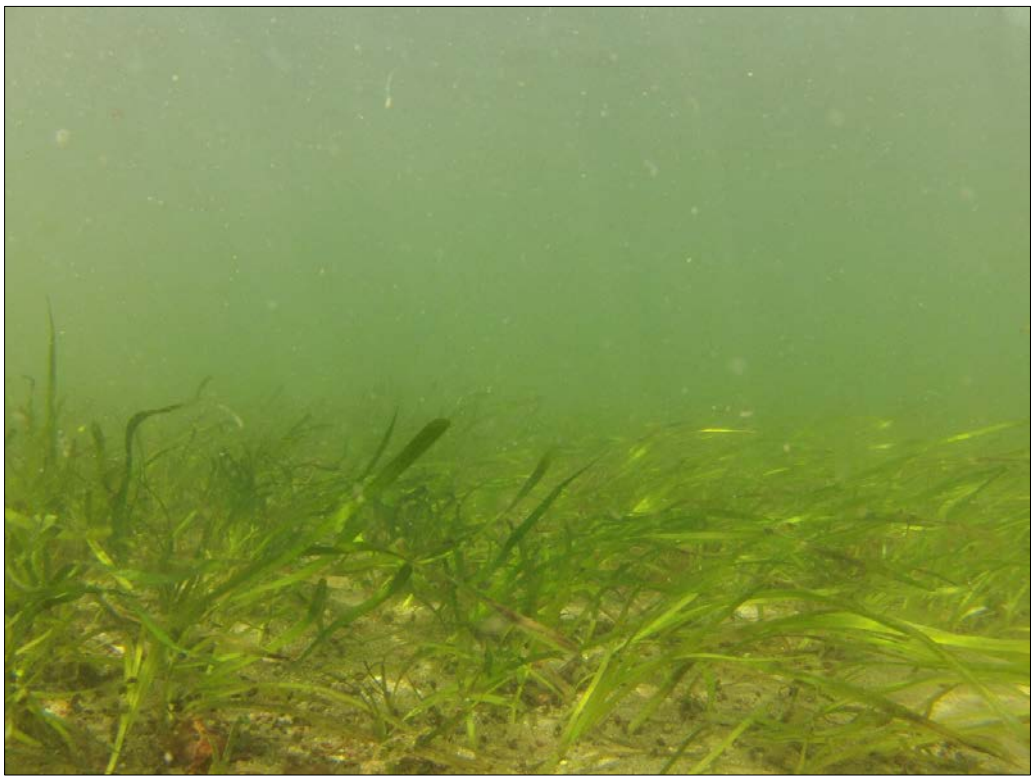
Quality Assurance Project Plan

Eelgrass Restoration in Puget Sound

WDFW Contract No. 14-02072

DNR Contract No. 15-110

February 2017



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Publication Information

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement PC 00J29801 to Washington Department of Fish and Wildlife. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Financial and/or logistical contributions for this study is also provided by: WDFW – Puget Sound Ecosystem Monitoring Program, Washington State DNR – Aquatic Reserves Program, and the Washington State DNR – Nearshore Habitat Program.

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1.0 Title Page, Table of Contents, and Distribution List

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Eelgrass Restoration in Puget Sound

February 2017
Draft September 2016

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2.0 Abstract

The Washington State Department of Natural Resources developed an Eelgrass (*Zostera marina* L.) transplant site suitability model to improve eelgrass restoration throughout Puget Sound. The model was developed to address the Puget Sound Partnership's "20% More Eelgrass by 2020" goal. The objectives of the Eelgrass Restoration in Puget Sound project is to implement the results of the "20% More Eelgrass by 2020" project and conduct eelgrass restoration at select test sites and large scale sites throughout Puget Sound that have a strong probability for transplant success. In addition, the project will monitor eelgrass shoots at donor sites and restoration sites (both test and large scale). Autonomous sensor packages will be deployed at large scale restoration sites to track water quality parameters, specifically temperature and pH. A final report will be submitted that summarizes the project, including the methods, work completed, data collected, data analyses, results, conclusions, and suggestions for future areas of research and restoration in Puget Sound.

The funds for this project were awarded through the Puget Sound Marine and Nearshore Protection and Restoration Grant Program. The project will completed through a contractual agreement with Hart Crowser (DNR contract no. 16-17).

3.0 Background

Puget Sound has an estimated 23,000 hectares (57,000 acres) of eelgrass (*Zostera marina* L.) (Gaeckle et al. 2011). Eelgrass and other seagrasses are considered indicators of estuarine health (Dennison et al. 1993, Krause-Jensen et al. 2005, Orth et al. 2006) and provide extensive ecosystem services worldwide (Constanza et al. 1997, Green and Short 2003, Larkum et al. 2006). In Puget Sound, eelgrass provides spawning grounds for Pacific herring (*Clupea harengus pallasi*), out-migrating corridors for juvenile salmon (*Oncorhynchus* spp.) (Phillips 1984, Simenstad 1994), and important feeding and foraging habitats for water birds such as the black brant (*Branta bernicla*) (Wilson & Atkinson 1995) and great blue heron (*Ardea herodias*) (Butler 1995). Due to its ecological importance and its rapid response to environmental degradation, eelgrass has been identified as a Vital Sign of ecosystem health and a 2020 eelgrass recovery target was adopted by the Puget Sound Partnership.

Seagrass decline has been observed globally and is primarily attributed to anthropogenic activities such as nutrient loading and shoreline development (Duarte 2002, Orth et al. 2006, Short and Burdick 1996, Waycott et al. 2009). In Puget Sound, there is widespread concern that eelgrass is significantly less abundant than it was historically (Dowty et al. 2010). Human-induced disturbances, assumed to have caused most of the loss and threats to critical nearshore habitats, are expected to increase with population growth and coastal development. However, there are critical uncertainties about the intensity, extent, and reversibility of stressors affecting eelgrass in Puget Sound (Thom et al. 2011).

The Washington State Department of Natural Resources has sought to achieve measurable increases in Puget Sound eelgrass area by strategically targeting eelgrass plantings at sites that have a strong likelihood for restoration success. Sites with a high probability of restoration success have been identified through an eelgrass transplant suitability model developed to address the Puget Sound Partnership's "20% More Eelgrass by 2020" goal. In addition to eelgrass transplants, the project is investigating the effects of harvest on donor sites, potential amelioration by restored eelgrass beds on the effects from ocean acidification, and monitoring of transplant survival trajectories over time.

3.1 Study area and surroundings

The study area includes unvegetated, subtidal areas throughout greater Puget Sound. Greater Puget Sound includes the waters east of Cape Flattery (Neah Bay), and south of Pt. Roberts south to Olympia.

Optimal eelgrass restoration areas require suitable fine grain sediments and adequate photosynthetically available radiation within subtidal lands between -1.4 m to -6 m depth relative to Mean Lower Low Water (MLLW).

3.1.1 Logistical problems

The best time to transplant eelgrass in Puget Sound is between March and July to take advantage of optimal environmental conditions. The spring timing coincides with an increase in eelgrass growth rates and vegetative expansion which will improve the success of transplanted shoots.

Most other logistical hurdles (e.g., permitting, access, transplanting techniques) have been resolved during previous eelgrass transplanting efforts over the last 5 years.

3.1.2 History of study area

It is believed that eelgrass (*Zostera marina*), the predominant local seagrass, area has been lost in Puget Sound because of increased shoreline development and periodic physical disturbances, as well as degradation in water quality (Thom and Hallum 1990, Thom 1995, Thom et al. 2011). Climate change effects are expected to further exacerbate eelgrass losses (Snover et al. 2005). Because of its importance to nearshore food webs, resources, and shoreline processes, eelgrass restoration has been recommended throughout the Salish Sea. In response to regional and global needs, the Partnership's Action Agenda specifically targets the restoration of 20% more eelgrass by 2020. Restoring eelgrass will benefit a multitude of species valued in Puget Sound, as well as contribute to water quality improvement, shoreline stabilization, and carbon sequestration. The eelgrass restoration project will enhance the recovery of eelgrass in Puget Sound.

3.1.3 Contaminants of concern

There are no known contaminants of concern at the sites where eelgrass will be transplanted.

3.1.4 Results of previous studies

There have been four other eelgrass restoration projects conducted throughout greater Puget Sound by the Washington State Department of Natural Resources. Although there has been limited eelgrass transplant monitoring conducted, preliminary results suggest a range of success from 0% to over 130% based on a shoot density metric (Thom et al. 2014).

Since 2014, the Washington State Department of Natural Resources has also conducted experimental work to test whether eelgrass can locally counteract ocean acidification by drawing CO_2 out of the water column via photosynthesis. Preliminary research shows that water passing over and through eelgrass beds growing in shallow environments – depths of 9 feet or less – may cause pH to increase at a rate of 0.05 pH units per hour during daylight hours. This in turn may cause the aragonite saturation state (Ω_{arag}) to increase 0.2 units per hour. The same preliminary research indicates no net change in pH or Ω_{arag} of water flowing over unvegetated habitat (unpublished data, Acidification Nearshore Monitoring Network (ANeMoNe).

3.1.5 Regulatory criteria or standards

N/A

4.0 Project Description

4.1 Project goals

The goal of the project is to restore eelgrass in greater Puget Sound. In addition to eelgrass transplants, the project will investigate the effects of harvest on donor sites, assess the potential of restored eelgrass beds to ameliorate ocean acidification, and will monitor transplant survival over time.

4.2 Project objectives

The objectives of the proposed eelgrass restoration project are to:

- Implement the results of the "20% More Eelgrass by 2020" project and conduct eelgrass restoration test plantings at select locations throughout Puget Sound to identify additional areas with the potential for successful large scale eelgrass restoration.
- Conduct eelgrass transplantation at test sites.
- Conduct eelgrass transplantation at large scale sites.
- Monitor restoration performance at test sites and large-scale sites through documenting shoot survival (density) and natural expansion (distribution) over regular intervals of time.
- Monitor shoot density recovery at donor sites over regular intervals of time.
- Install and monitored autonomous sensor packages to assess changes in pH.
- Collect continuous and reliable records for temperature and pH associated with transplanted eelgrass beds
- Produce a final report summarizing the project, methods, results, and conclusions.

4.3 Information needed and sources

Information helpful to the completion of the project include historical distribution of eelgrass (e.g., DNR's eelgrass monitoring data, ShoreZone data, PSEA) and the map booklet from Task 5 of WDFW-DNR IAA 12-1117. In addition, the project will collect eelgrass shoot density data at donor sites and transplanted sites along with temperature and pH data at sites transplanted with eelgrass.

4.4 Target population

Native eelgrass, *Zostera marina* L.

4.5 Study boundaries

Greater Puget Sound includes the nearshore environment east of Cape Flattery (Neah Bay) and south of Point Roberts (north Puget Sound-southern extent of the Strait of Georgia) south to the southern reaches of Puget Sound (Olympia area and the southern inlets). Sites with high potential for eelgrass restoration were determined through an eelgrass site suitability modelling experiment (Borde et al. 2014, Thom et al. 2014) and verified in the field with eelgrass test transplanting (Vavrinec et al. 2014). Although the study area may include greater Puget Sound, the focus will be in south Puget Sound (Figure 1).

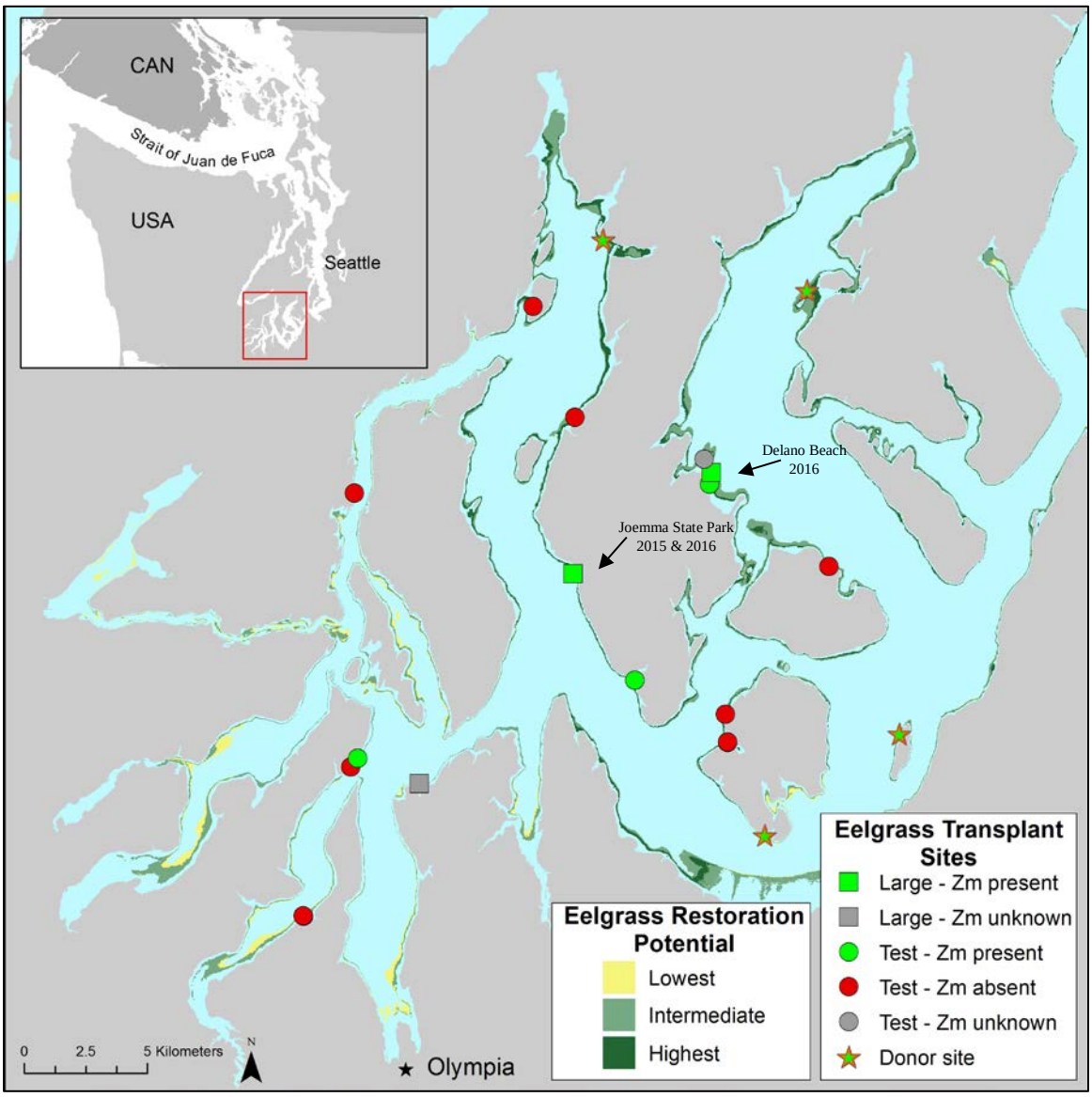


Figure 1. Map of Eelgrass (*Zostera marina*) restoration potential and eelgrass transplant sites in South Puget Sound, WA. Water quality sensors will be deployed at three sites: Joemma State Park 2015, 2016, and Delano Beach 2016.

