

**BRIGHTWATER CONVEYANCE FINAL DESIGN**

# **Eelgrass Program: 2008 Dungeness Crab Dive Survey Report**

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**Task 200 – Permitting**

**Subtask 202 - Outfall Support Services**

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*Rev 1*

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The purpose of this document is to provide brief context, methods, and results of the dive survey for Dungeness crab (*Cancer magister*) conducted by Grette Associates<sup>LLC</sup> in the Brightwater Marine Outfall Corridor (Corridor) on April 22, 2008. The crab survey was conducted based on methods contained within the “Dungeness Crab (*Cancer magister*) Diver Survey Methods,” submitted to the Washington Department of Fish and Wildlife (WDFW) and approved in April of 2008.

## Introduction

Nearshore construction of the Brightwater Marine Outfall trench, from the intertidal zone down to –80 ft MLLW, may cause mortality to Dungeness crabs that are entrained in the trenched sediments. Sheeted trench will be used to minimize such impacts to –30 ft MLLW. Although little information exists on the presence of crabs near the outfall alignment, impacts of construction in the Corridor area are not expected to exceed a width of 23 feet and, therefore, the trenching area is not expected to contain an abundance of Dungeness crab. The outfall trench will be 20 feet in width with a possible 1.5 feet impact area on either side of the sheeting. No crabs were observed in the vicinity of the Corridor during a King County DNRP geoduck survey conducted in 2002 and none were noted during a diver survey in September 2004. Qualitative observations by Grette Associates<sup>LLC</sup> divers during a 2006 eelgrass survey, in a study area surrounding the Corridor and an adjacent area, noted the presence of both Dungeness and red rock crabs. However, as it was not the focus of the study, it was not noted whether the observed crabs were within the outfall trenching area and estimates of density were not calculated.

As per previous agreement, King County plans to monetarily compensate WDFW, in the amount of \$20,000, for predicted adult Dungeness crab mortalities suffered during construction. This preconstruction, diver-based survey will provide an index of the density of adult Dungeness crab (3 cm and greater) present within the Corridor. If the monetary value of this density is less than \$20,000, King County is to provide the remaining funds to WDFW to conduct shellfish studies to gain information that is currently lacking for Dungeness crab and/or spot prawns. In the event more Dungeness crabs than expected are encountered during the survey, and the calculated monetary value exceeds \$20,000, King County is to compensate WDFW for the full amount. The monetary value of the crab densities will be based upon the current ex-vessel price of crab (i.e., ex-vessel price x weight x number of crabs lost). If a high number of gravid females are encountered during the preconstruction survey, compensation will be based on estimated % survival rates from larvae to adult using “Best Available Science.”

# Survey Methods

Due to constraints associated with diving to the depths necessary to reach the terminus of the Outfall Corridor (−80 ft MLLW = upwards of 90+ feet actual depth, depending on the tide), Grette Associates<sup>LLC</sup> surveyed the Corridor via two 6-foot wide belt-transects spanning 0 feet MLLW to −80 feet MLLW, a length of approximately 500 feet (Figure 1), providing complete survey coverage of 52 percent of the Corridor. An index of adult crab density (3 cm carapace width or greater) was tabulated based on a survey area coverage of 12-feet wide and 500-feet long (6000 ft<sup>2</sup>).

