Dungeness Crab Status in Southern Puget Sound

Washington Fish and Wildlife Commission – Fish Committee

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Washington Department of FISH and WILDLIFE

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Discussion Outline

- Biology
- Managing by the 3 “S” system
- Population status in South Puget Sound
- Potential causes of South Puget Sound population status
- Management options

Dungeness Crab Life Cycle

Clasping pair
Female molt, April - June

"Berried female"
Autumn

Zoea stages
Winter/Spring

Megalopae
Spring/Summer

Juvenile
2 years, 12 molts

Adults, 3+ years
Annual molts

3 “S” Management of Dungeness Crab

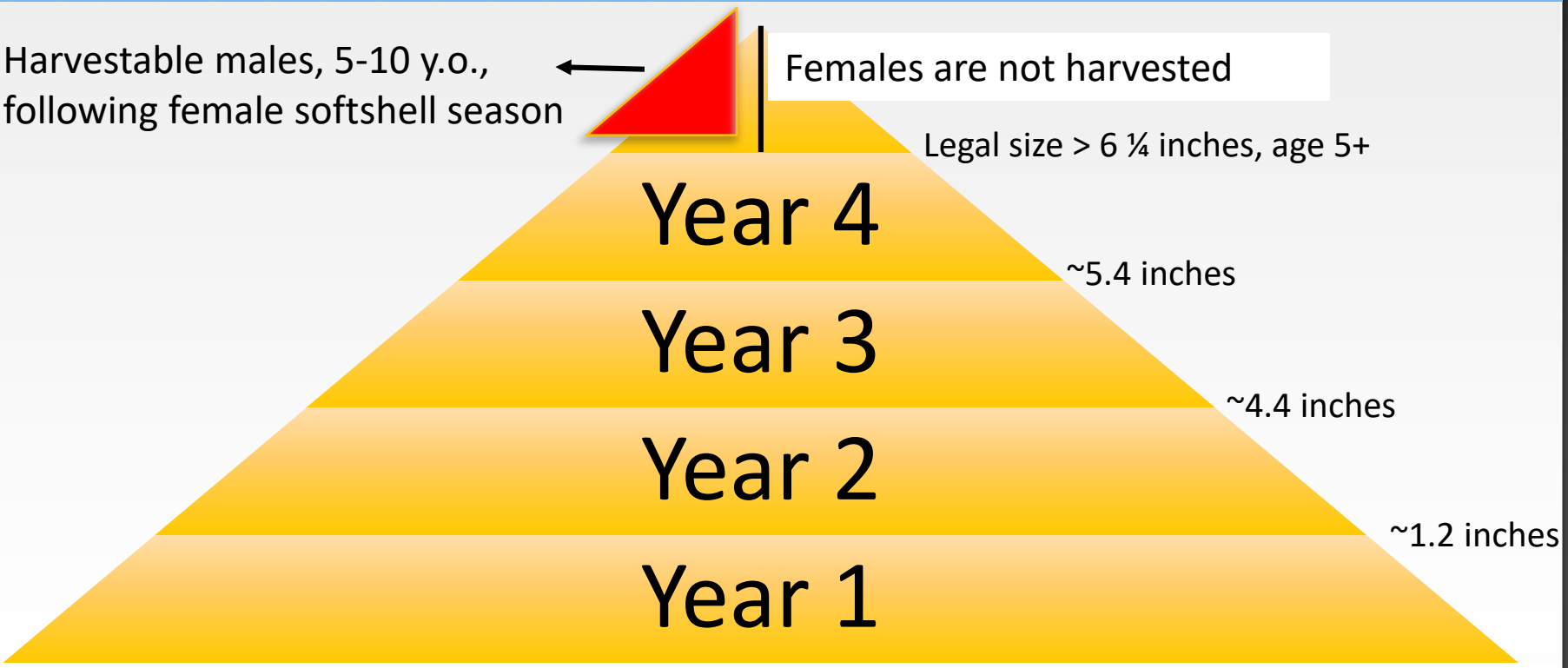
Size

Sex

Season

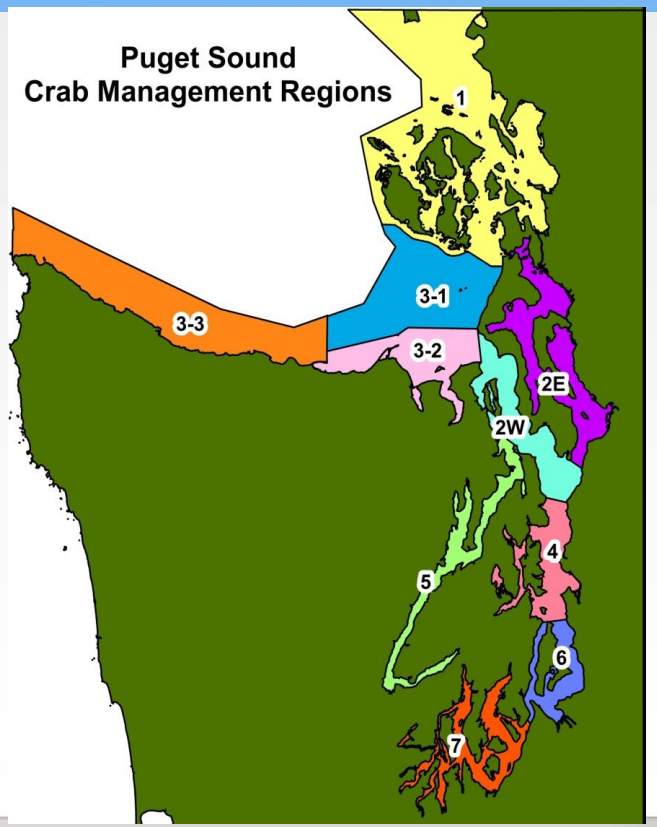
Closed during female molt April to June and most of male molt around September

Size and Age Structure of Dungeness Crab Population

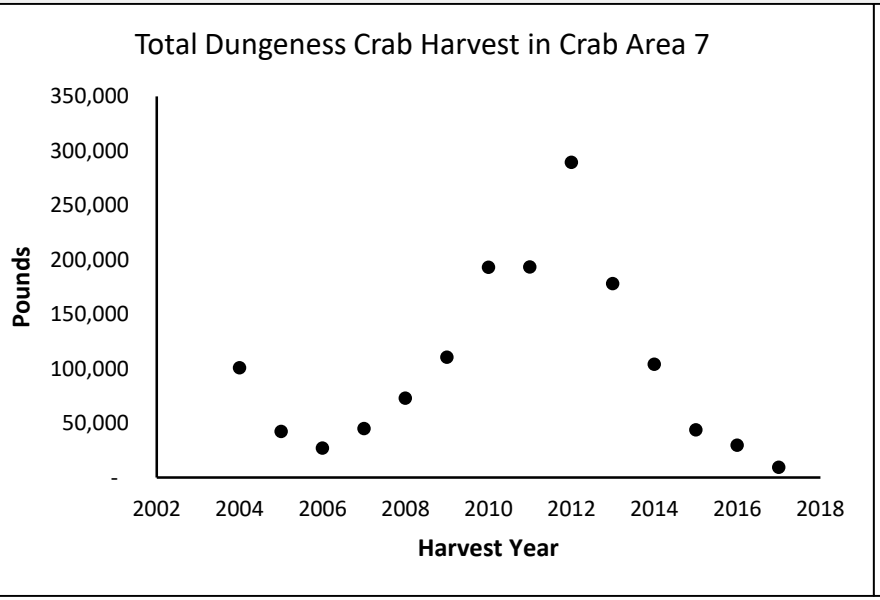


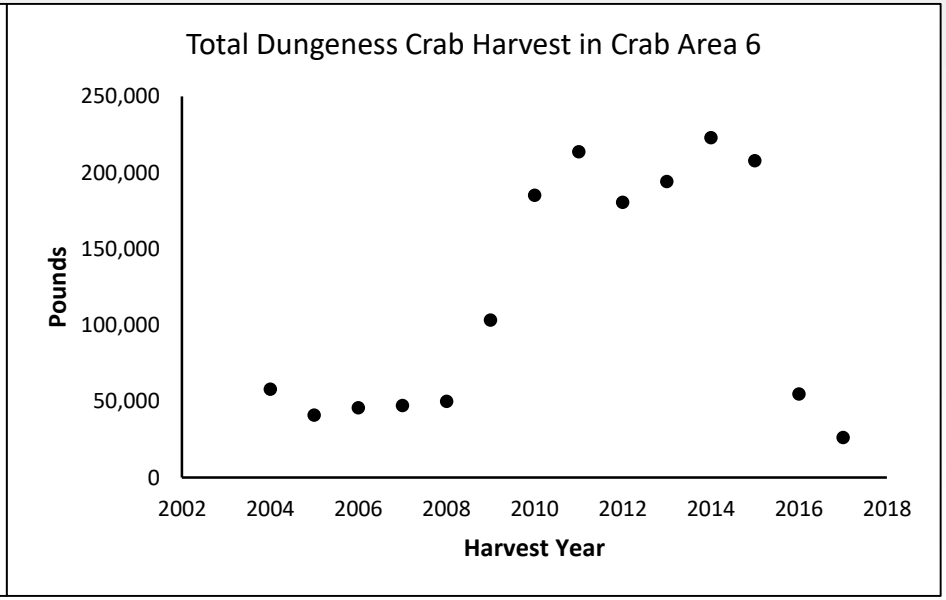
3-S Management Supports Robust Fisheries in Northern Puget Sound