4.6 Tasks required

1) Identify a minimum of
a) five (5) eelgrass donor sites for a total harvest potential of 170,000 shoots,
b) ten (10) eelgrass test sites that can support three (3) test plots (25 m^2 in area) each, and
c) eight (8) large scale eelgrass restoration sites (2,025 m^2 in area or a total of 20,260 shoots) each.

2) Develop a project plan and timeline to harvest eelgrass from donor sites and replant it in

a) thirty (30) test plots (three (3), 25 m^2 test plots in each test site), and
b) eight (8) large-scale eelgrass restoration sites (2,025 m^2 in area or a total of 20,260 shoots).

3) Implement the project plan to harvest and restore eelgrass at
a) thirty (30) test plots (three (3), 25 m^2 test plots in each test site) at a density of 20 shoots m^{-2} for a total of 780 shoots at each test site (3 test plots * 260 shoots), and
b) eight (8) large scale eelgrass restoration sites (2,025 m^2 in area) at a shoot density of 20 shoots m^{-2} for a total of 20,260 shoots at each large scale site. Large-scale restoration sites can be smaller in area if shoot density is increased to more than 20 shoot m^{-2}.

4) Monitor eelgrass at all donor sites and analyze data relative to changes in eelgrass shoot density over time.

5) Monitor eelgrass at all restoration sites (test sites and large-scale sites) and analyze data relative to changes in eelgrass shoot density and expansion (distribution) over time.

6) Deploy, maintain, and retrieve water quality sensors at donor sites and restoration sites (test sites and large-scale sites).

7) Produce a report indicating survival and recovery trajectories of the eelgrass at donor sites and restoration sites along with the results of the water quality monitoring data. The report should include statistically robust analyses of data with spatially explicit visualization of the shoot density, eelgrass distribution, and water quality results.

4.7 Practical constraints

Field work will be limited by environmental extremes and personnel safety. High tidal currents, large wind waves, and poor visibility can all limit the effectiveness of field work. However, the field researchers are used to adverse conditions and are adept at planning around the worst of weather, so these constraints should be minimized and have limited impact on the project.

4.8 Systematic planning process

N/A

5.0 Organization and Schedule

5.1 Key individuals and their responsibilities

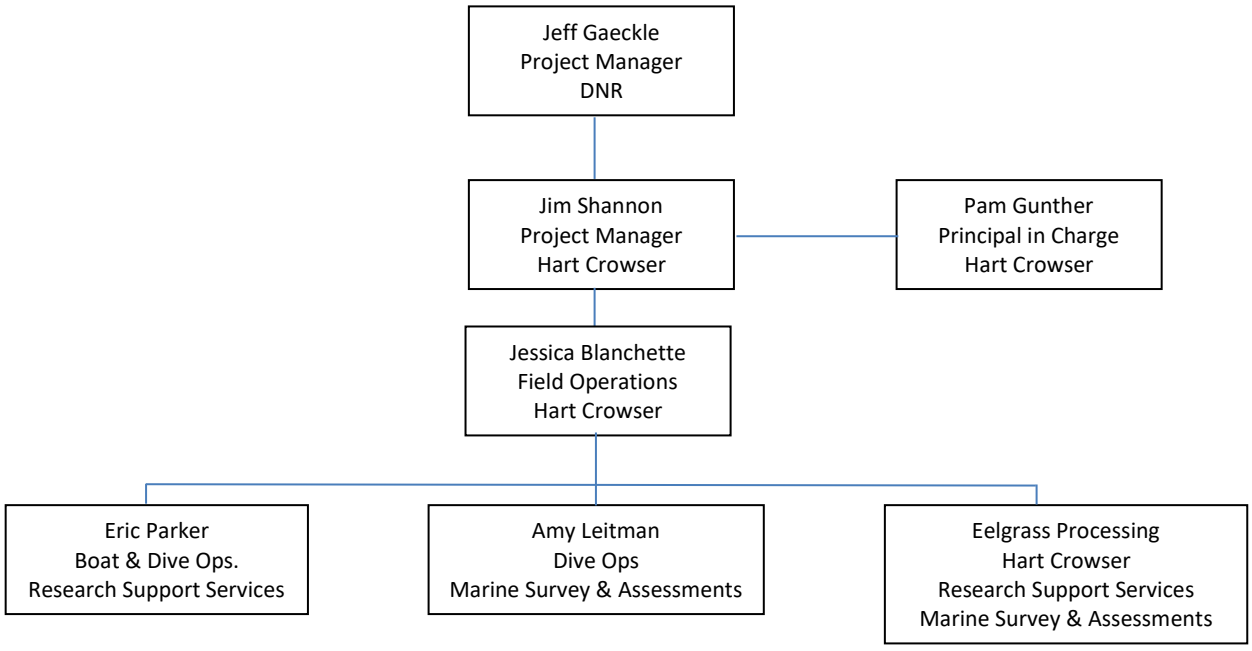
Jeff Gaeckle, Washington State Department of Natural Resources (DNR), will manage the project.

Hart Crowser, Inc., has been contracted to complete the work for the Eelgrass Restoration in Puget Sound project. Hart Crowser, Inc., will oversee field operations and manage the two subcontractors; Marine Surveys and Assessments and Research Support Services, Inc. The subcontractors will conduct the field work – eelgrass harvest and transplant activities, monitoring and the deployment of scientific water quality instrumentation.

5.2 Special training and certifications

Hart Crowser is the primary contractor on the project. Hart Crowser has subcontracted Marine Surveys and Assessments (MSA), and Research Support Services (RSS). Hart Crowser, MSA, and RSS have working relationship on projects of varying scale and scope concerning distribution and restoration of eelgrass in the nearshore environment. Hart Crowser, MSA, and RSS have multiple research vessels and trained personnel to operate the vessels and conduct the SCUBA diving necessary to complete the restoration project. Micah Horwith, Research Scientist (Aquatic Assessment and Monitoring Team, DNR) has extensive experience calibrating, deploying, maintaining, retrieving, and interpreting pH results from Durafet-based pH sensors.

5.3 Organization chart



5.4 Project schedule

The project consists of five deliverables and extends from 2016 through 2017 (Table 1).

Spring - Summer 2016

- Identify five test transplant sites and four large scale transplant sites
- Identify donor sites
- Transplant eelgrass

Fall 2016

- Monitor eelgrass at transplant and donor sites

Spring – Summer 2017

- Identify five test transplant sites and four large scale transplant sites
- Identify donor sites
- Transplant eelgrass
- Monitor eelgrass at transplant and donor sites
- Deploy temperature and pH sensors (April – May 2017)

Fall 2017

- Monitor eelgrass at transplant and donor sites
- Retrieve temperature and pH sensors (August – September 2017)
- Finalize report

Table 1. Tasks, deliverables and expected due dates for the contract between DNR and Hart Crowser (SC 16-17).

TASK	SUBTASK	DELIVERABLES	APPROXIMATE DUE DATE
1		Donor and restoration site identification	28 Feb 2016
2		Project plan and timeline	28 Feb 2016
3		Eelgrass restoration	
	a	30 test plots	31 Oct 2016
	b	8 large scale sites	31 Aug 2017
4		Eelgrass donor and restoration site monitoring	
	a	Donor sites	31 Oct 2017
	b	30 test plots	31 Oct 2017
	c	8 large scale sites	31 Oct 2017
5		Water quality monitoring	
	a	Sensor deployment	31 Oct 2017
	b	Sensor maintenance	31 Oct 2017
6		Final report	30 Nov 2017

5.5 Limitations on schedule

Inclement weather and personnel availability will likely be the primary reasons for limitations to maintain the project schedule. Project delays due to weather and personnel will be rescheduled later in the field season and should not affect project completion date.

5.6 Budget and funding

The project's funding source for $500,000.00 is the Puget Sound Marine and Nearshore Grant Program (WDFW 14-02072, Appendix A). These funds are separated into two components:

1) DNR for equipment, QAPP, and travel to conferences ($62,000.00)
2) Hart Crowser to complete the eelgrass restoration and monitoring work ($438,000.00, Appendix B. SC 16-17).

The budget for the Hart Crowser component of the project is included in Table 2.

Table 2. Tasks, deliverables, expected due dates and budget for the contract between DNR and Hart Crowser (SC 16-17).

TASK	SUBTASK	DELIVERABLES	APPROXIMATE DUE DATE	ESTIMATED BUDGET
1		Donor and restoration site identification	28 Feb 2016	$8,000
2		Project management, plan and timeline	28 Feb 2016	8,000.00
3		Eelgrass restoration		
	a	30 test plots	31 Oct 2016	$17,000.00
	b	8 large scale sites	31 Aug 2017	$372,000.00
4		Eelgrass donor and restoration site monitoring		$22,000.00
	a	Donor sites	31 Oct 2017	
	b	30 test plots	31 Oct 2017	
	c	8 large scale sites	31 Oct 2017	
5		Water quality monitoring		(included in Task 4)
	a	Sensor deployment	31 Oct 2017	
	b	Sensor maintenance	31 Oct 2017	
6		Final report	30 Nov 2017	$11,000.00
		TOTAL		$438,000.00

DNR will use the $62,000.00 for environmental monitoring sensors, the QAPP, and travel to conferences.

6.0 Quality Objectives

6.1 Decision Quality Objectives (DQOs)

N/A

6.2 Measurement Quality Objectives

The quality objective of the project is to provide eelgrass density data adequate for documenting conditions at donor sites and transplant sites. In addition, accurate and reliable data for water quality parameters (e.g., temperature and pH) will be collected at three transplant sites (Joemma State Park 2015, 2016, and Delano Beach 2016) using data loggers.

6.2.1 Targets for Precision, Bias, and Sensitivity

6.2.1.1 Precision

The precision of the eelgrass density data will be determined based on replicated sampling at the donor and transplant sites (Appendix B).

Durafet-based pH sensors, the sensors used to measure pH in transplanted eelgrass and outside of eelgrass on bare substrate, exhibit stability better than 0.005 pH units over periods of weeks to months, with short-term precision of ± 0.0005 pH units (Martz et al. 2010). However, field deployments introduce several factors that increase uncertainty, including biofouling on and around the sensing element and fluctuations in salinity. For this reason, DNR aims for a precision of 0.05 pH units in the field. This standard corresponds to a variance in E* no greater than 0.003.

6.2.1.2 Bias

The pH sensors are calibrated before and after each deployment in order to determine two sensor-specific properties: 1) the standard potential (E*) of the Durafet electrode, and 2) the temperature dependence of that standard potential (E^*_T). When these properties are known, pH can be calculated from Durafet voltage using the following equation (Martz et al. 2010):

$$pH = (\text{Durafet voltage} - E^* - E^*_T \times T) / (R \times (T + 273.15) \times \ln(10)/F) \quad \text{(Eq. 1)}$$

Where R is the gas constant: 8.3145 J x K^{-1} x mol^{-1}
T is temperature in Celsius
And F is the Faraday constant 96485 C x mol^{-1}

For calibration, Tris-buffered synthetic seawater is prepared following SOP 6a in Dickson et al. (2007). A cap filled with 30mL of this synthetic seawater is placed over the Durafet sensor. Sensors are left for 72 hours to equilibrate to matrix salinity of 35. Sensors are then programmed to log at 10-minute intervals, and fully immersed in a water bath at room

temperature (between 19 and 21 degrees Celsius), where a precise thermometer is taking contemporaneous measurements at 10-minute intervals. The water bath is intended to provide thermal mass. Sensors are left at room temperature for at least 24 hours and then moved to a refrigerator that maintains temperature between 1˚ and 3˚ Celsius. After at least 24 hours at the colder temperature, sensors and thermometers are removed from the water bath and data downloaded.

