



WDFW works to manage and restore Dungeness Crab in Washington waters



The Washington Department of Fish and Wildlife

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Dungeness crab have always been less abundant in South Puget Sound when compared to North Puget Sound, but starting in 2013 harvests began to decline at unusually high rates. Marine Area 13, southwest of the Tacoma Narrows, was particularly hit by the decline. Tribal and recreational crabbing peaked at 214,404 lbs. of Dungeness crab harvested in 2012 and then plummeted to just 8,679 lbs. in 2017.

By 2018, WDFW and Tribal co-managers made the difficult decision to close Marine Areas 11 and 13, encompassing Vashon Island and South Puget Sound. In theory, this closure protects Dungeness crab from harvest and allows populations time to recover before harvest is reinstated.

Managers still do not have a clear explanation for why Dungeness crab are faring poorly in these areas. Notably, the Dungeness crab population in the southern portion of Marine Area 12 (Hood Canal) is also struggling. WDFW shellfish biologists are monitoring the challenge and collecting data to inform decision-making regarding the upcoming 2020 recreational crabbing season.

The agency's work

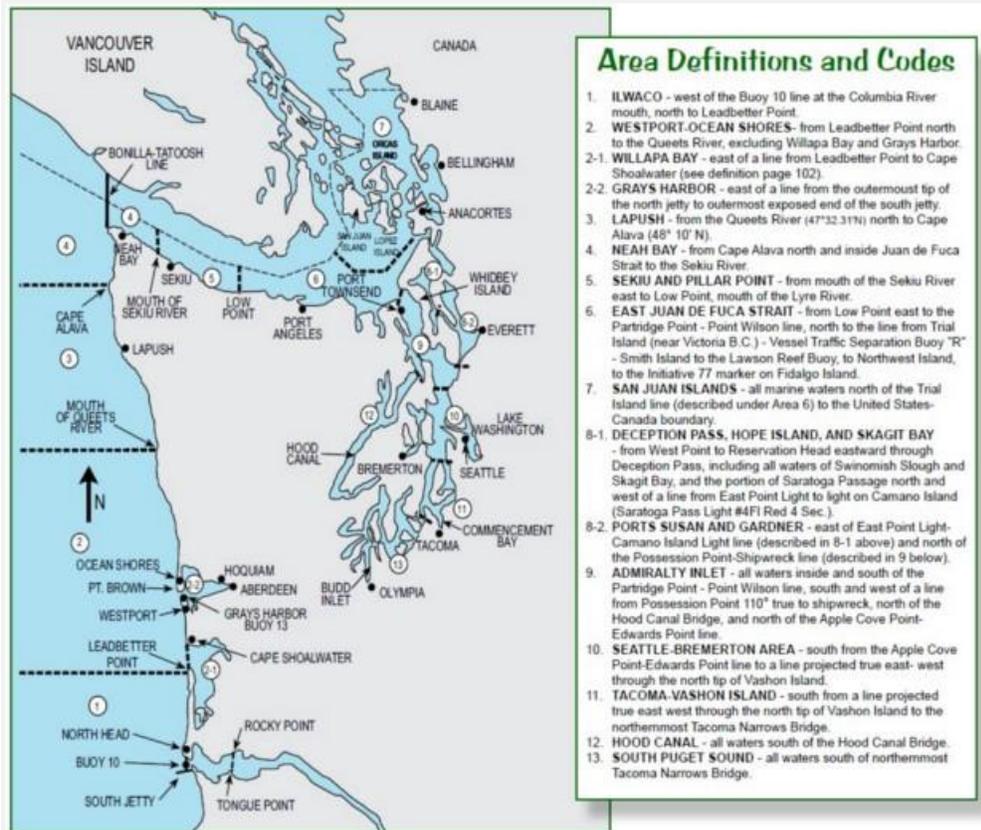
For Marine Areas with open fisheries, WDFW measures the status of Dungeness crab populations by summarizing Catch Record Card data from recreational crabbers along with catch data from

commercial crabbers. The State also conducts test fishing to measure the average density of adult crab in different areas of Puget Sound. Following the closure of South Sound to all harvest, test fishing has allowed State and Tribal managers to track natural changes in the density of crab without the confounding influence of any harvest.

What does test fishing look like?

To test fish an area, a team of shellfish biologists board a research vessel and set crab traps in strategic locations. The WDFW team uses modified commercial crab traps with the escape rings blocked to catch smaller adults and females. This allows for a broader survey of crab size and age that can provide clues into the health and future trajectory of a population. A healthy crab population should have plenty of males and females of all ages.

After setting crab traps, the team will return to check the traps 24 hours later and record the number, size, and species of male and female crab in each pot. They repeat these surveys over a span of several days, resetting their traps in new locations each day. Once they collect all the data, biologists analyze test fishing results and evaluate crab density, species diversity, and shell size. Test fishing conducted several years in a row helps infer whether a population is growing, shrinking, or remaining the same.



