

COUNTY: Island

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PROJECT TITLE: Island County Marine Resources Committee Operations and Projects

TASK NUMBER: 2.6 - Summary report on year two bull kelp monitoring activities

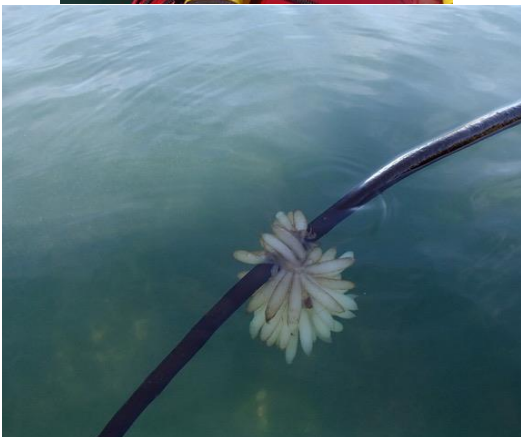
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Bull Kelp Monitoring in Island County, 2021 Island County Marine Resources Committee



Clockwise, from upper left: Heading out at Lowell Point (E. Thoreen). Kelp crab at Ebey's Landing (L. Rhodes).
Gayle Austin and Barbara Bennett at Possession Point (R. Beier).
Squid eggs on kelp stipe at Possession Point (R. Beier).

Report submitted in partial fulfillment of WA Department of Ecology grant SEANWS-2019-IsCoPH-00005, Task 2.2 (Monitoring: Kelp)

Project period: October 2020 – September 2021

Report date: October 8, 2021

Project leads: Ron Beier, Hannah Liss (MRC)

Summary and Observations for 2021

- Hoypus Point was added as a survey location.

- All beds from 2020 were fully surveyed in 2021.
- New program and MRC leads transitioned in.
- 18 volunteers reported 159 hours for this project.
- Temperature logging for multiple depths was conducted at select sites.

Introduction

Kelp forests represent significant habitat for a wide variety of invertebrate and vertebrate animals, and have influence on and are influenced by other submerged aquatic vegetation. In addition to providing structural habitat, primary productivities are very high and they are a significant store of carbon, ultimately distributing that to deep and nearshore environments. In Washington State, two species of kelp are dominant: giant kelp (*Macrocystis integrifolia*) and bull kelp (*Nereocystis luetkeana*). While both species occur along Washington's outer coast and coastal Strait of Juan de Fuca, bull kelp is the species found along shorelines of the inner Salish Sea.

Bull kelp is intertwined with Salish Sea ecosystems, native culture, fishing, and recreation. It is the most visible and charismatic of the regional algae and has been subject of multiple environment and human interest stories. A recent example ([An Amazon Rainforest of the sea fights for survival beneath Puget Sound](#)) underscores the importance of this work.

Following a state-wide moratorium of commercial harvest of wild kelp and seaweeds in 1988, Washington State Department of Natural Resources (WDNR) initiated annual aerial surveys of coastal aquatic vegetation from Port Townsend Bay to the Columbia River. These surveys have continued for nearly every year, and in 2010, surveys were extended to include the resources of the Smith and Minor Island Aquatic Reserve (SMIAR), which is contained entirely within Island County. In the latest analysis of coastal kelp from 2013 to 2014 (excluding SMIAR), decline in planimeter area of bull kelp around Port Townsend was ~14%, and range-wide decline in planimeter area of both kelps was 38% (Van Wagenen 2015).

Focused *in situ* surveys of bull kelp beds in South Puget Sound have uncovered disturbing trends of progressive shrinkage of bed areas (Berry, 2017; Berry, 2019). In addition to loss of canopy area, maximum depth for beds decreased and condition of individual kelp appeared poor, with an abundance of epiphytes, endophytes, and kelp crab. Whether these disturbing patterns occur in other parts of Puget Sound is unknown, but does raise concerns about the status of bull kelp throughout the region.

The earliest comprehensive evaluation of kelp resources was conducted in 1911, where over half of the total tonnage of bull kelp in the American portion of the Salish Sea was estimated to be located within the jurisdiction of modern Island County (Rigg 1915). Uncertainty about the distribution of bull kelp in areas not monitored by WDNR overlaid by anticipated changes in marine conditions attributable to climate are motivations to conduct

an inventory and assessment of this resource in Island County. The Island County Marine Resources Committee (MRC) considered this an important activity to conduct under its sponsorship. Efforts were initiated in 2015 to select kelp beds and test a kayak-based survey protocol. Those efforts were expanded in 2016 and have continued through 2021.

Scope and Objectives

This report describes the project for fiscal year 2021. Surveys occur from June through September. Due to the co-incidence of the end of the field season and the report deadline, not all of the 2021 data is included in this report.