The pH of the Tris-buffered synthetic seawater is calculated across the calibration period from thermometer observations following the equation from Dickson et al. (2007):

$$pH = ((11911.08 - 18.2499 \times S - 0.039336 \times S^2) \times 1/(T + 273.15)) - 366.27059 + 0.53993607 \times S + 0.00016329 \times S^2 + ((64.52243 - 0.084041 \times S) + \log(T + 273.15)) - (0.11149858 \times (T + 273.15))$$

(Eq.2)

Where T is as in equation 1
and S is the salinity of the Tris-buffered synthetic seawater (35)

Durafet voltage is then regressed against temperature:

$$\text{Durafet voltage} - (R \times \ln(10) \times (T + 273.15) * pH) / F = T$$

(Eq. 3)

Where R, T, and F are as in equation 1 and pH is the calculated pH of the Tris-buffered synthetic seawater

E* is the intercept and E^*_T the slope of the resulting model. The date of calibration and the calculated E* and E^*_T for each sensor are recorded and compared against previous calibration results to evaluate sensor drift and accuracy of observations in the field.

If pre- and post-deployment calibrations yield E* values within this range, measurements across the deployment are reported with a confidence interval of 0.05 pH units, and reasonable assurance that sensor drift did not occur. If pre- and post-deployment calibrations yield E* values outside this range, pH across the deployment can be calculated using a variable value for E*, which uses the pre-deployment E* value and transitions linearly to the post-deployment value.

Alternatively, pH sensor measurements can be compared against discrete water samples collected and preserved in the field by the addition of mercuric chloride. In the laboratory, these discrete samples can undergo pH measurement by spectrophotometry. In situ pH can then be calculated using in situ temperature, and the calculated in situ pH can be used to evaluate sensor accuracy.

The manufacturer-determined stability (drift) for the Hobo Tidbit Temperature sensors is 0.1˚C per year. Sensors will be calibrated prior to and after deployment with other Hobo Tidbit Temperature sensors to determine consistency in measured temperature between

multiple units. Sensors that measure values beyond 10% of the average between sensors will not be used for the project.

6.2.1.3 Sensitivity

The pH sensors have an expected precision of 0.05 pH units in field deployments. The accuracy of each sensor is evaluated over each deployment by comparing the pre- and post-deployment calibration values of E*, with procedures and thresholds outlined in section 6.2.1.2. 2016 deployments of the pH sensors demonstrated accuracies of at least ±0.15 pH units, excluding instrument failures due to extreme biofouling or battery exhaustion.

Based on the range of seawater temperatures the Hobo Tidbit Temperature sensor will be exposed to, the resolution is 0.03˚C and the accuracy is ±0.25˚C. Additional sensor specifications are at this link: http://www.onsetcomp.com/products/data-loggers/utbi-001.

6.2.2 Targets for Comparability, Representativeness, and Completeness

6.2.2.1 Comparability

All shoot densities will be measured using a 0.25 m^2 quadrat. All water quality parameters (e.g., pH and temperature) will be measured by autonomous sensors at frequencies of 30 minutes or less. In 2016, DNR established the Acidification Nearshore Monitoring Network (ANeMoNe). ANeMoNe consists of 8 sites in Puget Sound and on the Washington Coast, with sensor arrays deployed in and outside of eelgrass. Each sensor array includes instruments measuring pH, temperature, conductivity, dissolved oxygen, and chlorophyll. The objectives of this network include the collection of long-term data to evaluate temporal and spatial variation in the effect of eelgrass on carbonate chemistry. The sensors and calibration procedures used in this project will be identical to those deployed through ANeMoNe, which will allow immediate comparability with 8 other sites in Washington waters. The analysis of data generated through this project will leverage DNR's investment in ANeMoNe by comparing the chemical effects of eelgrass restoration with the effects of established eelgrass beds across seasons and across a broad geographic swath.

6.2.2.2 Representativeness

Eelgrass shoot density data is scheduled to be collected seasonally (Jan, Apr, Jul, and Oct). Water quality data is continuously collected for the duration of the sensor deployment.

6.2.2.3 Completeness

The number of samples collected for shoot density is described in the project SOW (Appendix B). Funding prohibits multiple water quality sensors for repeated sampling with these instruments at each site.

7.0 Sampling Process Design (Experimental Design)

7.1 Study Design

7.1.1 Field measurements

Eelgrass shoot density (shoots m^{-2}) will be quantified along with any increase in area planted. However, area planted will likely not expand during the 2 year project period.

7.1.2 Sampling location and frequency

The sampling location and frequency is described in detail in Appendix B and C.

Donor sites
Shoot density will be measured in thirty (30) to fifty (50), 0.25 m^2 quadrats within each donor site to track donor site recovery. Sample size and design will depend upon donor site characteristics and will be determined through discussions between the Contractor and DNR. Monitoring will occur once every 2-3 months through November 2017. Preferred monitoring will occur in April, July and October of each year of the project (2016 and 2017). Quadrat selection and monitoring interval will be determined and agreed upon through discussions between the Contractor and DNR.

Test transplant sites
Shoot density will be quantified in all (N=13) of the 1 m^2 quadrats planted with eelgrass in each of the three (3) test plots at all ten (10) test sites. Therefore, shoot density will be quantified in a total of 390, 1 m^2 quadrats across the thirty (30) test plots at the ten (10) test sites. Monitoring, determined through discussions between the Contractor and DNR, will occur once every 2-3 months through November 2016. However, it is preferred that monitoring occur in April, July and October of each year of the project (2016 and 2017).

Large-scale transplant sites
Shoot density will be quantified in thirty (30) to fifty (50) of the 1,013, 1 m^2 quadrats planted with eelgrass in each of the eight (8) large scale restoration sites. Therefore, shoot density will be quantified in a total of 240-400, 1 m^2 quadrats across the eight (8) large scale sites. Monitoring will occur once every 2-3 months through November 2017. However, it is preferred that monitoring occur in April, July and October of each year of the project (2016 and 2017). Quadrat selection and monitoring interval will be determined and agreed upon through discussions between the Contractor and DNR.

Environmental sensors (pH and temperature)
Sea water pH and temperature will be measured at 3 sites; Joemma State Park 2015 large scale transplant, Joemma State Park 2016 large scale transplant and Delano Beach 2016 large scale transplant. Sensors will be deployed in transplanted eelgrass and at an adjacent area within the same bathymetry in bare substrate. Sensors will be deployed in April – May 2017 and recovered in August – September 2017. All sensors will record every 30 minutes

continuously from the time of deployment (Mar – Apr 2017) until recovered (Aug – Sep 2017). Sensors will be deployed along similar depth contours between the three sites at a depth deeper than -1.5 m (MLLW) and shallower than -2.5 m (MLLW).

7.1.3 Parameters to be determined

Shoot density will be quantified at all donor sites, test transplant sites and large scale transplant sites. Large scale transplant efforts are not conducted until a test transplant effort is determined successful. Sea water pH and temperature (˚C) will be measured in three large scale transplant sites (e.g., Joemma State Park 2015, 2016 and Delano Beach 2016) between April and September 2017.

7.2 Maps or diagram

The transplant areas are unknown prior to evaluating a site during field visits and conducting test transplants. Sensors placement will be within successfully transplanted eelgrass at a large-scale restoration site.

7.3 Assumptions underlying design

A major assumption underlying the eelgrass restoration is that the restoration is successful and plants persist in subsequent months to years to measure shoot density and the effects the eelgrass has on seawater pH.

7.4 Relation to objectives and site characteristics

Site characteristics need to be sufficient to support eelgrass. To test this, the project conducts a test transplant effort in the area prior to committing to a large scale restoration effort. A successful test transplant area will be monitored for 6 months to a year prior to a full, large scale eelgrass transplant. The iterative process of test transplanting – monitoring – large scale transplant effort ensures a greater transplant success rate.

The collection of water quality parameters (pH and temperature) is to determine the effect transplanted eelgrass has on these variables.

7.5 Characteristics of existing data

There is limited existing data for the transplant sites, particularly since eelgrass does not currently grow in these sites. There may be some data for eelgrass donor sites from DNR's eelgrass monitoring program (http://www.dnr.wa.gov/programs-and-services/aquatics/aquatic-science/puget-sound-eelgrass-monitoring-data-viewer). There is also no prior record of temperature or pH data at the eelgrass transplant sites.

8.0 Sampling Procedures

8.1 Field measurement and field sampling SOPs

SOPs for eelgrass restoration and monitoring are included in Appendix C. Restoration Plan and Timeline: Puget Sound Eelgrass (*Zostera marina*) Restoration and Monitoring.

8.2 Containers, preservation methods, holding times

N/A

8.3 Invasive species evaluation

N/A

8.4 Equipment decontamination

N/A

8.5 Sample ID

N/A

8.6 Chain-of-custody, if required

N/A

8.7 Field log requirements

The contractor maintains field logs and provides scanned copies as part of the required deliverable for the project. As part of the contract, the field log includes the following information:

- Name and geographic coordinates (Latitude / Longitude) of the project
- Maps
- Bathymetry data to demonstrate project activities are deeper than -1.4 m (MLLW)
- Field personnel
- Sequence of events
- Environmental conditions (e.g., sediment type)
- Photographs and/or videos
- Date, time, location, ID, and description of each sample
- Field measurement results
- Unusual circumstances that might affect interpretation of results

8.8 Other activities

N/A

9.0 Measurement Methods

9.1 Field procedures table/field analysis table

The field procedures involve deploying a pH sensor that measures seawater pH and temperature. DNR sensors will measure the pH and temperature of seawater. The custom sensors are built around a Honeywell Durafet – an established technology employed in the commercially available SeaFET pH sensors. Durafets use ion sensitive field effect transistor technology (ISFET) to measure pH. An ISFET is a Metal Oxide Semiconductor Field Effect Transistor (MOSFET), where the conduction channel is covered by a layer of amphoteric material rather than a metal gate electrode. The pH of the matrix controls the protonation/deprotonation state and surface charge of the insulator material, which in turn controls the strength of the electric field in the conduction channel of the FET. The conduction channel of the FET is located between the source and drain, and a feedback circuit is used to hold the drain-source current constant. Finally, a reference electrode is used in place of a metal gate electrode. The matrix pH is proportional to the reference electrode to source voltage.

Identical custom-built sensors have been used in multiple peer-reviewed studies (Hofmann et al. 2014, Price et al. 2012, Kroeker et al. 2011).

9.1.2 Matrix

Puget Sound water (i.e., seawater).

9.1.3 Number of samples

DNR pH sensors will record measurements every 30 minutes from deployment in April 2017 through August 2017. Each sensor will record approximately 10,000 observations.

9.1.4 Expected range of results

Based on previous deployments of DNR sensors, pH measurements will likely range between 7.5 and 8.5 pH units, depending upon freshwater input, temperature, and biological processes, including eelgrass photosynthesis and respiration. Temperature measurements will likely range between 8 and 20 degrees Celsius.

Analyte	Sample Matrix	Samples [Number/ Arrival Date]	Expected Range of Results	Reporting Limit	Sample Prep Method	Analytical (Instrumental) Method
pH	Seawater	10,000	7.5 – 8.5 pH units	4.0 – 10 pH units	N/A	Autonomous sensor
Temperature	Seawater	10,000	8 – 20°C	-20 - 70°C	N/A	Autonomous sensor

9.1.5 Analytical method

N/A

10.0 Quality Control (QC) Procedures

10.1 Table of field and lab QC required

DNR pH sensors are only calibrated before and after each deployment in order to determine two sensor-specific properties: 1) the standard potential (E*) of the Durafet electrode, and 2) the temperature dependence of that standard potential (E^*_T). When these properties are known, pH can be calculated from Durafet voltage using the following equation (Martz et al. 2010):

pH = (Durafet voltage – E^* - E^*_T x T) / (R x (T + 273.15) x ln(10)/F)
(Eq. 1)

Where R is the gas constant: 8.3145 J x K^{-1} x mol^{-1}
T is temperature in Celsius
And F is the Faraday constant 96485 C x mol^{-1}

For calibration, Tris-buffered synthetic seawater is prepared following SOP 6a in Dickson et al. (2007). A cap filled with 30mL of this synthetic seawater is placed over the Durafet sensor. Sensors are left for 72 hours to equilibrate to matrix salinity of 35. Sensors are then programmed to log at 10-minute intervals, and fully immersed in a water bath at room temperature (between 19 and 21 degrees Celsius), where a precise thermometer is taking contemporaneous measurements at 10-minute intervals. The water bath is intended to provide thermal mass. Sensors are left at room temperature for at least 24 hours and then moved to a refrigerator that maintains temperature between 1˚ and 3˚ Celsius. After at least 24 hours at the colder temperature, sensors and thermometer are removed from the water bath and data downloaded.

The pH of the Tris-buffered synthetic seawater is calculated across the calibration period from thermometer observations following the equation from Dickson et al. (2007):

pH = ((11911.08 – 18.2499 x S – 0.039336 x S^2) x 1/(T + 273.15)) – 366.27059 + 0.53993607 x S + 0.00016329 x S^2 + ((64.52243 – 0.084041 x S) + log(T + 273.15)) – (0.11149858 x (T + 273.15))

Where T is as in equation 1
and S is the salinity of the Tris-buffered synthetic seawater (35)

Durafet voltage is then regressed against temperature:

Durafet voltage – (R x ln(10) x (T + 273.15) * pH) / F = T
(Eq. 3)

Where R, T, and F are as in equation 1 and pH is the calculated pH of the Tris-buffered synthetic seawater

E* is the intercept and E^*_T the slope of the resulting model. The date of calibration and the calculated E* and E^*_T for each sensor are recorded and compared against previous calibration results to evaluate sensor drift and accuracy of observations in the field.