WDFW Marine Areas

WDFW has been test fishing Dungeness crab in South Puget Sound since 2015 in response to the declining harvests there. In 2018, results of pre-season test fishing in Marine Area 13 revealed an average density of 0.3 legal size male Dungeness per trap. For contrast, the healthy Whidbey Island fishery produces an average of 17–34 legal size males per trap. South Sound test fishing in 2019 revealed no significant improvement in that number, and Marine Areas 11 and 13 remained closed through the summer and winter.



Biologists work to monitor crab populations

Why are Dungeness crab populations in South Puget Sound so low?

Understanding where Dungeness crab populations are today requires considering a suite of factors that influence them throughout their unique life history. To reproduce, female Dungeness crab hold onto the fertilized eggs until they hatch and are released into the water. Once released, the newly hatched larvae are suspended in marine waters for approximately 120 days before they settle to the bottom. Before they settle, they are largely at the whim of the tides and currents. These new crabs may settle very close to or very far from where they actually emerged as larvae, depending on the circulation of marine waters.

Once settled and crawling around on the bottom, it takes approximately four years for an individual male Dungeness crab to grow from egg to a size that is legal to harvest. Current regulations allow male Dungeness crab at least one chance to mate before they reach the legal harvest size of 6 1/4 inches, but the rate of growth is not the only factor in crab life histories that come into play. Female Dungeness crab are able to store sperm from a mating up to 2.5 years and still produce fertilized egg masses. This means that a typical population of Dungeness crab is able to reproduce with a relatively small number of adult males, many of which are below harvest size.

In short, Dungeness crab populations should be resilient to harvest pressure given the reproductive characteristics of the species and the Size-Sex-Season management structure under which Dungeness fisheries are managed.

Considering some of these life history features, it is unlikely that the low density of crab observed in South Sound is simply due to too many adult males being removed before they could successfully mate. **Harvest pressure over the past decade is not the primary factor in the decline of Dungeness crab.**

If low numbers were simply a result of the harvest pressure, then closing the South Puget Sound fishery in 2018 should allow the population to naturally rebound over the course of a few years. However, if the population is not recovering on its own, there are

likely other environmental factors limiting Dungeness crab production.

Specifically, WDFW biologists are seeing evidence of less survival of larval crab to adulthood.

Factors that could contribute to this hypothesized explanation include the effects of changing ocean conditions — which may include warming surface waters, ocean acidification, pollutant levels, and hypoxia (insufficient oxygen) — upon the growth and survival of young Dungeness crab. These factors could make larval supply inconsistent, reduce survival of juveniles, or impair the reproductive capacity of the adults.

Test fishing conducted by WDFW and tribal biologists provides important data which can be used along with other environmental data to assess these theories and help determine if crab populations are recovering under the marine area closures. Unfortunately, initial results from test fishing in 2020 have revealed that Dungeness crab densities are still very low in MA 13.

When and how do we determine crab seasons?

The WDFW shellfish team collects data in February so that State and Tribal co-managers can meet throughout the spring to plan for the upcoming Puget Sound crabbing season. **The decision to open Marine Areas 11 and 13 will not be made until the**

late spring. Despite the need to take conservation action to potentially recover local populations of Dungeness crab, nobody wants these areas to remain closed. Under the current closure, recreational crabbers who live along South Puget Sound must travel to areas where Dungeness crab are more abundant such as Bainbridge Island, Whidbey Island, the San Juan Islands, and the Strait of Juan de Fuca. WDFW understands the inconvenience and costs to local crabbers.

2020 season outlook

At this point, shellfish managers are preparing for crabbing opportunities in central and northern Puget Sound, with the best prospects for Dungeness crab being in Marine Areas 7, 8–1, 8–2, and 9. Coastal crabbing opportunities are managed separately from Puget Sound.

Test fishing in South Puget Sound revealed a continued abundance of Red Rock crab in 2020. While it's tempting to ask whether Marine Areas 11 and 13 could support a Red Rock-only recreational crabbing season, there are significant management and enforcement limitations to this course of action. Specifically, a red-rock only fishery could lead to repeated handling and mortality of any Dungeness crab that remain.

Working together to meet challenges

Since the *US v. Washington* court decision in 1995 known as the Rafeedie Decision reaffirmed the right of Treaty Tribes to half of the shellfish in Washington state, WDFW and 17 Treaty Tribes coordinate equitable harvest of shellfish in the Treaty Tribes usual and accustomed areas. It is standard for the State and Tribes to work together when deciding to open or close an area for crabbing.

The Tribes, WDFW and many other partners all play a role in working to solve difficult challenges to restore healthy Dungeness crab populations to all parts of the Sound. The efforts to monitor and study Dungeness crab are important steps to continue to provide sustainable recreational, Tribal, and commercial opportunities now and in the future.

Special thanks to Keegan Curry, whose writing, research, visual communication, and interviewing skills are in evidence in this blog and in the linked video.