Crab Region	2017-18 Harvest (lbs.)	Percent by Region
1	5,096,978	54.9
2	2,988,573	32.2
3	864,103	9.3
4	116,709	1.3
5	184,001	2.0
6	26,086	0.3
7	9,462	0.1
Total=	9,285,912	100.0

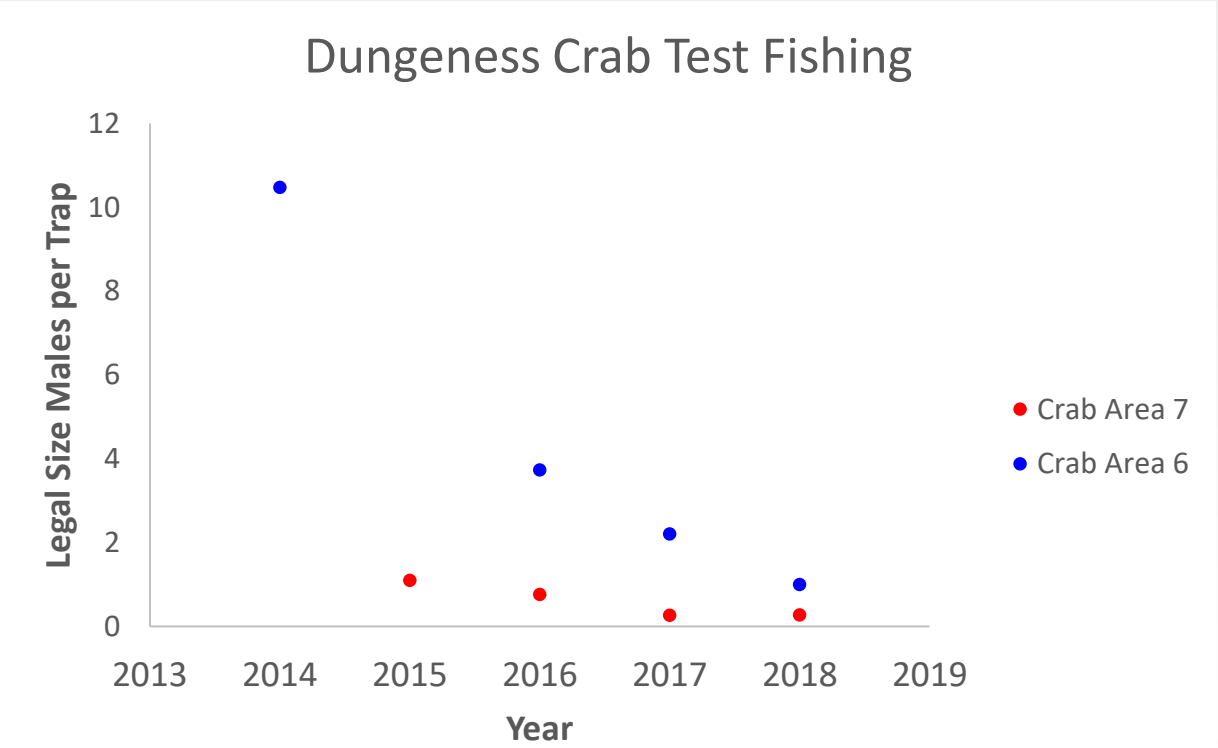