10.2 Corrective action processes

The quality and utility of the data downloaded from the pH sensors will be determined following post deployment calibration. Since there will not be a mid-deployment pH sensor calibration, issues related to data collection will not be determined until after deployment. Faulty or malfunctioning pH and temperature sensors will result in the loss of data.

11.0 Data Management Procedures

11.1 Data recording/reporting requirements

pH data will be downloaded from DNR pH sensors using MadgeTech 4 software. Data will be exported to *.xlsx and *.csv formats, and archived onto DNR servers. pH will be calculated from Durafet voltage following methods in Section 10.1 (above).

Temperature data will be downloaded from the Hobo Tidbit Temperature sensors using Hoboware software (ver 3.7.8), exported to *.csv and *.xlsx formats, and stored onto DNR servers.

Data will be reviewed in MS Excel to identify outliers. Minor and major outliers will be determined using the inter-quartile range (IQR) x 1.5 and 3, respectively. Data beyond the value of the minor outlier (IQR x 1.5) will be omitted from further assessment.

After data are reviewed, data will be uploaded to the Washington State Department of Ecology's Environmental Information Management (EIM) database. EIM will upload these data to EPA's STORET database.

11.2 Lab data package requirements

N/A

11.3 Electronic transfer requirements

Data will be transferred in MS Excel and .csv formats.

11.4 Acceptance criteria for existing data

N/A

11.5 EIM/STORET data upload procedures

Water quality data will be submitted to Ecology's Environmental Information Database (EIM) database system. EIM will upload these data to EPA's STORET database.

12.0 Audits and Reports

12.1 Number, frequency, type, and schedule of audits

N/A

12.2 Responsible personnel

N/A

12.3 Frequency and distribution of report

Each of the tasks listed in Section 4.6 has detailed deliverables listed. The frequency and distribution of these products is outlined in the project SOW (Appendix A and B). In addition, Nearshore Habitat Program staff will review and submit a draft project report to peer reviewers and the NEP QC for comments. Jeff Gaeckle is responsible for these products.

12.4 Responsibility for reports

Hart Crowser will write the interim progress reports for eelgrass transplanting and monitoring along with the draft and final reports for the project. The Nearshore Habitat Program staff will review and submit the draft project report to peer-reviewers and the NEP QC for comments. Jeff Gaeckle is responsible for these products.

13.0 Data Verification

13.1 Field data verification, requirements, and responsibilities

All sample location data for the project will be verified with GPS-plotted latitude and longitude data and corresponding to field notes provided by the Contractor. Instrument sensors will be calibrated as described in Section 6. Otherwise, water quality parameters will not be field-verified with other instrumentation or procedures. Temperature and pH valued logged on sensors will be screened for outliers as described in Section 11.0. Instrument sensor drift will be detected and addressed as described in Section 6.2.1.2.

13.2 Lab data verification

N/A

13.3 Validation requirements, if necessary

N/A

14.0 Data Quality (Usability) Assessment

14.1 Process for determining whether project objectives have been met

The project objectives will be met through the collection of shoot density data and the water quality (e.g., temperature and pH) data. It is possible that both data sets will have zeros (0). In the case of shoot density data, a zero value will indicate an unsuccessful transplant effort as a result of a number of factors (e.g., biotic and abiotic factors). Even so, these data will be valuable for refining the eelgrass transplant process. A zero value from the water quality sensors would likely be due to a malfunctioning sensor. Unfortunately, determination that a sensor malfunctioned cannot be determined until it is retrieved and the data are downloaded. If the sensor malfunctions, there is no way to recover lost data under these circumstances. Project deliverables can still be generated considering either result.

14.2 Data analysis and presentation methods

Data collected for the project is designed to provide an assessment of eelgrass transplant success based on the number of eelgrass shoots that survive after transplanting. Water quality parameters (e.g., temperature and pH) will provide additional evidence for how eelgrass may affect these properties. Analysis and presentation of data will be conducted using programs commonly employed by the Nearshore Habitat Program.

14.3 Treatment of non-detects

When measuring eelgrass shoot density, zero (0) values indicate the transplant effort was not successful. These data will be included in the analyses.

As for measuring water temperature and pH, zero (0) values would not be realistic measurements for Puget Sound seawater. Therefore, zero (0) values would suggest a malfunctioning or faulty sensor.

14.4 Sampling design evaluation

The eelgrass transplant method implemented in this study is slightly different than used for previous projects (Thom et al. 2014). Eelgrass will be transplanted at higher densities (~60-120 shoots m^{-2}) and secured to the substrate using a hemp (burlap) fabric and staples. Preliminary test transplants have observed some success using this modified method and subsequent transplant method assessments may lead to modified eelgrass transplant techniques for future efforts that will increase transplant success.

15.0 References

Borde, AB, RM Thom, KE Buenau, SA Zimmerman. 2014. Eelgrass habitat suitability maps and recommendations. PNNL-SA-23560. 42 pp.

Dickson, AG, CL Sabine, JR Christian (Eds.) 2007. Guide to best practices for ocean CO_2 measurements. PICES Special Publication 3, 191 pp.

Ecology, 2004. Guidance for the Preparation of Quality Assurance Project Plans for Environmental Studies. http://www.ecy.wa.gov/biblio/0403030.html

Hofmann GE, TG Evans, MW Kelly, JL Padilla-Gamiño, CA Blanchette, L Washburn, F Chan, MA McManus, BA Menge, B Gaylord, TM Hill, E Sanford, M LaVigne, JM Rose, L Kapsenberg, JM Dutton. 2014. Exploring local adaptation and the ocean acidification seascape – studies in the California Current Large Marine Ecosystem. Biogeosciences, 11, 1053-1064.

Kammin, 2010. Definition developed or extensively edited by William Kammin, 2010.

Kroeker KJ, F Micheli, MC Gambi, TR Martz. 2011. Divergent ecosystem responses within a benthic marine community to ocean acidification. Proceedings of the National Academy of Sciences, 108, 14515-14520.

Martz TA, JG Connery, KS Johnson. 2010. Testing the Honeywell Durafet for seawater pH applications. Limnology and Oceanography: Methods, 8, 172-184.

Price NN, TA Martz, RE Brainard, JE Smith. 2012. Diel variability in seawater pH relates to calcification and benthic community structure on coral reefs. PLoS ONE 7(8): e43843.

Thom, RM, JL Gaeckle, KE Buenau, AB Borde, J Vavrinec, L Aston, DL Woodruff. 2014. Eelgrass (*Zostera marina* L.) restoration in Puget Sound: development and testing of tools for optimizing site selection. PNNL-23635. 62 pp.

USEPA, 1997. Glossary of Quality Assurance Terms and Related Acronyms. http://www.ecy.wa.gov/programs/eap/qa.html

USEPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4. http://www.epa.gov/quality/qs-docs/g4-final.pdf

USGS, 1998. Principles and Practices for Quality Assurance and Quality Control. Open-File Report 98-636. http://ma.water.usgs.gov/fhwa/products/ofr98-636.pdf

Vavrinec, J, AB Borde, RM Thom, SL Southard, J Elster, KD Hall, LM Aston, JL Gaeckle. 2014. Evaluation of potential eelgrass restoration sites: methods, results, and recommendations. PNNL-23502. 44 pp.

16.0 Appendices

Appendix A. IAA 14-02072 - Contract between WDFW and DNR

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

January 6, 2015

Mr. Jeff Gaeckle
Department of Natural Resources

Subject: WDFW Contract No. 14-02072, Eelgrass Restoration in Puget Sound

Enclosed is one original of the referenced contract. Please retain this original for your organization's records.

Please contact me via e-mail at Phillip.Thompson@dfw.wa.gov or (360) 902-2203 if you have any questions or concerns regarding this contract.

Sincerely,

Phillip Thompson
Deputy Contracts Officer

Washington Department of FISH and WILDLIFE

PUGET SOUND MARINE AND NEARSHORE GRANT PROGRAM
GRANT AGREEMENT

TITLE: Eelgrass Restoration in Puget Sound

WDFW NUMBER: 14-02072

GRANTEE: Department of Natural Resources

CONTRACT PERIOD: 10/27/2014 to 12/30/2016

TYPE: Payable / Grant / Other

CONTRACT VALUE: $500,000.00

A. PARTIES TO THIS CONTRACT

This contract is entered into between the Washington State Department of Fish and Wildlife (WDFW), 600 Capitol Way North, Olympia, WA 98501-1091; and Department of Natural Resources (Grantee), 1111 Washington St., Olympia, WA 98504-7041; and shall be binding upon the agents and all persons acting by or through the parties.

B. PURPOSE OF CONTRACT

The purpose of this contract is to provide a grant award to the Grantee for the project specified herein.

C. DESCRIPTION OF PROJECT

The Grantee shall perform the project as described in Attachments, which are incorporated herein by this reference:
Attachment "A" General Terms and Conditions
Attachment "B" Federal Provisions
Attachment "C" Contract/Project Summary
Attachment "D" Statement of Work

The Grantee is a subgrantee of federal funds as identified under "Federal Funding Information" in Attachment "C"

D. PERIOD OF PERFORMANCE

The performance period under this contract shall commence on 10/27/2014 and terminate on 12/30/2016. No expenditures made before or after this period are eligible for reimbursement unless incorporated by written amendment into this contract. The contract may be terminated or the performance period extended pursuant to terms set forth in Attachment "A."

E. COMPENSATION / PAYMENT

The total dollars provided by WDFW for this contract shall not exceed $500,000.00. The Grantee shall be responsible for all project costs exceeding this amount. Only eligible reimbursement activities that are in direct support of the project deliverables identified in this contract will be reimbursed. Any additional services provided by the Grantee must have prior written approval of WDFW.

Compensation for services rendered shall be payable upon receipt of properly completed invoices, which shall be submitted to the Project Manager by the Grantee not more often than monthly. The invoices shall describe the document to WDFW's satisfaction, a description of work performed, activities accomplished, or the progress of the project. The rates shall be in accordance with those herein agreed to.

Payment shall be considered timely if made by WDFW within 30 days after receipt of properly completed invoices. Payment shall be sent to the address designated by the Grantee. WDFW may, in its sole discretion, terminate the contract or withhold payments claimed by the Grantee for the services rendered if the Grantee fails to satisfactorily comply with any term or conditions of this contract.

F. RIGHTS AND OBLIGATIONS

All rights and obligations of the parties of this contract are subject to this contract, including the Attachments, which are incorporated herein by this reference. By signing this contract the Grantee acknowledges that they have read, fully understand, and agree to be bound by all terms and conditions set forth in this contract.

G. *COMPLIANCE WITH APPLICABLE STATUTES, RULES, AND WDFW POLICIES*

The Grantee shall comply with, all applicable state, federal, and local laws and regulations, including published WDFW policies, while performing under this contract

H. *ORDER OF PRECEDENCE*

In the event of an inconsistency in this contract, unless otherwise provided herein, the inconsistency shall be resolved by giving precedence in the following order:

Applicable Federal and State of Washington statutes and regulations.
Special Terms and Conditions (including Attachment "C" – Statement of Work) as contained in this basic contract instrument.
Attachment "A" - General Terms and Conditions.
Any other provision, term or material incorporated herein by reference or otherwise incorporated.

I. *CONTRACT REPRESENTATIVES*

The below named representatives for each of the parties shall be the contact people for all communications and billings regarding the performance of this contract. All written communications regarding this contract shall be sent to the designated representatives at the addresses below unless notified in writing of any change.

Grantee's Representative
Jeff Gaeckle
(360) 902-1030
jeffrey.gaeckle@Grantee.wa.gov

WDFW's Representative
Patricia Jatczak
(360)902-2597
Patricia.Jatczak@dfw.wa.gov

J. *ENTIRE CONTRACT*

This contract, along with all attachments and exhibits, constitutes the entire agreement of the parties. No other understandings, verbal or otherwise, regarding this contract shall exist or bind any of the parties.

K. *APPROVAL*

This contract shall be subject to the written approval of WDFW'S authorized representative and shall not be binding until so approved. This contract may be altered, amended, or waived only by a written amendment executed by both parties.

IN WITNESS WHERE, WDFW and the Grantee have signed this contract.

DEPARTMENT OF NATURAL RESOURCES

12/16/14
Signature and Date

Peter Goldmark CPL
Printed Name and Title

SEAL OF THE COMMISSIONER OF PUBLIC LANDS STATE OF WASHINGTON

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

12/19/14
Signature and Date

Jeffrey R. Hugdahl
Contracts and Purchasing Manager
Printed Name and Title

Attachment A -

GENERAL TERMS AND CONDITIONS
Grant Agreement
Federal Funds

DEFINITIONS
As used throughout this contract, the following terms shall have the meaning set forth below:

A. "AGENCY" shall mean the **Department of Fish and Wildlife** of the State of Washington, any division, section, office, unit or other entity of the AGENCY, or any of the officers or other officials lawfully representing that AGENCY.

B. "AGENT" shall mean the AGENCY Director, and/or the delegate authorized in writing to act on the Director's behalf.

C. "CFR" shall mean the Code of Federal Regulations. All references in the contract to CFR chapters or sections shall include any successor, amended or replacement regulations.

D. "GRANTEE" shall mean any organization or individual that is performing service(s) under this contract, and shall include all employees of the GRANTEE.

E. "RCW" shall mean the Revised Code of Washington. All references in the contract to RCW chapters or sections shall include any successor, amended or replacement statutes.

F. "Subcontractor" shall mean one not in the employment of the GRANTEE, who is performing all or part of those services under this contract under a separate contract with the GRANTEE. The terms "Subcontractor" and "Subcontractors" means Subcontractor(s) in any tier.

