# Appendix 7: Draft Dataset description – DNR COSTR and AQRES

# Puget Sound Vital Signs
# Floating kelp canopy area indicator: dataset description

Department of Natural Resources' air photo-based monitoring of the open coast, Strait of Juan de Fuca and Aquatic Reserves (DNR-COSTR and AQRES)

Last updated: May 23, 2022

## 1. Introduction

In 2020, the Puget Sound Partnership added a new *floating kelp canopy area* indicator to the Puget Sound Vital Signs, in recognition that kelp forests are foundations for diverse and productive ecosystems. The indicator fills gaps in scientific information about the condition of floating kelp canopies. It also serves as a communications tool for sharing information with the public.

*Floating kelp canopy area* indicator results will be available on Puget Sound Info – Vital Signs in June 2023. Detailed indicator information will be available on the Puget Sound Floating Kelp Hub Site.

Summarized indicator results will be presented on the web sites in a format targeted for broad audiences. In addition, three types of technical documents describe the indicator in detail: (1) indicator assessment procedures, (2) sub-basin reports, (3) dataset descriptions which can be found on the Puget Sound Floating Kelp Hub Site.

The purpose of dataset descriptions is to provide key information about datasets that are synthesized in the floating kelp canopy area indicator, including considerations related to dataset integration. Dataset descriptions are not meant to replace detailed metadata, which is available directly from the data owners/maintainers (links below).

This document describes the Washington Department of Natural Resources long-term monitoring of floating kelp canopies along Washington's open coast, Strait of Juan de Fuca and Aquatic Reserves using aerial photography (Fig. 1).

# 2. Dataset description

## 2.1 Summary

DNR's long-term monitoring along the Open Coast and Strait of Juan de Fuca (COSTR) has conducted annual aerial photography-based surveys since 1989 (except 1993) during late summer, the season of maximum floating kelp extent in the study area. Starting in 2011, these methods were expanded to include annual surveys of DNR's Aquatic Reserves with substantial floating kelp resources: Smith and Minor Island, Cypress Island and Cherry Point. (The Protection Island Aquatic Reserve is included in the COSTR monitoring area).

## 2.2 Description

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|---|---|
| Spatial Extent: | Open coast and the Strait of Juan de Fuca to Point Wilson, Port Townsend (COSTR).<br><br>DNR's northern Aquatic Reserves (AR): Smith and Minor Island AR, Cypress Island AR, Cherry Point AR (AQRES). Note: Protection Island AR is included in the COSTR dataset. |
| Metric(s) | Bed (polygons), tabular data summarizing canopy area, bed area, relative density. In COSTR, estimates are sub-divided into giant kelp and bull kelp. In AQRES, only bull kelp is present. |
| Assessment Units | Comprehensive within study area |
| Survey years | 1989-2021 (COSTR), 2011-2021 (AQRES) |
| Frequency | annual |
| Methods summary | Near-vertical low-tide color-infrared imagery is collected from a fixed wing platform during late summer. Imagery is projected onto 1:12,000 paper maps and kelp canopies are hand-delineated. Bed area is estimated by buffering canopy data with a 20 m radius of association.<br><br>The hand-delineated paper canopy maps are scanned. Then tabular estimates of canopy area and bed area are produced and summarized at the scale of map indices (stretches of shoreline defined by geomorphic features such as headlands). |
| Access | All survey data is maintained by the Nearshore Habitat Program, in the Washington Department of Natural Resources (nearshore@dnr.wa.gov).<br><br>Kelp monitoring results and spatial/tabular data are available from: https://www.dnr.wa.gov/programs-and-services/aquatics/aquatic-science/kelp-monitoring |

## 2.3 Considerations for integration in the Floating Kelp Canopy indicator

A primary strength of the COSTR and AQRES datasets the methodological consistency over a long time period. A related weakness is that the methods have not been updated with technological advances in spatial data collection and processing. In the currently distributed dataset, the most accurate and precise data are the tabular estimates of canopy area, bed area and relative density index (RDI), summarized by zone (also called map index). The spatial data (bed polygons) are generalized features, and some differences in the spatial features among years reflect changes in spatial processing technology over the past 3 decades rather than real changes.

Two major enhancements to the dataset are recommended, if funding permits:

- Upgrade imagery collection procedures to use a large format photogrammetric mapping camera system and 4- band imagery. Process imagery to orthomosaics.
- Explore ability to re-process existing survey data so that floating kelp abundance can be assessed at spatial scales finer than zones (also called map indexes).

## 2.4 References

Van Wagenen, R.F. (2015). *Washington Coastal Kelp Resources: Port Townsend to the Columbia River. Summer 2014.* Nearshore Habitat Program, Washington State Department of Natural Resources.
https://www.dnr.wa.gov/publications/aqr_nrsh_vanwagenen_2015_kelp_tables.pdf