Objectives for 2021 included:

1. Add a new site (Hoypus Point) to improve geographic coverage.
2. Collect data from previously surveyed kelp beds by boat-based surveys to extend historical observations.
3. Transition to a new program lead and orientation of new volunteers.
4. Utilize temperature loggers for measuring temperatures at multiple depths.

Project Progress

Addition of Hoypus Point to increase coverage

Bull kelp is distributed widely in Island County (Figure 1) with most on the West side of Whidbey Island.

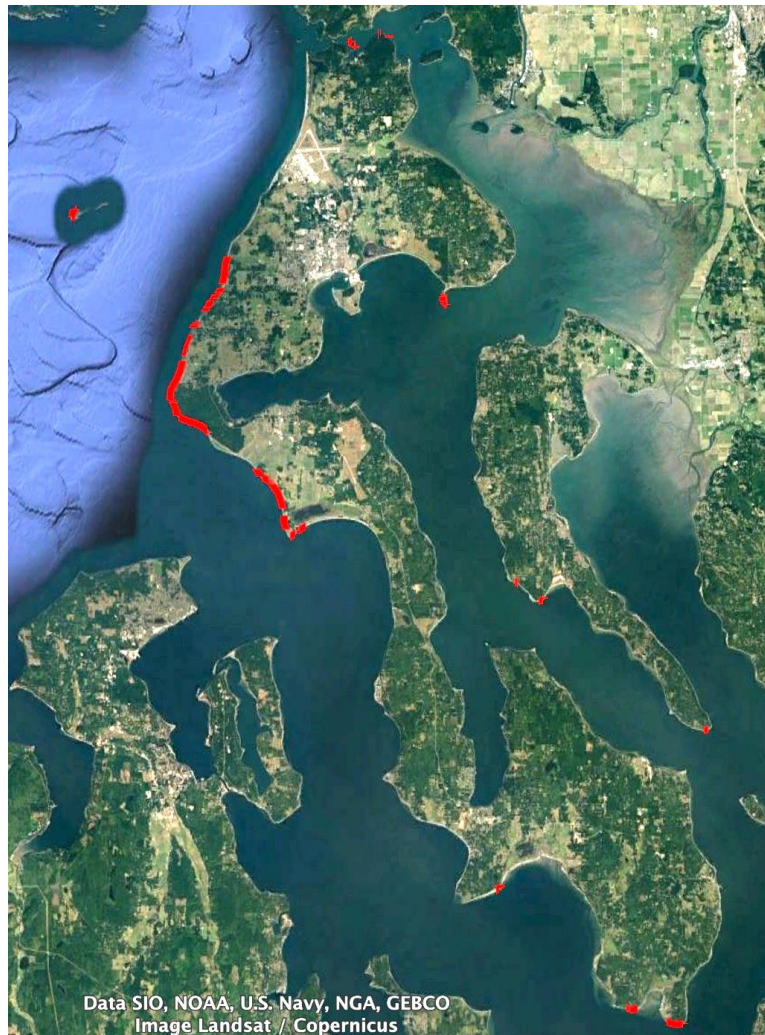


Figure 1. Map of Island County with associated bull kelp beds (highlighted in red) in 2019.

In 2019, the estimate of the amount of shoreline with associated bull kelp was ~ 12.7 miles, which is approximately 6.5% of Island County's shoreline.

With the addition of Hoypus Point, on the Northern tip of Whidbey Island, to the MRC-surveyed sites, surveys are conducted within the five most prominent bull kelp beds on Whidbey and Camano Islands. Those beds (Figure 2) provide coverage for all sides of Whidbey Island with two locations in Saratoga Passage. Descriptions of each site are provided later in this report.



Figure 2. Locations of kelp beds surveyed in 2021

Survey Summary

Five sites were surveyed in the 2021 season (Figure 3). The primary objective is to determine surface area (SA) of the bed throughout the season and maximum SA for the year. Maximum SA usually occurs in August, hence that month is a priority. Water temperature, depth throughout the bed, reproductive status of the plants, and occurrence of animals associated with the bed are also recorded.

Bull Kelp Monitoring 2020 - 2021

year	2021							
	6		7		8		9	
month	Temp	SA	Temp	SA	Temp	SA	Temp	SA
Hoypus Point	11	6.3	14.4	n/a	-	8.6	-	8.6
Ebey's Landing					12	150		
Polnell Point					13.9	150		
Possession Point	16.3	51.1	16	220	17.5	270	14.9	210
Lowell Point			16.1	54.3	16.8	76.7	13.3	93.4
	Key:			sampled in month				
			15	Temp - surface temperature (Celsius)				
			122	SA - area of bed (units of 1000 m ²)				
			-	Data in analysis				

Figure 3. 2021 Sampling months (green) overlaid with temperature and surface area for Island County bull kelp sites. Please note that, due to timing with reporting, not all data is available.