G. "USC" shall mean United States Code. All references in the contract to USC chapters or sections shall include any successor, amended or replacement statutes.

ACCESS TO DATA
In compliance with RCW 39.26.180, the GRANTEE shall provide access to data generated under this contract to AGENCY, the Joint Legislative Audit and Review Committee, and the State Auditor at no additional cost. This includes access to all information that supports the findings, conclusions, and recommendations of the GRANTEE'S reports, including computer models and methodology for those models.

ADVANCE PAYMENTS PROHIBITED
No payments in advance of or in anticipation of goods or services to be provided under this contract shall be made by the AGENCY.

AMENDMENTS
This contract may be amended by mutual agreement of the parties. Such amendments shall not be binding unless they are in writing and signed by personnel authorized to bind each of the parties.

AMERICANS WITH DISABILITIES ACT (ADA) OF 1990, PUBLIC LAW 101-336, also referred to as the "ADA" 28 CFR Part 35
Both parties shall comply with the ADA, which provides comprehensive civil rights protection to individuals with disabilities in the areas of employment, public accommodations, state and local government services, and telecommunications.

ASSIGNMENT
The work to be provided under this contract, and any claim arising thereunder, is not assignable or delegable by either party in whole or in part, without the express prior written consent of the other party, which consent shall not be unreasonably withheld.

ATTORNEYS' FEES
In the event of litigation or other action brought to enforce contract terms, each party agrees to bear its own attorney fees and costs.

BUY AMERICAN ACT
The GRANTEE shall comply with 41 USC 10a-10c (the "Buy American Act") by purchasing only American-made equipment and products with contract funds except articles, materials, and supplies — a) for use outside the United States; b) for which the cost would be unreasonable, as determined in accordance with federal regulations; c) for which the AGENCY determines that domestic preference would be inconsistent with the public interest; or d) that are not mined, produced, or manufactured in the United States in sufficient and reasonable available commercial quantities, of a satisfactory quality.

CENTRAL CONTRACTOR REGISTRATION AND DATA UNIVERSAL NUMBERING SYSTEM (DUNS)
Unless exempt under 2 CFR 25.110, the GRANTEE shall comply with 2 CFR 25 and be registered in the federal Central Contractor Registration (CCR) system; maintain an active CCR registration with current information at all times during the period of performance for this contract; and provide its DUNS number to the AGENCY.

CONFIDENTIALITY/SAFEGUARDING OF INFORMATION
The GRANTEE shall not use or disclose any information concerning the AGENCY, or information that may be classified as confidential, for any purpose not directly connected with the administration of this contract, except with prior written consent of the AGENCY, or as may be required by law.

CONFLICT OF INTEREST
Notwithstanding any determination by the Executive Ethics Board or other tribunal, the AGENCY may, in its sole discretion, by written notice to the GRANTEE terminate this contract if it is found after due notice and examination by the AGENT that there is a violation of the Ethics in Public Service Act, Chapter 42.52 RCW; or any similar statute involving the GRANTEE in the procurement of, or performance under this contract.
In the event this contract is terminated as provided above, the AGENCY shall be entitled to pursue the same remedies against the GRANTEE as it could pursue in the event of a breach of the contract by the GRANTEE. The rights and remedies of the AGENCY provided for in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law. The existence of facts upon which the AGENT makes any determination under this clause shall be an issue and may be reviewed as provided in the "Disputes" clause of this contract.

COST PRINCIPLES AND AUDIT REQUIREMENTS
The GRANTEE agrees to comply with the costs principles of the below listed federal regulations as appropriate for this contract:
OMB Circular A-87 (State, Local and Indian Tribal Governments)
OMB Circular A-21 (Educational Institutions)
OMB Circular A-122 (Nonprofit Organizations)
The GRANTEE agrees to comply with the organizational audit requirements of OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations, and further understands and agrees that funds may be withheld, or other related requirements may be imposed, if outstanding audit issues (if any) from OMB Circular A-133 audits (and any other audits of Contract funds) are not satisfactorily and promptly addressed.

COPYRIGHT PROVISIONS
Unless otherwise provided, all materials produced under this contract shall be considered "works for hire" as defined by the U.S. Copyright Act and shall be owned by the AGENCY. The AGENCY shall be considered the author of such materials. In the event the materials are not considered "works for hire" under the U.S. Copyright laws, the GRANTEE hereby irrevocably assigns all right, title, and interest in materials, including all intellectual property rights, to the AGENCY effective from the moment of creation of such materials.

Materials means all items in any format and includes, but is not limited to, data, reports, documents, pamphlets, advertisements, books, magazines, surveys, studies, computer programs, films, tapes, and/or sound reproductions. Ownership includes the right to copyright, patent, register and the ability to transfer these rights.

For materials that are delivered under the contract, but that incorporate pre-existing materials not produced under the contract, the GRANTEE hereby grants to the AGENCY a nonexclusive, royalty-free, irrevocable license (with rights to sublicense others) in such materials to translate, reproduce, distribute, prepare derivative works, publicly perform, and publicly display. The GRANTEE warrants and represents that the GRANTEE has all rights and permissions, including intellectual property rights, moral rights and rights of publicity, necessary to grant such a license to the AGENCY.

The GRANTEE shall exert all reasonable effort to advise the AGENCY, at the time of delivery of materials furnished under this contract, of all known or potential invasions of privacy contained therein and of any portion of such document that was not produced in the performance of this contract.

The AGENCY shall receive prompt written notice of each notice or claim of infringement received by the GRANTEE with respect to any data delivered under this contract. The AGENCY shall have the right to modify or remove any restrictive markings placed upon the data by the GRANTEE.

COVENANT AGAINST CONTINGENT FEES

The GRANTEE warrants that no person or selling agent has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, excepting bona fide employees or bona fide established agents maintained by the GRANTEE for securing business.
The AGENCY shall have the right, in the event of breach of this clause by the GRANTEE, to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration or recover by other means the full amount of such commission, percentage, brokerage or contingent fee.

DAVIS-BACON AND RELATED ACTS

If any work performed by the GRANTEE or Subcontractor employees is subject to the Davis Bacon Act and Davis-Bacon prevailing wage provisions contained in applicable federal laws, the GRANTEE shall ensure that they and their Subcontractor(s) a) pay at least once per week wages to GRANTEE and/or Subcontractor laborers and mechanics at a rate not less than the minimum wages specified in wage determinations made by the U.S. Department of Labor; and b) provide to the AGENCY each week U.S. Department of Labor Form WH-347 "Payroll (For Contractors Optional Use)" stating the wages paid to GRANTEE and /or Subcontractor laborers and mechanics engaged in work funded by this contract.

DISALLOWED COSTS

The GRANTEE is responsible for any audit exceptions or disallowed costs incurred by its own organization or that of its Subcontractors.

DISPUTES

Except as otherwise provided in this contract, when a dispute arises between the parties and it cannot be resolved by direct negotiation, either party may request a dispute hearing with AGENT.

1. The request for a dispute hearing must:

- Be in writing;
- State the disputed issue(s);
- State the relative positions of the parties;
- State the GRANTEE'S name, address, and contract number; and
- Be mailed to the AGENT and the other party's (respondent's) contract manager within 3 working calendar days after the parties agree that they cannot resolve the dispute.

2. The respondent shall send a written answer to the requester's statement to both the AGENT and the requester within 5 calendar days.
3. The AGENT shall review the written statements and reply in writing to both parties within 10 calendar days. The AGENT may extend this period if necessary by notifying the parties.
4. The parties agree that this dispute process shall precede any action in a judicial or quasi-judicial tribunal.

Nothing in this contract shall be construed to limit the parties' choice of a mutually acceptable alternate dispute resolution method in addition to the dispute resolution procedure outlined above.

DRUG-FREE WORKPLACE
The GRANTEE shall comply with the Drug-Free Workplace Act of 1988, 41 USC 701-707, as amended. Compliance with the Drug-Free Workplace Act includes publishing a drug-free workplace statement and establishing a drug-free awareness program for GRANTEE employees; and taking actions concerning GRANTEE employees who are convicted of violating drug statutes in the workplace. The GRANTEE shall provide written notice of a conviction of a GRANTEE employee of a drug violation in the workplace to the AGENCY within seven (7) calendar days after the GRANTEE learns of the conviction.

DUPLICATE PAYMENT
The AGENCY shall not pay the GRANTEE, if the GRANTEE has charged or will charge the State of Washington or any other party under any other contract or agreement, for the same services or expenses.

ENTIRE AGREEMENT
This contract contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this contract shall be deemed to exist or to bind any of the parties hereto.

EQUIPMENT MANAGEMENT
For the purposes of this contract, "Inventoriable Equipment" shall mean a tangible asset which has a service life of more than one year and with a unit cost of $5,000 or greater; and tangible assets with a unit cost of more than $300 that the AGENCY considers "small and attractive," such as engines, chain saws, communications equipment, global position systems, optical devices, cameras, microcomputer and related systems, smart phones and tablets, video equipment; and firearms, boats and motorized vehicles of any value.

If the GRANTEE uses contract funds to purchase Inventoriable Equipment, title to that Inventoriable Equipment shall be held by the AGENCY unless otherwise specified in this contract. The AGENCY's Inventoriable Equipment provided to the GRANTEE shall be used only for the performance of this contract. Title to the AGENCY's Inventoriable Equipment shall remain with the AGENCY.

The GRANTEE shall take reasonable steps to account for and protect Inventoriable Equipment from loss or damage; report to the AGENCY any loss or damage of such property; and take reasonable steps to protect such property from further damage. The GRANTEE shall surrender to the AGENCY all Inventoriable Equipment either provided by the AGENCY or purchased with contract funds upon the completion or termination of this contract.

FEDERAL DEBARMENT AND SUSPENSION
The GRANTEE certifies, that neither it nor its "principals" (as defined in 49 CFR 29.105) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Further, the GRANTEE agrees not to enter into any arrangements or other contracts with any party that is on the "List of Parties Excluded from Federal Procurement or Non-procurement Programs" which can be found at https://www.sam.gov.

FEDERAL FUNDING ACCOUNTABILITY AND TRANSPARENCY ACT
This contract is subject to the requirements of the Federal Funding Accountability and Transparency Act (FFATA) as stated in 2 CFR 170. The GRANTEE agrees to comply with applicable requirements to assist the AGENCY in reporting first-tier subawards of $25,000 or more and, in certain circumstances, in reporting the names and total compensation of the five most highly compensated executives of first-tier subgrantees of award funds. Such data will be submitted to the FFATA Subaward Reporting System (FSRS).

FINAL INVOICE
The GRANTEE shall submit the final invoice not later than 60 calendar days from the end of the contract period.

GOVERNANCE
This contract is entered into pursuant to and under the authority granted by the laws of the state of Washington and any applicable federal laws. The provisions of this contract shall be construed to conform to those laws.

In the event of an inconsistency in the terms of this contract, or between its terms and any applicable statute or rule, the inconsistency shall be resolved by giving precedence in the following order:

a. Applicable state and federal statutes and rules;
b. Statement of work; and
c. Any other provisions of the contract, including materials incorporated by reference.

GOVERNING LAW
This contract shall be construed and interpreted in accordance with the laws of the State of Washington, and the venue of any action brought hereunder shall be in the Superior Court for Thurston County.

INDEMNIFICATION
To the fullest extent permitted by law, the GRANTEE shall indemnify, defend, and hold harmless State, agencies of State and all officials, agents and employees of State, from and against all claims for injuries or death arising out of or resulting from the performance of the contract. "Claim," as used in this contract, means any financial loss, claim, suit, action, damage, or expense, including but not limited to attorney's fees, attributable for bodily injury, sickness, disease, or death, or injury to or destruction of tangible property including loss of use resulting therefrom.

The GRANTEE'S obligations to indemnify, defend, and hold harmless includes any claim by the GRANTEES' agents, employees, representatives, or any Subcontractor or its employees.

The GRANTEE expressly agrees to indemnify, defend, and hold harmless the State for any claim arising out of or incident to the GRANTEE'S or any Subcontractor's performance or failure to perform the contract. The GRANTEE'S obligation to indemnify, defend, and hold harmless the State shall not be eliminated or reduced by any actual or alleged concurrent negligence of State or its agents, agencies, employees and officials.

The GRANTEE waives its immunity under Title 51 RCW to the extent it is required to indemnify, defend and hold harmless State and its agencies, officials, agents or employees.

INDEPENDENT CAPACITY OF THE GRANTEE
The parties intend that an independent contractor relationship will be created by this contract. The GRANTEE and his or her employees or agents performing under this contract are not employees or agents of the AGENCY. The GRANTEE will not hold himself/herself out as or claim to be an officer or employee of the AGENCY or of the State of Washington by reason hereof, nor will the GRANTEE make any claim of right, privilege or benefit that would accrue to such employee under law. Conduct and control of the work will be solely with the GRANTEE.

INDUSTRIAL INSURANCE COVERAGE
The GRANTEE shall comply with the provisions of Title 51 RCW, Industrial Insurance. If the GRANTEE fails

to provide industrial insurance coverage or fails to pay premiums or penalties on behalf of its employees, as may be required by law, the AGENCY may collect from the GRANTEE the full amount payable to the Industrial Insurance accident fund. The AGENCY may deduct the amount owed by the GRANTEE to the accident fund from the amount payable to the GRANTEE by the AGENCY under this contract, and transmit the deducted amount to the Department of Labor and Industries, (L&I) Division of Insurance Services. This provision does not waive any of L&I's rights to collect from the GRANTEE.