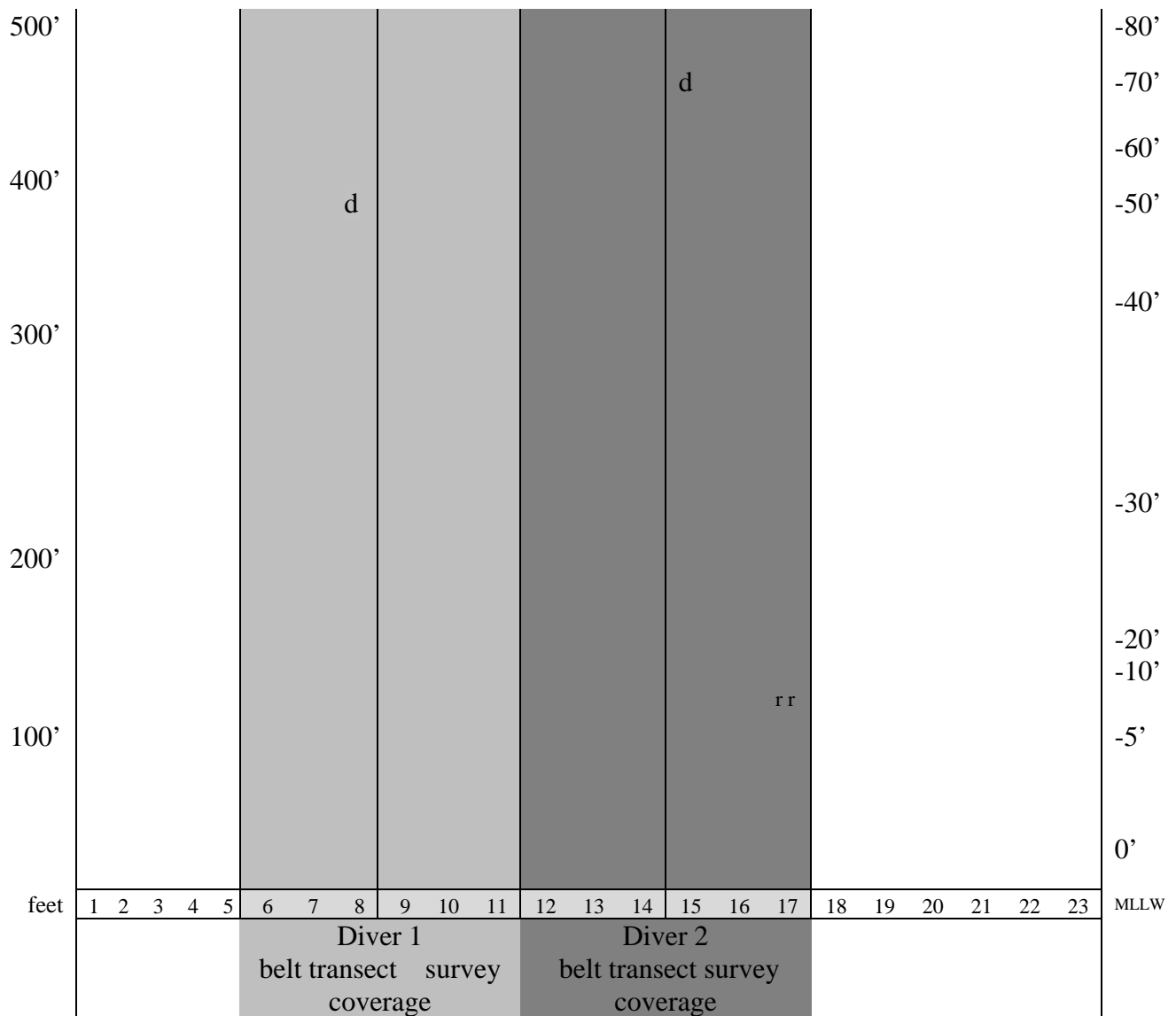
For the survey, two divers established the transect lines by extending tapes from 0 ft to −80 ft MLLW based on a compass heading determined from the alignment of the existing Corridor. The divers then returned simultaneously along the two transects (6 feet apart) from −80 ft to 0 ft MLLW while surveying the sediment surface 3 feet to either side of their respective transect. Divers carefully searched among eelgrass and macroalgae present and scrutinized open patches of sand for irregularities in the sediment surface or protruding eyestalks signifying the presence of a buried crab (Taggart et al. 2004). Divers carried a measuring device (e.g., ruler or graduated piece of PVC) to facilitate carapace width estimations. Care was taken not to double-count crabs that moved from one side of the transect line to the other, or moved ahead and resettled along the transect line. The presence/absence of any gravid females was noted during the survey, as was the presence of the red rock crab, *Cancer productus*.

## Results

During the diver survey conducted on April 22, 2008, underwater visibility was approximately 20 ft. Sediment within the boundaries of the Corridor was composed of silty sand from −80 ft to −15 ft MLLW and fine sand above this elevation. A gradual slope from −80 ft to −40 ft MLLW was observed, with a bench from −40 ft to −26 ft MLLW, and then a slope similar in gradient from −26 to −10 MLLW. Between −10 and 0 MLLW a very gradual incline occurred for approximately 80 ft in length. The general environment of each elevation was characterized as follows (for more details concerning macroalgae cover at depth, see Appendix A): −80 ft to −46 ft MLLW was characterized by sparse detritus, few anemones, hermit crabs, flounder and sea stars. −46 ft to −26 ft MLLW was characterized by dense detritus, unattached macroalgae and eelgrass. −26 ft to −15 ft MLLW was characterized by sparse detritus. −15 ft to −0 ft MLLW was characterized by bare patches with intermittent attached macroalgae and eelgrass.

Two adult female Dungeness crabs and two adult red rock crabs were observed along the length of the two transects. One female Dungeness (approx. 7" carapace width) was observed at −71 ft, another (approx. 8" carapace width) at −50 ft, and a mating pair of red rock crabs was observed at −7 ft MLLW depth (male approx. 7", female approx. 5" carapace width) (Figure 1). Based on

data collected in the 6000 ft<sup>2</sup> survey area, the overall density of adult Dungeness crabs per ft<sup>2</sup> was 0.00033. No females were gravid.



**Figure 1. Dungeness crab density at the Marine Outfall Corridor Survey Area. Each Dungeness crab is represented by a 'd' and each red rock crab by a 'r.' Feet MLLW is noted on the right y-axis. Approximate transect length in feet is noted on the left y-axis. Corridor width in feet is noted on the x-axis.**

## Discussion

Two Dungeness and two red rock crabs were found in the Brightwater Marine Outfall Corridor Survey Area. As stated in the “Dungeness Crab (*Cancer magister*) Diver Survey Methods,” the monetary value of the Dungeness crab density for this site is based upon the current ex-vessel price of crab (i.e., ex-vessel price x weight x number of crabs lost). In this case, the monetary value of crabs misplaced by the Marine Outfall Corridor construction effort is significantly less than \$20,000. As stated previously, King County is to monetarily compensate WDFW for predicted adult Dungeness crab mortalities suffered during construction. Since the monetary value of the observed density is less than \$20,000, King County is advised to provide funds to WDFW to conduct shellfish studies to gain information that is currently lacking for Dungeness crab and/or spot prawns.

## Literature Cited

Taggart, S. J., O’Clair, C.E., Shirley, T.C., and Mondragon, J., 2004. Estimating Dungeness crab (*Cancer magister*) abundance: crab pots and dive transects compared. Fisheries Bulletin. 102: 488-497.