Historical Trends

The primary goal of this work is to understand the long-term dynamics of these beds and enable the integration of Island County data into the regional picture in collaboration with other MRCs and government agencies. Annual snapshot surveys allow for the compilation of data over time to observe status and trends.

The historical summary since program inception in 2015 (Figure 4) is updated through 2021 and clear trends in SA are evident. Detailed interpretation of these and regional data is out of scope for this annual report but is available on the [WDNR's bull kelp monitoring page](#).

Site	Location	2015	2016	2017	2018	2019	2020	2021
Hoypus Point	N Whidbey		16.3	14.6	30.3			8.6
Ebey's Landing	CW Whidbey	80	82.5	91.8	86.1	165.1	162.4	150
Polnell Point	CE Whidbey		145	110.9	300	191.3	166.1	150
Possession Point	SE Whidbey			86.9	148	262.2	203.4	270
Lowell Point	CW Camano		72.8	55.6			25.4	93.4
		72.8	Sampled in year and max Surface Area (1000's of m ²)					

Figure 4. Program view of summary sampling and maximum Surface Area for Island County bull kelp sites.

New Program Lead

We want to acknowledge the tremendous energy, capability, and curiosity that Linda Rhodes brought, as program lead, to the Island County MRC bull kelp survey program.

Leadership of the program starting in 2021 transitioned to Ron Beier. Ron has been a long-term lead for the Possession Point surveys. His counterpart on the MRC as committee focal is Hannah Liss.

Terrific Volunteers

It takes a special sort of person to volunteer for this work, and we cannot be more proud of the volunteers committed to seeing the work done well and with enthusiasm. Beyond the scientific skills to record quality data in a dynamic, wet, and often windy environment, it takes a certain level of enthusiasm, grace, and curiosity to be effective. We are very lucky to have a great group of volunteers and look forward post pandemic to a warm celebration of hard work.

Many of our volunteers came from Sound Water Stewards, and we are very appreciative of their partnership and help. It has truly been a collaborative effort.

Project participants

Project lead: Ron Beier, Hannah Liss (MRC)

Kayak surveys: Elaine Andrews, Gayle Austin, Ron Beier, Barbara Bennett, Vernon Brisley, Barbara Brock, Ken Collins, Debbie Engblom, Don Engblom, Nancy Hotter, Bill Meyer, Hannah Liss, Linda Rhodes, Jenny Roman, Ellyn Thoreen.

Ken Collins also led the coordination effort for this report. This report is based off of previous annual reports authored by Linda Rhodes.

Joan Schrammeck provided back up and coordinating assistance for Camano Island.

Temperature logger surveys: In addition to Ron Beier, Barbara Hardman and David Davis conducted temperature surveys throughout the season at Possession Point.

Discussion

In at least one bed, maximum surface area was expressed in September. We will do further analysis and suspect, given the lack of storms in summer, 2021 beds may have been able to stay intact longer. Two beds were not surveyed in September.

The temperature for Polnell Point was relatively low in 2020, and this continued in the 2021 year.

The drop in surface area of the Hoypus Point bed from 2016-2018 compared to 2021 merits further scrutiny as all other beds are relatively stable.

In past years, Gregg Ridder and Vernon Brisley conducted aerial surveys of Island County bull kelp beds. This work is on hold, as the Federal Aviation Administration (FAA) raised the elevation level for flights, which in turn would require new cameras and configuration, adding considerable cost.

Temperature loggers and protocol to measure surface, mid-water, and bottom temperatures were developed in 2020 and continue in targeted use at Possession Point courtesy of Barbara Hardman and David Davis.

Looking Forward

As we think through better understanding drivers of bull kelp abundance and density, a number of areas for more detailed and systematic survey come to mind. We will work with the Northwest Straits Commission (NWSC) and stakeholders to plan and test what we can apply in the 2022 season.

1. Review bed coverage. Are there additional beds we should be monitoring given the heterogeneous mix of beds in Island County?
2. Improved temperature logging. We anticipate the need for better accuracy, ease of use, and consistency of protocol. With temperature assumed to be a key driver, we would like to develop a more systematic and consistent strategy for our surveys. We anticipate there may be need for more detailed temperature logging at key sites.
3. Improve salinity monitoring and extend to all sites. This is particularly important in Island County given the diversity of fresh water influences on the surveyed beds.
4. Continue research into the use of underwater imagery to complement surface observations.

Site Descriptions

Hoypus Point

“Small but influential” may be the best description for the Hoypus Point bed. Located 0.5 km east of Hoypus Point (Figure 5), this bed sits on the boundary of the funnel of water flowing in and out of Saratoga Passage through Deception Pass.