While Harvest Has Peaked and Declined in South Puget Sound

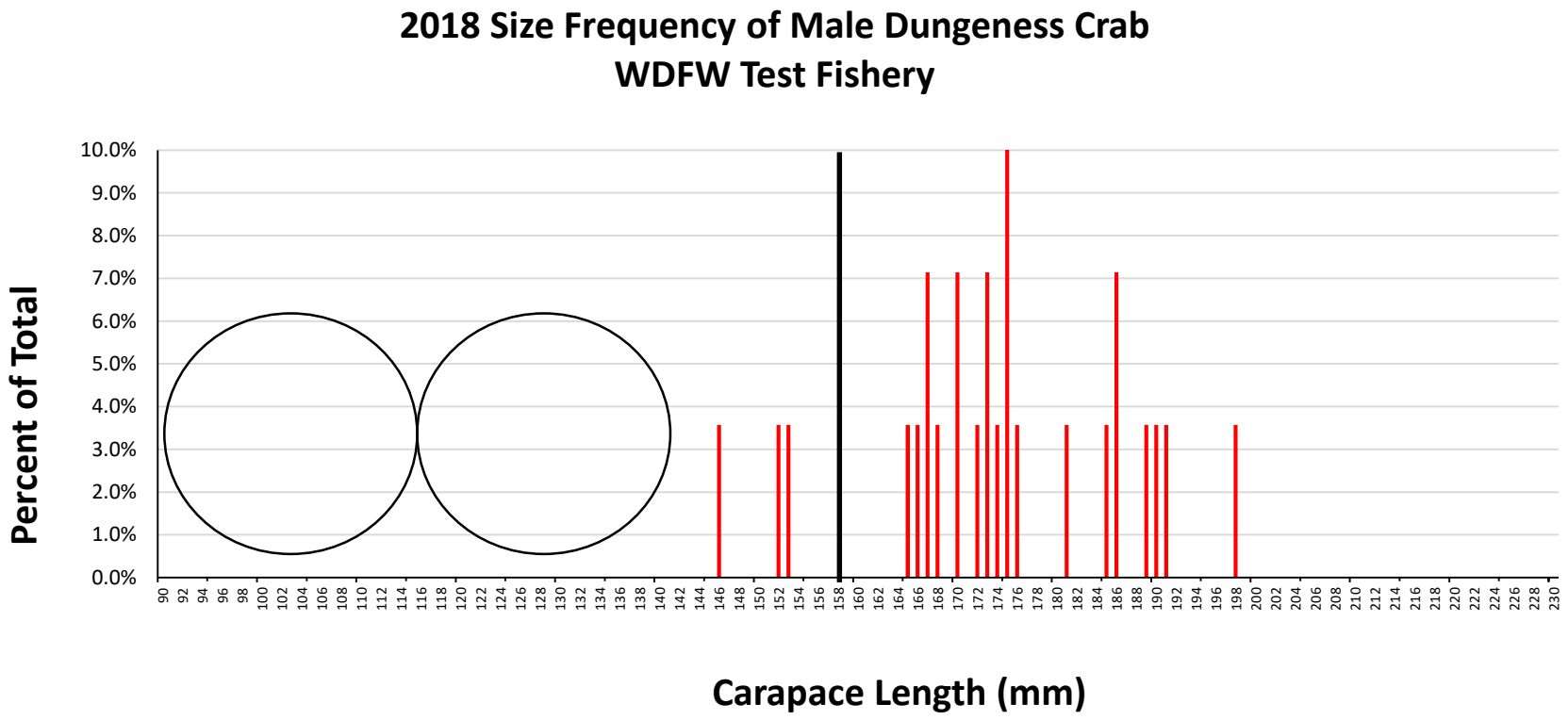




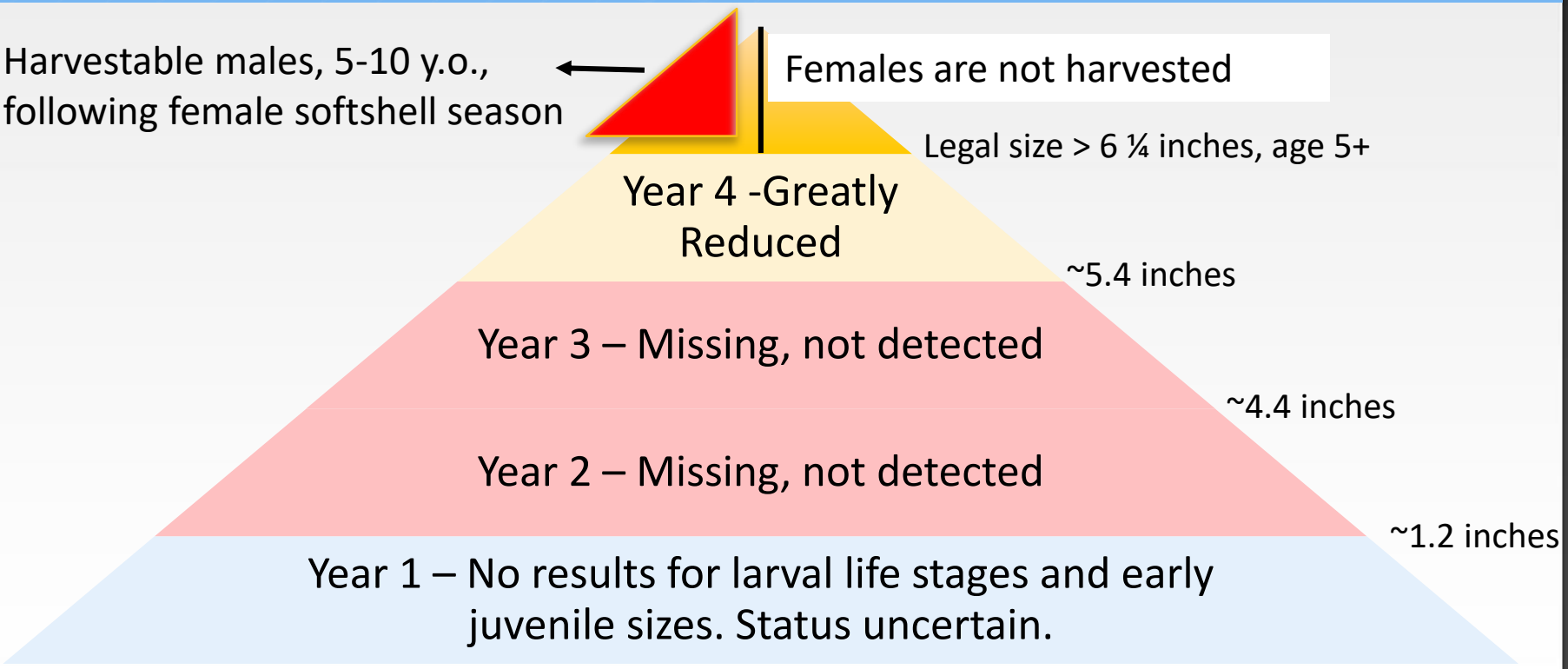
Test Fishing Provides Supporting Evidence of