INSURANCE

The GRANTEE shall provide insurance coverage as set out in this section. The intent of the required insurance is to protect the state should there be any claims, suits, actions, costs, damages or expenses arising from any negligent or intentional act or omission of the GRANTEE or Subcontractor, or agents of either, while performing under the terms of this contract.

The GRANTEE shall provide insurance coverage, which shall be maintained in full force and effect during the term of this contract, as follows:

1. Commercial General Liability Insurance Policy. Provide a Commercial General Liability Insurance Policy, including contractual liability, in adequate quantity to protect against legal liability arising out of contract activity but no less than $1,000,000 per occurrence. Additionally, the GRANTEE is responsible for ensuring that any Subcontractors provide adequate insurance coverage for the activities arising out of subcontracts.
2. Automobile Liability. In the event that services delivered pursuant to this contract involve the use of vehicles, either owned or unowned by the GRANTEE, automobile liability insurance shall be required. The minimum limit for automobile liability is $1,000,000 per occurrence, using a Combined Single Limit for bodily injury and property damage.
3. The insurance required shall be issued by an insurance company/ies authorized to do business within the state of Washington, and shall name the state of Washington, its agents and employees as additional insureds under the insurance policy/ies. All policies shall be primary to any other valid and collectable insurance. GRANTEE shall instruct the insurers to give AGENCY thirty (30) calendar days advance notice of any insurance cancellation.

If the GRANTEE is self-insured, evidence of its status as a self-insured entity shall be provided to the AGENCY. If requested by the AGENCY, the GRANTEE must describe its financial condition and the self-insured funding mechanism.

The GRANTEE shall submit to AGENCY within fifteen (15) calendar days of the contract effective date, a certificate of insurance or evidence of its status as a self-insured entity that outlines the coverage and limits defined in this section. The GRANTEE shall submit renewal certificates as appropriate during the term of the contract; the failure of the AGENCY to enforce this term in no way reduces the GRANTEE's responsibilities under this section.

LICENSING, ACCREDITATION AND REGISTRATION

The GRANTEE shall comply with all applicable local, state, and federal licensing, accreditation and registration requirements/standards, necessary for the performance of this contract.

LIMITATION OF AUTHORITY

Only the AGENT or AGENT'S delegate by writing (delegation to be made prior to action) shall have the express, implied, or apparent authority to alter, amend, modify, or waive any clause or condition of this contract. Furthermore, any alteration, amendment, modification, or waiver or any clause or condition of this contract is not effective or binding unless made in writing and signed by the AGENT.

MATCHING FUNDS

The GRANTEE shall be responsible for providing matching funds as indicated in the contract (if any). If the GRANTEE is responsible for matching funds they shall state the amount of match used during the billing

period and the cumulative amount of match used to date on every invoice submitted for payment to the AGENCY.

The GRANTEE shall comply with the uniform administrative rules on matching or cost sharing for Federal grants and cooperative agreements and subawards as appropriate for this contract:

Federal Grantor Agency: Matching or Cost Sharing Standards
Department of Agriculture: 7 CFR Section 3016.24
Department of Commerce: 15 CFR Section 24.24
Department of Defense: 32 CFR Section 33.24
Department of the Interior: 43 CFR Section12.64
Environmental Protection Agency: 40 CFR Section 31.24

MINORITY, WOMEN AND VETERAN-OWNED BUSINESSES

The AGENCY encourages participation by minority and women-owned business enterprises certified by the Office of Minority and Women's Business Enterprises (OMWBE); and veteran-owned businesses certified by the Department of Veteran's Affairs (DVA). If any part of this contract is subcontracted to an OMWBE or DVA-certified firm the GRANTEE shall submit a statement of participation indicating what OMWBE or DVA certified firm was used and the dollar amount of their subcontracts.

NONDISCRIMINATION

During the performance of this contract, both parties shall comply with all federal and state nondiscrimination laws, regulations and policies. In the event of the GRANTEE'S non-compliance or refusal to comply with any nondiscrimination law, regulation, or policy, this contract may be rescinded, canceled or terminated in whole or in part, and the GRANTEE may be declared ineligible for further contracts with the AGENCY. The GRANTEE shall, however, be given a reasonable time in which to cure this noncompliance. Any dispute may be resolved in accordance with the "Disputes" procedure set forth herein.

PREVAILING WAGE

If any work performed by the GRANTEE or its Subcontractors is subject to Chapter 39.12 of the Revised Code of Washington, the GRANTEE shall ensure that the GRANTEE and its Subcontractors pay the prevailing rate of wages to all GRANTEE and/or Subcontractor workers, laborers or mechanics in the performance of any part of the work described in the contract in accordance with state law and Department of Labor and Industries rules and regulations.

PRIVACY

Personal information including, but not limited to, "Protected Health Information," collected, used, or acquired in connection with this contract shall be protected against unauthorized use, disclosure, modification or loss. The GRANTEE shall ensure its directors, officers, employees, Subcontractors or agents use personal information solely for the purposes of accomplishing the services set forth herein. The GRANTEE and its Subcontractors agree not to release, divulge, publish, transfer, sell or otherwise make known to unauthorized persons personal information without the express written consent of the AGENCY or as otherwise required by law.

Any breach of this provision may result in termination of the contract and the demand for return of all personal information. The GRANTEE agrees to indemnify and hold harmless the AGENCY for any damages related to the GRANTEE'S unauthorized use of personal information.

RECORDS MAINTENANCE

The parties to this contract shall each maintain books, records, documents and other evidence which sufficiently and properly reflect all direct and indirect costs expended by either party in the performance of the services described herein. These records shall be subject to inspection, review or audit by personnel of both parties, other personnel duly authorized by either party, the Office of the State Auditor, and federal officials so authorized by law. All books, records, documents, and other material relevant to this contract will be retained for six years after expiration and the Office of the State Auditor, federal auditors, and any persons duly authorized by the parties shall have full access and the right to examine any of these materials during this period.

Records and other documents, in any medium, furnished by one party to this contract to the other party, will remain the property of the furnishing party, unless otherwise agreed. The receiving party will not disclose or make available this material to any third parties without first giving notice to the furnishing party and giving it a reasonable opportunity to respond. Each party will utilize reasonable security procedures and protections to assure that records and documents provided by the other party are not erroneously disclosed to third parties.

RESTRICTIONS ON LOBBYING
The GRANTEE certifies that under the requirements of Lobbying Disclosure Act, 2 USC, Section 1601 et seq., no Federal appropriated funds have been paid or will be paid, by or on behalf of the GRANTEE, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

RIGHT OF INSPECTION
The GRANTEE shall provide right of access to its facilities to the AGENCY, or any of its officers, or to any other authorized agent or official of the state of Washington or the federal government, at all reasonable times, in order to monitor and evaluate performance, compliance, and/or quality assurance under this contract.

SAVINGS
In the event funding from state, federal, or other sources is withdrawn, reduced, or limited in any way after the effective date of this contract and prior to normal completion, the AGENCY may terminate the contract under the "Termination " clause, without the thirty-day notice requirement, subject to renegotiation at the AGENCY'S discretion under those new funding limitations and conditions.

SEVERABILITY
The provisions of this contract are intended to be severable. If any term or provision is illegal or invalid for any reason whatsoever, such illegality or invalidity shall not affect the validity of the remainder of the contract.

SITE SECURITY
While on AGENCY premises, the GRANTEE, its agents, employees, or Subcontractors shall conform in all respects with physical, fire or other security policies or regulations.

STATEWIDE VENDOR PAYMENT REGISTRATION
The GRANTEE is required to be registered in the Statewide Vendor Payment System prior to submitting a request for payment under this contract. The Washington State Department of Enterprise Services (DES) maintains the Statewide Vendor Payment System; to obtain registration materials contact the Statewide Payee Desk at (360) 407-8180; or go to:
http://des.wa.gov/services/ContractingPurchasing/Business/VendorPay/Pages/default.aspx.

SUBCONTRACTING
Neither the GRANTEE nor any Subcontractor(s) shall enter into subcontracts for any of the work contemplated under this contract without obtaining prior written approval of the AGENCY. In no event shall the existence of the subcontract operate to release or reduce the liability of the GRANTEE to the AGENCY for any breach in the performance of the GRANTEE'S duties. This clause does not include contracts of employment between the GRANTEE and personnel assigned to work under this contract.
Additionally, the GRANTEE is responsible for ensuring that all terms, conditions, assurances and certifications set forth in this contract are carried forward to any subcontracts. The GRANTEE and its Subcontractors agree not to release, divulge, publish, transfer, sell or otherwise make known to unauthorized persons personal information without the express written consent of the AGENCY or as provided by law.

TERMINATION
Except as otherwise provided in this contract, the AGENCY may, by 10 calendar days written notice,

beginning on the second day after the mailing, terminate this contract, in whole or in part. If this contract is so terminated, the AGENCY shall be liable only for payment required under the terms of this contract for services rendered or goods delivered prior to the effective date of termination.

TERMINATION FOR CAUSE

In the event the AGENCY determines the GRANTEE has failed to comply with the conditions of this contract in a timely manner, the AGENCY has the right to suspend or terminate this contract. Before suspending or terminating the contract, the AGENCY shall notify the GRANTEE in writing of the need to take corrective action. If corrective action is not taken within 30 calendar days, the contract may be terminated or suspended. The AGENCY reserves the right to suspend all or part of the contract, withhold further payments, or prohibit the GRANTEE from incurring additional obligations of funds during investigation of the alleged compliance breach and pending corrective action by the GRANTEE or a decision by the AGENCY to terminate the contract. A termination shall be deemed a "Termination for Convenience" if it is determined that the GRANTEE: (1) was not in default; or (2) failure to perform was outside of his or her control, fault or negligence. The rights and remedies of the AGENCY provided in this contract are not exclusive and are, in addition to any other rights and remedies, provided by law.

TERMINATION PROCEDURES

Upon termination of this contract, the AGENCY, in addition to any other rights provided in this contract, may require the GRANTEE to deliver to the AGENCY any property specifically produced or acquired for the performance of such part of this contract as has been terminated. The provisions of the "Treatment of Assets" clause shall apply in such property transfer.

The AGENCY shall pay to the GRANTEE the agreed upon price, if separately stated, for completed work and services accepted by the AGENCY, and the amount agreed upon by the GRANTEE and the AGENCY for (i) completed work and services for which no separate price is stated, (ii) partially completed work and services, (iii) other property or services that are accepted by the AGENCY, and (iv) the protection and preservation of property, unless the termination is for default, in which case the AGENT shall determine the extent of the liability of the AGENCY. Failure to agree with such determination shall be a dispute within the meaning of the "Disputes" clause of this contract. The AGENCY may withhold from any amounts due the GRANTEE such sum as the AGENT determines to be necessary to protect the AGENCY against potential loss or liability.

The rights and remedies of the AGENCY provided in this section shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

After receipt of a notice of termination, and except as otherwise directed by the AGENT, the GRANTEE shall:

1. Stop work under the contract on the date, and to the extent specified, in the notice;
2. Place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the work under the contract that is not terminated;
3. Assign to the AGENCY, in the manner, at the times, and to the extent directed by the AGENT, all of the rights, title, and interest of the GRANTEE under the orders and subcontracts so terminated, in which case the AGENCY has the right, at its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;
4. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the AGENT to the extent AGENT may require, which approval or ratification shall be final for all the purposes of this clause;
5. Transfer title to the AGENCY and deliver in the manner, at the times, and to the extent directed by the AGENT any property which, if the contract had been completed, would have been required to be furnished to the AGENCY;
6. Complete performance of such part of the work as shall not have been terminated by the AGENT; and
7. Take such action as may be necessary, or as the AGENT may direct, for the protection and preservation of the property related to this contract, which is in the possession of the GRANTEE and in which the AGENCY has or may acquire an interest.

TRAFFICKING VICTIMS PROTECTION ACT
As described in 2 CFR Part 175 the AGENCY may terminate this contract, without penalty, if the GRANTEE is found to be in violation of the Trafficking Victims Protection Act of 2000

UNIFORM ADMINISTRATIVE REQUIREMENTS FOR GRANTS AND COOPERATIVE AGREEMENTS
The GRANTEE shall comply with the uniform administrative rules for Federal grants and cooperative agreements and subawards as appropriate for this contract:

Federal Grantor Agency	State/Local Govt.	Higher Ed, Non-Profit and Commercial Organizations
Department of Agriculture	7 CFR Part 301	67 CFR Part 3019
Department of Commerce	15 CFR Part 24	15 CFR Part 14
Department of Defense	32 CFR Part 33	32 CFR Part 32
Department of the Interior	43 CFR Part 12 (C)	43 CFR Part 12 (F)
Environmental Protection Agency	40 CFR Part 31	40 CFR Part 30

WAIVER
A failure by either party to exercise its rights under this contract shall not preclude that party from subsequent exercise of such rights and shall not constitute a waiver of any other rights under this contract unless stated to be such in a writing signed by an authorized representative of the party and attached to the original contract.

APPROVED AS TO FORM BY THE OFFICE OF THE ATTORNEY GENERAL 1/28/2014

ATTACHMENT B

FEDERAL PROVISIONS

The Grantee shall comply with all applicable federal, State, and local laws, rules, and regulations in carrying out the terms and conditions of this Agreement.

