the Congress provided the States of Washington, Oregon and California with interim authority to regulate the Dungeness crab fishery in the adjacent federal waters off each state. Vessels must obtain permits from these states before engaging in the fishery. The three States coordinate their activities through the Tri-State Dungeness Crab Commission, which is hosted by Pacific States Marine Fisheries Commission. The interim authority was enacted as section 112(d) of Public Law 104-27 (16 U.S.C. 185 note) in 1996. Interim authority was due to expire on October 1, 1999 but was extended for an additional 2 years under the provisions of Section 203 of P.L. 105-384, then extended for an additional 5 years to September 30, 2006 under the provisions of Section 624 of the FY 2002 Commerce, State, Justice Appropriations Act. The most recent extension was enacted as Section 302(e) of Public Law 109-479, the 2007 Amendments to the Magnuson-Stevens Fishery Conservation and Management Act. The Congressional decision to continue extending the delegated authority under the Act without significant change is largely based on the successful partnership between the National Marine Fisheries Service, tribal governments and the States of Oregon, Washington and California in managing a productive, sustainable fishery. Current authority is set to expire on September 30, 2016.

Continuation of the Dungeness State Management authority is necessary in the exclusive economic zone to maintain consistency and stability and ensure against loopholes to the conservation regime.

### **Harvest Methods:**

Crab pots are used for most all commercial crabbing. They are very similar to those used in the recreational fishery, but these pots are not just simple traps. Pots must conform to construction guidelines that efficiently minimize their impact.

Multiple crab pots are set in rows, each on an individual line. Pots are retrieved using hydraulic “crab blocks” which is essentially a power driven winch. An efficient crew can hoist and re-bait as many as 400 pots per day. Pots are predominantly set between 10 and 50 fathoms (60-300 feet) although Dungeness crab commonly occur from intertidal areas to 200 fathoms (1200 feet). Crabs are stored live in holds on boats that are filled with re-circulating sea water and are delivered every few days to fish processing plants.

**Biology of Harvest:**

Fishing seasons are built around the “3 S’s” size, sex and season.

**Size:** Crabs can be harvested commercially only when they reach a size of 6 ¼” carapace width. This assures that the crab will have at least one year of reproduction, but more than two.

**Sex:** Only male crabs are harvested. All females must be immediately released and are left to reproduce throughout their life span.

**Season:** The Commercial crab season generally starts December 1, and continues through August 14. Testing takes place each year before the season to assure crabs harvested average at least 25% meat content (23% North of Cascade head). Generally the range of meat content of Dungeness crab is 13-30%, depending on a combination of molt and reproductive timing which relate to environmental factors such as ocean conditions and food availability. Dungeness crab landings are naturally cyclical. Total production for the region averages 42.5 million pounds annually.

**The Market:**

The Dungeness Crab Fishery for 2014 was strong. As the table below shows, the total harvest of coastal Dungeness crab hit 53 million pounds this past season.

<b>West Coast Dungeness Crab</b>		
		<b>2014</b>
<b>Washington</b>	Pounds	21,800,000
	\$ Value	\$61,300,000
<b>Oregon</b>	Pounds	14,400,000
	\$ Value	\$50,200,000
<b>California</b>	Pounds	16,800,000
	\$ Value	\$58,300,000
<b>West Coast</b>	53,000,000	\$169,800,000

**Protocol changes** – A few changes to the Tri-State Pre-Season Testing Protocol were of testing schedules and procedures to help further ensure an organized opening to the commercial crab season on good quality crab. A summary of the Tri-State meeting and the revised preseason testing protocol can be found on PSMFC’s website at <http://www.psmfc.org/crab/>.

**Additional Sampling** – During the last four years of preseason testing Oregon has been conducting some additional sampling to help learn more about the fishery and Dungeness crab. Starting in 2010 they began sampling a subset of the pots fished in each test string to document the quantity and species composition of all the species caught in the pots, including female and sub-legal male Dungeness crab. Documentation of bycatch rates is a key component of all sustainable fisheries. Through this sampling we have sampled 668 pots measured 13,883 crab. Results of this sampling continue to indicate catch per unit effort (CPUE) of sub-legal male Dungeness crab is the highest of all the categories of bycatch, followed by female Dungeness crab, other invertebrates (sea stars, etc.) and fish species.

### **Oregon Dungeness crab Fishery Receives Marine Stewardship Council Sustainability Certification:**

The Oregon Dungeness crab fishery operating off the West Coast of the United States has earned Marine Stewardship Council (MSC) certification following independent assessment to the MSC standard for sustainable, well-managed fisheries. Products from the fishery will now be eligible to bear the blue MSC ecolabel.

In the course of the MSC assessment process, the fishery client worked with academic experts to produce improvements such as:

- An ongoing monitoring plan which includes measuring female fertilization and abundance rates to produce an estimate of an index of female abundance.
- An age-structured productivity model as a means to assess fishing effort and size limit, which, is used to estimate potential Target Reference Points.
- A proposed Limit Reference Point based on declining catch over time in successive generations, adjusting from a California value to one specific to Oregon.

Scientific Certification Systems was the certified for this assessment. During the assessment, the three principles of the MSC standard were evaluated in detail: the status of the fish stock, the impact of the fishery on the marine ecosystem and the management system overseeing the fishery.

**Credit to:**

California Department of Fish and Wildlife, California’s Living Marine Resources: A Status Report  
Oregon Dungeness Crab Commission  
ODFW Commercial Crab Fishing