Declining Dungeness Crab in South Puget Sound



Lack of Dungeness Recruits in South Puget Sound



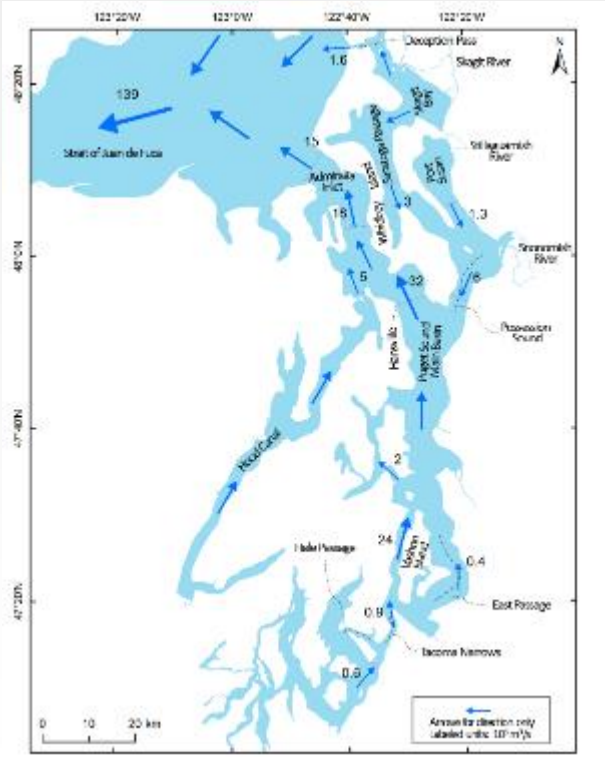
South Puget Sound Size Structure of Dungeness Crab Population