Administrative Conditions

1. CIVIL RIGHTS OBLIGATIONS

a)**GENERAL**

This term and condition incorporates by reference the signed assurance provided by the grantee's authorized representative on: 1) EPA Form 4700-4, "Preaward Compliance Review Report for All Applicants and Grantees Requesting EPA Financial Assistance"; and 2) Standard Form 4248 or Standard Form 424D, as applicable. These assurances and this term and condition obligate the grantee to comply fully with applicable civil rights statutes and implementing EPA regulations.

b)**TITLE VI- LEP, Public Participation and Affirmative Compliance Obligation**

- As a grantee of EPA financial assistance, you are required by Title VI of the Civil Rights Act to provide meaningful access to LEP individuals. In implementing that requirement, the granteeagrees to use as a guide the Office of Civil Rights (OCR) document entitled *"Guidance to Environmental Protection Agency Financial* Assistance *Grantees Regarding Title VI Prohibition Against National Origin Discrimination Affecting Limited English Proficient Persons."* The guidance can be found at
  http://frwebgate.access.gpo.gov/cgi-binlgetdoc.cgi?dbname=2004 register&docid=fr25jn04-79.pd
  - If the grantee is administering permitting programs under this agreement, the grantee agrees to use as a guide OCR's Title VI Public Involvement Guidance for EPA Assistance Grantees Administering Environmental Permitting Programs. The Guidance can be found at http://edocket.access.gpo.gov/2006/pdf/06-2691.pdf.
  - In accepting this assistance agreement, the grantee acknowledges it has an affirmative obligation to implement effective Title VI compliance programs and ensure that its actions do not involve discriminatory treatment and do not have discriminatory effects even when facially neutral. The grantee must be prepared to demonstrate to EPA that such compliance programs exist and are being implemented or to otherwise demonstrate how it is meeting its Title VI obligations.

2. Contract *Work Hours and Safety Standards Act (40 U.S.C. 327-333)*

Where applicable, all contracts awarded by grantees in excess of $2000 for construction contracts and in excess of $2500 for other contracts that involve the employment of mechanics or laborers shall include a provision for compliance with Sections 102 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333), as supplemented by Department of Labor regulations (29 CFR part 5). Under Section 102 of the Act, each contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than 1 1/2 times the basic rate of pay for all hours worked in excess of 40 hours in the work week. Section 107 of

the Act is applicable to construction work and provides that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

3. **Copeland "Anti-Kickback" Act**
   All contracts and subgrants in excess of $2000 for construction or repair awarded by grantees and subgrantees shall include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874), as supplemented by Department of Labor regulations (29 CFR part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subgrantee shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled. The grantee shall report all suspected or reported violations to the Federal awarding agency.

4. **Disadvantaged Business enterprise Requirements, General Compliance**
   Grantee agrees to comply with the requirements of EPA's Program for Utilization of Small, Minority and Women's Business Enterprises in procurement under assistance agreements, contained in 40 CFR, Part 33.

5. **Federal Employees**
   No Subcontract or grant funds may be used to provide any Federal Employee transportation assistance, reimbursement, and any other expense.

6. **FY12 APPR ACT: Unpaid Federal Tax liabilities and Federal Felony Convictions**
   This award is subject to the provisions contained in the Department of Interior, Environment, and Related Agencies Appropriations Act, 2012, HR 2055, Division E, Sections 433 and 434 regarding unpaid federal tax liabilities and federal felony convictions. Accordingly, by accepting this award the grantee ackmowledges that it (1) is not subject to any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuanft to an agreement with the aurthority responsible for collecting the tax liability, and (2) has not been convicted (or had an officer or agent acting on its behalf convicted) of a felony criminal conviction under and Federal law within 24 months preceding the award, unless EPA has considered suspension or debarment of the corporation, or such officer or agent, based on these tax liabiliites or convictions and determined that such action is not necessary to such action is not necessary to protect the Government's interests. If the grantee fails to comply with these provisions, EPA will annul this agreement and may recover any fundsthe grantee has expended in violation of sections 433 and 434.

7. **Fly America Act**
   The Contractor agrees to comply with 49 USC 40118 (the "Fly America" act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that grantees and subgrantees of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the

requirements of this section in all subcontracts that may involve international air transportation.

8. **Hotel-Motel Fire Safety Act**
   Pursuant to 40 CFR 30.18, if applicable, and 15 USC 2225a, Grantee agrees to ensure that all space for conferences, meetings, conventions, or training seminars funded in whole or in part with federal funds complies with the protection and control guidelines of the Hotel and Motel Fire Safety Act (PL 101-391, as amended. Grantee may search the Hotel-Motel National Master List at: http://www.usfa.dhs.gov/applications/hotel to see if a property is in compliance (FEMA ID is currently not required), or to find other information about the Act.

9. **Management Fees**
   Management fees or similar charges in excess of the direct costs and approved indirect rates are not allowable. The term "management fees or similar charges" refers to expenses added to the direct costs in order to accumulate and reserve funds for ongoing business expenses, unforeseen liabilities, or for other similar costs which are not allowable under this assistance agreement. Management fees or similar charges may not be used to improve or expand the project funded under this Agreement, except to the extent authorized as a direct cost of carrying out the scope of work.

10. **Recovered Materials**
    The Contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 USC 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

11. **Recycled Paper**

Institutions of Higher Education Hospitals and Non-Profit Organizations

In accordance with 40 CFR 30.16, Grantee agrees to use recycled paper and double-sided printing for all reports which are prepared as a part of this Agreement and delivered to EPA. This requirement does not apply to reports prepared on forms supplied by EPA, or to Standard Forms, which are printed on recycled paper and are available through the General Services Administration.

State Agencies and Political Subdivisions

In accordance with Section 6002 of the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6962) any State agency or agency of a political subdivision of a State which is using appropriated Federal funds shall comply with the requirements set forth. Regulations issued under RCRA Section 6002 apply to any acquisition of an item where the purchase price exceeds $10,000 or where the quantity of such items acquired in the course of the preceding fiscal year was $10,000 or more. RCRA Section 6002 requires that preference be given in procurement programs to the purchases of specific products containing recycled materials identified in guidelines developed by EPA. These guidelines are listed in 40 CFR 247.

State and Local Institutions of Higher Education and Non-Profit Organizations
In accordance with 40 CFR 30.16, State and local institutions of higher education, hospitals, and non-profit organizations that receive direct Federal funds shall give preference in their procurement programs funded with Federal funds to the purchase of recycled products pursuant to EPA's guidelines.

State Tribal and Local Government Grantees

In accordance with the policies set forth in EPA Order 1000.25 and Executive Order 13423, Strengthening Federal Environmental, Energy and Transportation Management (January 24, 2007), Grantee agrees to use recycled paper and double sided printing for all reports which

are prepared a part of this Agreement and delivered to EPA. This requirement does not apply to reports prepared on forms supplied by EPA, or to Standard Forms, which are printed on recycled paper and are available through the General Services Administration.

12. Reimbursement Limitation

If Grantee expends more than the amount of federal funding in its approved budget in anticipation of receiving additional funds, it does so at its own risk. The Federal Government is not legally obligated to reimburse Grantee for costs incurred in excess of the approved budget.

13. Rights to Inventions Made Under a Contract or Agreement

Contracts or agreements for the performance of experimental, developmental, or research work shall provide for the rights of the Federal Government and the grantee in any resulting invention in accordance with 37 CFR part 401, "Rights to Inventions made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

14. Sub-Awards

If Grantee makes sub-awards under this Agreement, Grantee is responsible for selecting its sub-awardees and, if applicable, for conducting sub-award competitions. Grantee agrees to:

1. Establish all sub-award agreements in writing;
2. Maintain primary responsibility for ensuring successful completion of the approved project (GRANTEE CANNOT DELEGATE OR TRANSFER THIS RESPONSIBILITY TO A SUB-AWARDEE).
3. Ensure that any sub-awards comply with the standards in Section 210(a)-(d) of OMB Circular A-133, and are not used to acquire commercial goods or services for the sub-awardee.
4. Ensure that any sub-awards to 501(c)(4) organizations do not involve lobbying activities;
5. Monitor the performance of sub-awardees, and ensure sub-awardees comply with all applicable regulations, statutes, and terms and conditions which flow down in the sub-award;
6. Obtain DFW's consent before making a sub-award to a foreign or international organization, or a sub-award to be performed in a foreign country; and
7. Obtain approval from DFW for any new sub-award work that is not outlined in the approved work plan in accordance with 40 CFR Parts 30.25 and 31.30, as applicable.

Programmatic Conditions:

1.Recognition of EPA Funding

Reports, documents, signage, videos, or other media, developed as part of projects funded by this Agreement shall contain the following statement:

> "THIS PROJECT HAS BEEN FUNDED WHOLLY OR IN PART BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY UNDER ASSISTANCE AGREEMENT PC 00J29801 TO WASHINGTON DEPARTMENT OF FISH AND WILDLIFE. THE CONTENTS OF THIS DOCUMENT DO NOT NECESSARILY REFLECT THE VIEWS AND POLICIES OF THE ENVIRONMENTAL PROTECTION AGENCY, NOR DOES MENTION OF TRADE NAMES OR COMMERCIAL PRODUCTS CONSTITUTE ENDORSEMENT OR RECOMMENDATION FOR USE."

2.Copyrighted Material

EPA has the right to reproduce, publish, use, and authorize others to use copyrighted works or other data developed under this assistance agreement for Federal purposes.

DFW acknowledges that EPA may authorize another grantee to use copyrighted works or other data developed under this Agreement as a result of: a) the selection of another grantee by EPA to perform a project that will involve the use of the copyrighted works or other data or; b) termination or expiration of this agreement.

3.Peer Review

The results of this project may affect management decisions relating to Puget Sound. Prior to finalizing any significant technical products the Principal Investigator (PI) of this project must solicit advice, review and feedback from a technical review or advisory group consisting of relevant subject matter specialists. A record of comments and a brief description of how respective comments are addressed by the PI will be provided to the DFW Program Manager prior to releasing any final reports or products resulting from the funded study.

4.Environmental Data and Information Technology

Grantees are required to institute standardized reporting requirements into their work plans and include such costs in their budgets. All environmental data will be required to be entered into the EPA's Storage and Retrieval data system (STORET). The best method (local or state consolidated) for reporting will be determined on a project-by-project basis between the DFW grant manager and grantee. More information about STORET can be found at http://www.epa.gov/STORET.

8. Program Income

If program income is generated, the sub- grantee is required to account for program income related to this project. Program income earned during the project period shall be retained by the grantee and shall be added to funds committed to the project, and shall be used to further eligible project objectives.

9. Electronic and Information Technology Accessibility

Subgrantees are subject to the program accessibility provisions of Section 504 of the Rehabilitation Act, codified in 40 CFR Part 7, which includes an obligation to provide individuals with disabilities reasonable accommodations and an equal and effective

opportunity to benefit from or participate in a program, including those offered through electronic and information technology ("EIT"). In compliance with Section 504, EIT systems or products funded by this award must be designed to meet the diverse needs of users (e.g., U.S. public, grantee personnel) without barriers or diminished function or quality. Systems shall include usability features or functions that accommodate the needs of persons with disabilities, including those who use assistive technology. At this time a subgrantee's websites, interactive tools, and other EIT as being in compliance with Section 504 if such technologies meet standards established under Section 508 of the Rehabilitation Act, codified at 36 CFR Part 1194. While Section 508 does not apply directly, we encourage grantees to follow either the 508 guidelines or other comparable guidelines that concern accessibility to EIT for individuals with disabilities.

10. Riparian Buffers

Riparian buffer restoration projects in agricultural areas shall be consistent with the interim riparian buffer recommendations provided to EPA and the Natural Resource Conservation Service by National Marine Fisheries Service letters of February 4, 2013 and April 9, 2013, or the October 28, 2013 guidance previously agreed to by Lead Organizations (LOs) (see attachments). LOs shall confirm in writing projects' consistency with the recommendations referenced above. When evaluating project proposals, LOs also should consider the extent to which proposals include appropriate riparian buffers or otherwise address pollution sources on other water courses on the properties in the project area to support water quality and salmon recovery. Deviations can only be obtained through an exception approved by EPA. In order for EPA to evaluate a request for an exception, the LO must submit the scientific rationale demonstrating adequacy of buffers for supporting water quality and salmon recovery. The request must summarize tribal input on the scientific rationale or other relevant issues. The scientific rationale could be developed from sources such as site-specific assessment data, salmon recovery plans, Total Maximum Daily Loads (TMDLs) and the state nonpoint plan. EPA will confer with the National Oceanic and Atmospheric Administration (NOAA) and the Washington Department of Ecology and provide the opportunity for affected tribes to consult with EPA before making a final decision on a deviation request.

Attachment C -

CONTRACT/PROJECT SUMMARY

TITLE: Eelgrass Restoration in Puget Sound	**WDFW CONTRACT NUMBER:** 14-02072
PERIOD: 10/27/2014 to 12/30/2016 **GRANTEE:** Department of Natural Resources **GRANTEE CONTACT:** Jeff Gaeckle (360) 902-1030 **CONTRACT TYPE:** Payable / Grant / Other	**WDFW MANAGER:** Patricia Jatczak 3609022597

SUMMARY CONTRACT DESCRIPTION:

-This grant will implement the results of the "20% More Eelgrass by 2020" project and conduct eelgrass plantings at select locations throughout Puget Sound and monitor restoration sites in order to provide information about the conditions and factors influencing the success of the plantings.