Figure 5. Undated image of the Hoypus Point kelp bed. (Google Earth)

The bed sits adjacent to large sand bars and what appear to be shallow beds of sugar kelp. The bed reached maximum expression on the surface in August. With tremendous mixing of “fresh” ocean water from Deception Pass and large amounts of fresh water from the east, and high currents, we looked forward to a bed that may be a “hybrid” personality between the western and eastern sides of Whidbey Island.

Ebey's Landing

The Ebey's Landing bed is located in Admiralty Inlet and receives full marine influence from the Strait of Juan de Fuca.



Figure 6. Near infra-red image of Ebey's Landing bull kelp bed in August, 2019. (G. Ridder and V. Brisley)

As noted in the 2020 report, the bed was larger than in previous years and in August 2019 merged with the adjacent beds that extend to Fort Casey and Keystone for the first time since observations began. In 2020 and 2021, bed merger occurred again, suggesting this may be a persistent expansion. Although data were collected into the adjacent bed, a southeast limit was established for bed area calculations.

Surface temperatures at the Ebey's Landing bed tend to be relatively low and consistent across the months, probably due to the strong marine influence from the Strait of Juan de Fuca.

Polnell Point

The Polnell Point bed is located at the head of Saratoga Passage, between Whidbey and Camano Islands, at the eastern end of Crescent Harbor and approximately 13 km from the south fork of the Skagit River. The bed is within the influence of this large freshwater influx.

Aerial images and surveys over time indicate this bed is strongly expressed at the surface by the end of August (Figure 7). Because of this, the bed is not surveyed in June or July.

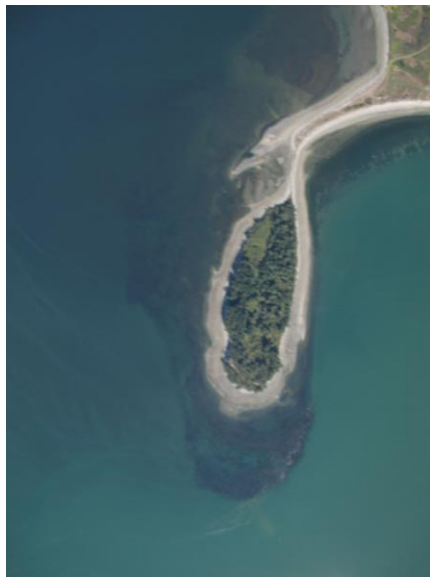


Figure 7. Polnell Point bull kelp bed on August 28, 2019, showing the large area of the bed. (G. Ridder and V. Brisley)

Being close to the south fork of the Skagit River, higher temperatures and lower salinities in surface waters are expected and have been observed prior to 2020. Surface temperatures in 2020 and 2021 were lower than in previous years.

Lowell Point

Lowell Point is located in Saratoga Passage, along the western shore of Camano Island immediately south of Camano Island State Park. This bed receives freshwater from the Skagit, Skykomish, and Snohomish Rivers. Due to the proximity of the State Park, crabbing and fishing are common activities near the bed, and there is frequent small boat traffic. The bed is comma-shaped, following the shallower underwater shelf around the point (Figure 8).



Figure 8. Lowell Point and bull kelp bed. (Google Maps)

Possession Point

The Possession Point bed is located at the confluence of Admiralty Inlet, Possession Sound, and the Central Basin of Puget Sound. It receives both marine and riverine influences, as well as potential anthropogenic effects from the Central Basin. Possession Point is an extremely popular fishing location and diving area, which may be due in part to its kelp bed and nearby artificial reef.

Although aerial assessment has identified kelp beds on either side of the Cultus Bay outflow, the surveyed bed is located to the east of the outflow and bounded by a stationary aid to navigation (Figure 9).

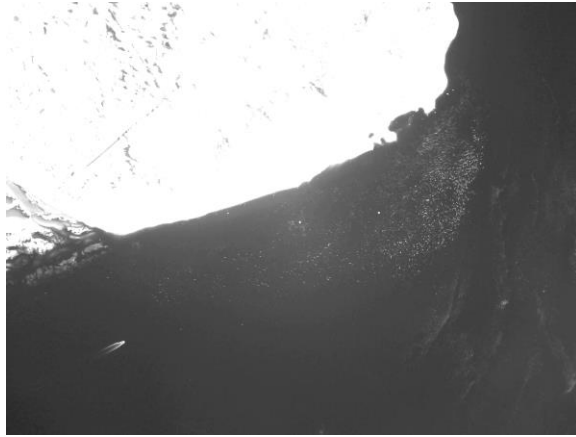


Figure 9. Near infra-red image of the Possession Point bull kelp bed on August 28, 2019. (G. Ridder and V. Brisley)

Surface temperatures at the Possession Point bed are typically higher than the Ebey's Landing bed. Temperature and salinity fluctuate in a manner consistent with Possession Point receiving freshwater from river sources (e.g., Snohomish River) that are warmer in summer months.

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Additional Resources

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