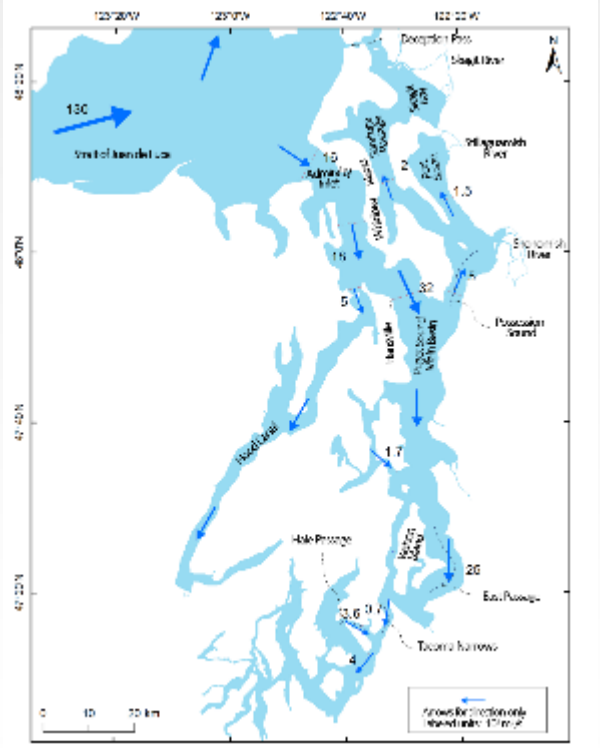


Potential Causes for Lack of Dungeness Crab Recruits in South Puget Sound

- Distant source of brood stock for larval production and inconsistent larval advection
- High temperature, low dissolved oxygen or ocean acidification
- Excessive harvest

South Puget Sound has restricted water flow South of the Tacoma Narrows





Climate Change – Increasing temperature, low dissolved oxygen and ocean acidification may be affecting current and future Dungeness crab health and survival

- P. Sean MacDonald (2018) of the University of Washington has shown that high temperatures observed in South Puget Sound in July and August severely affects juvenile Dungeness crab feeding behavior.
- Sulkin et al. (1996) suggests that temperatures exceeding 64.4 degrees F causes high mortality in newly settled juvenile Dungeness crab.
- DOE concluded that 2015 dissolved oxygen (DO) deficit for Puget Sound was high overall, compared to other years. Low DO is known to cause mortalities in numerous marine species.
- Paul McElhany (2016) of NOAA found that ocean acidic conditions foreseeable in the near future (pH 7.0-7.5), affect larval crab development and may have large ecological impacts to predators including Pacific herring and chinook salmon.

Harvest Effects on Dungeness crab populations

- The 3-S model of management was developed for open systems, such as coastal waters, where the effects of harvest are mitigated by regular larval production and recruitment. A confined system like South Puget Sound may need to incorporate a 4th metric, larval production and juvenile recruitment.
- Shellfish populations become stressed when critically low density levels are reached, and reproductive success is greatly diminished. This is known as an Allee Effect. For Dungeness crab extremely low density could affect successful mating.

Feedback from stakeholders

- Over the last two years, we have received numerous comments from the public-at-large about poor Dungeness crab harvest in South Puget Sound. All of these comments complained about the lack of crab and most recommend fishery closure in this region.
- On March 19, 2018 crustacean staff met with the Recreational Crab Advisory Committee, and members recognized the low abundance in South Puget Sound, agreed that harvest opportunity is significantly reduced, and realize fishery closure is a viable option.

Feedback from stakeholders

- Treaty co-managers are actively involved in assessing the fishery and recognize significant decline in abundance and harvest. On April 6, 2018 treaty managers distributed draft harvest plans that close commercial treaty harvest in Crab Areas 6 and 7. C&S harvest was reserved in draft harvest plans.

- WDFW crustacean staff met with the Commercial Crab Association on April 11, 2018 and shared South Puget Sound abundance data. The possibility of reduced quotas if the trend continued northward was discussed, as well as potential shifts of recreational effort and increasingly disproportionate harvest between recreational and commercial harvesters.

Management Options Under Consideration

1. **Close <u>both</u> the Dungeness and red rock crab (RRC) summer fisheries in South Puget Sound Crab Areas 6 and 7.**
2. **Close <u>only</u> the Dungeness crab summer fishery in South Puget Sound Crab Areas 6 and 7.**
3. **Reduce limits and seasons in South Puget Sound Crab Areas 6 and 7.**
4. **Do nothing.**