Master Index Number(s): 33511

CFDA Number	Award Year	Award Number	Research & Development?
66.123 Puget Sound Action Agenda: Technical Investigations and Implementation Assistance/Environmental Protection Agency	2014	PC-00J90701	No

Attachment D -

STATEMENT OF WORK

Eelgrass Restoration in Puget Sound

Washington Department of Natural Resources

Statement of Work

SCOPE & OBJECTIVES

Eelgrass is an ecologically critical component of the Puget Sound food chain, supporting forage fish, salmon, and crabs and benefitting larger species that feed on them. In addition, research suggests that eelgrass may play a role in buffering local effects of ocean acidification, which is an emerging threat to Puget Sound. Through the eelgrass restoration model developed in the "20% More Eelgrass by 2020" project, the eelgrass restoration in Puget Sound project seeks to achieve measurable results by strategically targeting eelgrass plantings in areas that have a strong likelihood for success. In addition to eelgrass transplants, the project seeks to establish and strengthen partnerships with local entities that can be involved in eelgrass science, restoration, and monitoring.

The objectives of this project are to:

- Implement the results of the "20% More Eelgrass by 2020" project and conduct eelgrass plantings at select locations throughout Puget Sound
- Conduct test plantings to identify additional areas with the potential for successful eelgrass restoration
- Monitor restoration sites in order to provide information about the conditions and factors influencing the success of the plantings
- Gather data that will contribute to understanding the role eelgrass plays in buffering ocean acidification
- Advance the eelgrass recovery target while contributing to other recovery targets related to eelgrass, such as marine water quality and essential fish habitat (e.g., salmonids and herring)
- Provide analysis of the restoration effort and outcomes that will inform and support future eelgrass recovery work
- Establish and strengthen partnerships with local entities that can be involved in eelgrass science, restoration, and monitoring

TASKS & DELIVERABLES

Task 1: Project Management and Reporting

Grantee will communicate with Grant Program staff through regular meetings, phone calls, email updates, and progress reports. GRANTEE will provide the Grant Program with a detailed project plan and timeline to align expectations and ensure outcomes of the project are achieved on schedule and within budget. GRANTEE will contact other organizations to determine opportunities to partner on project implementation and to sub-contract portions of the project tasks as appropriate. GRANTEE will enter into sub-contractor or other partnership agreements, as appropriate, and maintain working relationships. The following items are also included in Task 1.

1.) **GRANTEE will prepare a detailed project plan to ensure expectations are aligned. It will include descriptions of partner roles, selected sites for plantings, the data or rationale supporting the selection of these sites, characteristics of the sites such as size of the area to be restored, and a detailed description of the monitoring plan for these sites.**

Deliverable 1.1: Detailed project plan and timeline
Target Completion Date: January 2015
Estimated Cost: *match*

2.) **GRANTEE will prepare a Quality Assurance Project Plan (QAPP). The format for the QAPP will follow what is prescribed by the Washington State Department of Ecology, a format approved by the US EPA. A NEP Waiver Form will be submitted, and a QAPP will be completed and approved by Department of Ecology's QA Officer before conducting any work related to collecting environmental data. The QAPP and the NEP Waiver form will be combined into one document and submitted for approval. All work under this project must be conducted according to an approved QAPP.**

Deliverable 1.2: A NEP Waiver Form, and an approved QAPP for the project
Target Completion Date: May 2015
Estimated Cost: *$10,000.00*

3.) **GRANTEE will provide bi-annual progress reports (FEATS) describing the work completed for the Grant Program during the reporting period. GRANTEE will submit these reports to the Grant Program by October 15 and April 15 of each year. Progress reports shall include, at a minimum:**

a. **A description of the work completed in the reporting period, including costs to-date and costs reimbursed**
b. **The status and completion date for the project activities**
c. **Description of any problems or circumstances affecting the completion date, scope of work, or costs**
d. **Project highlights**

Deliverable 1.3: Bi-annual FEATS reporting
Target Completion Date: Bi-annually by October 15 and April 15 of each year
Estimated Cost: *match*

4.) **Final presentation/meeting with the Grant Program staff, stakeholders, and subject-matter experts to review project results and discuss the intersection of this project with other efforts. Funds are available for registration and travel to regional, national or international conference.**

Deliverable 1.4: **Coordination meeting notes/summary**
Target Completion Date: **December 2016**
Estimated Cost: ***$2000.00***

5.) **GRANTEE will submit a final performance report (FEATS), as well as a 2-3 page narrative report, to the Grant Program at the completion of the project. These reports will cover the entire reporting period and also summarize the basic project accomplishments, as well as identify key lessons related to planning, design, execution, and evaluation.**

Deliverable 1.5: **Final FEATS and narrative reports**
Target Completion Date: **April 2017**
Estimated Cost: ***match***

Total Cost for Task 1, parts 1.1 + 1.2 + 1.3 + 1.4 + 1.5: $12,000.00

Task 2: Eelgrass Transplanting

GRANTEE will implement eelgrass plantings in 2015 at select sites throughout Puget Sound. These sites will have been selected for their high probability of restoration success, based on data from the "20% More Eelgrass by 2020" project. The project will also include test plantings at sites selected using the 20% More Eelgrass by 2020 model for their high likelihood of success, with at least one follow up round of plantings in 2016 to supplement the original sites or the test transplant sites. Updates on the plantings will be given through quarterly progress reports,

in which GRANTEE will provide a narrative description of planting efforts, any delays or problems, and project updates.

Deliverable 2.1A-G: Seven quarterly progress reports on status of eelgrass transplant efforts
Target Completion Date: March, June, September and December 2015, and March, June, September 2016
Estimated Cost: *$45,000.00* (for each report)
Total Cost for Task 2, parts A-G: $315,000.00

Task 3: Monitoring and Data Collection

GRANTEE will monitor eelgrass planting sites as outlined in the detailed project plan and QAPP. Monitoring will involve collecting pre-planting baseline and post-planting monitoring data, as well as gathering data related to ocean acidification. Ocean acidification and other environmental data collection will require the purchase and maintenance of sensors. Updates on monitoring efforts will be given through quarterly progress reports, in which GRANTEE will provide a narrative description of monitoring efforts and data collected, any delays or problems, and project updates.

Deliverable 3.1: Environmental monitoring equipment to measure ocean acidification and other site specific parameters.
Target Completion Date: December 2015
Estimated Cost: *$50,000.00*

Deliverable 3.2A-G: Seven quarterly progress reports on the status of transplant monitoring efforts
Target Completion Date: March, June, September and December 2015, and March, June, September 2016
Estimated Cost: *$14,000.00* (for each report), *$98,000.00* (total)

Total Cost for Task 3, 3.1 + 3.2: $148,000.00

Task 4: Final Report

At the culmination of the project, GRANTEE will provide a final report summarizing the project, including methods, the work done, the data collected, the results and conclusions, and suggestions for future areas of work or research. The report will provide an analysis of the restoration effort and outcomes that will inform and support future eelgrass recovery work across the region.

Deliverable 4.1: Draft final report prepared for peer review
Target Completion Date: October 2016
Estimated Cost: *$20,000.00*
Deliverable 4.2: Final report, plus a summary of the peer review including reviewer information, a record of comments, and discussion of how they were addressed
Target Completion Date: December 2016
Estimated Cost: *$5,000.00*

Total Cost for Task 4, parts 4.1 + 4.2: $25,000.00

Work on this grant must be completed by December 2016

Table 1. Proposed budget for eelgrass restoration in Puget Sound project.

TASK	DESCRIPTION	COST
1	**Project Management & Reporting**	
1.1	Project plan & timeline	-
1.2	NEP waiver & QAPP	$10,000.00
1.3	Bi-annual FEATS (7)	-
1.4	Final presentation	$2000.00
1.5	Final FEATS & close-out report	-
	subtotal	*$12,000.00*
2	**Eelgrass Transplanting**	
2.1a	Progress report – Mar 2015	$45,000.00
2.1b	Progress report – Jun 2015	$45,000.00
2.1c	Progress report – Sep 2015	$45,000.00
2.1d	Progress report – Dec 2015	$45,000.00
2.1e	Progress report – Mar 2016	$45,000.00
2.1f	Progress report – Jun 2016	$45,000.00
2.1g	Progress report – Sep 2016	$45,000.00
	subtotal	*$315,000.00*
3	**Monitoring and Data Collection**	
3.1	Environmental monitoring equipment	$50,000.00
3.2a	Progress report – Mar 2015	$14,000.00
3.2b	Progress report – Jun 2015	$14,000.00
3.2c	Progress report – Sep 2015	$14,000.00
3.2d	Progress report – Dec 2015	$14,000.00
3.2e	Progress report – Mar 2016	$14,000.00
3.2f	Progress report – Jun 2016	$14,000.00
3.2g	Progress report – Sep 2016	$14,000.00
	subtotal	*$148,000.00*
4	**Final Report**	
4.1	Final draft report for peer review	$20,000.00
4.2	Final report	$5,000.00
	subtotal	*$25,000.00*
	TOTAL	**$500,000.00**

Appendix B. SC 16-17 – Contract between DNR and Hart Crowser

(Contains Statement of Work)

WASHINGTON STATE DEPARTMENT OF
Natural Resources
PETER GOLDMARK - Commissioner of Public Lands

SERVICES CONTRACT
(Hart Crowser, Inc.)

Contract No. SC 16-17

This Contract is between the State of Washington Department of Natural Resources, referred to as the DNR, and Hart Crowser, Inc., referred to as the Contractor, for the express purposes described in the following provisions of this Contract.

The purpose(s) of this Contract is to provide technical services to the Eelgrass Stressor – Response Program (ESRP), one component of the Puget Sound Ecosystem Monitoring Program (PSEMP), to restore eelgrass (*Zostera marina* L.) at sites suitable for eelgrass restoration.

The parties mutually agree to the terms, conditions and covenants described below, attached, or incorporated by reference as follows:

1.01 Rights and Obligations. Attachment A contains the General Terms and Conditions governing work to be performed under this Contract, the nature of the working relationship between the DNR and the Contractor, and specific obligations of both parties. All rights and obligations of the parties to this Contract shall be subject to and governed by Attachment A and other attachments each incorporated by reference, and by the Special Terms and Conditions.

SPECIAL TERMS AND CONDITIONS

2.01 Scope of Work.

(1) The Contractor will provide the following:

This work supports the DNR Nearshore Habitat Program's Eelgrass Stressor-Response Program (ESRP), one component of the Puget Sound Ecosystem Monitoring Program (PSEMP). The focus of the ESRP is to restore eelgrass (*Zostera marina*) at sites suitable for eelgrass restoration and survival based on the "20% more eelgrass in Puget Sound by 2020" project.

The Contractor shall provide and oversee daily operation of all equipment and staff

required to complete the eelgrass restoration project. A DNR scientist will provide technical input during various phases of the project.

The Contractor shall produce the following:

Task 1 - Donor and Restoration Site Identification

The Contractor, through discussions with DNR, will identify

a) five (5) eelgrass donor sites for a total harvest potential of 170,000 shoots,
b) ten (10) eelgrass test sites that can support three (3) test plots (25 m^2 in area) each, and
c) eight (8) large scale eelgrass restoration sites (2,025 m^2 in area for each site).

The locations of the eelgrass donor and harvest sites and transplant methods will be agreed upon through discussions between DNR and the Contractor.

Task 2 - Project Plan and Timeline

The Contractor will provide a document that describes detailed methods and timeline for each of the following:

a) Donor site eelgrass harvest and storage methods,
b) Planting unit preparation and storage,
c) Restoration site planting schematic and methods
    1. Thirty (30) test plots - three (3), 25 m^2 test plots in each of ten (10) test sites
    2. Eight (8) large scale eelgrass restoration sites (2,025 m^2 in area for each site)

The eelgrass harvest and transplant methods will be agreed upon through discussions between DNR and the Contractor. The eelgrass transplant methods can be modified to investigate questions regarding transplant donor stock and harvest rates, and transplant methods, as long as the experimental design is statistically robust and the final total area planted with eelgrass is approved by DNR.

Task 3 - Eelgrass Harvest and Transplantation

The Contractor will provide a document that summarizes the eelgrass harvest and transplanting efforts for the following:

a) thirty (30) test plots (three (3), 25 m^2 test plots in each of the ten (10) test sites) at a density of 20 shoots m^{-2} for a total of 780 shoots at each test site (3 test plots * 260 shoots), and
b) eight (8) large scale eelgrass restoration sites (2,025 m^2 in area for each site) at a shoot density of 20 shoots m^{-2} for a total of 20,260 shoots at each large scale site.

Table 1 provides a summary of the eelgrass restoration project. The summary document should include: temporal and spatially explicit data on test site and test plots restoration efforts. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describe in detail the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) restoration plots (test plots and large scale sites).

Table 1. Summary of the eelgrass restoration project.

SITE TYPE$_1$	QUANITITY$_1$	SITE TYPE$_2$	QUANTITY$_2$	TOTAL AREA	AREA PLANTED	RESTORATION SHOOT DENSITY	TOTAL SHOOTS
(1°)		(2°)		(m^2)	(m^2 $plot^{-1}$)	(shoots m^{-2})	
Donor	≥ 5						
Test site	10	test plots	3	25	13	20	7,800
Large scale	8	-	-	2,025	1,013	20	162,080
TOTALS			***Test sites***	750	390		
			Large scale	162,000	8,104	***Eelgrass shoots***	**169,880**

Test restoration sites

10 – minimum # of test sites = 10 test sites
3 – minimum # of test plots (25 m^2) in each test site
20 – minimum shoot density per meter squared (20 shoots m^{-2})
260 – minimum # of shoots in test plot (13 m^2 planted)
780 – minimum # of shoots for each test site
7,800 – minimum # of shoots planted in the thirty (30) test plots across ten (10) test sites

Large scale restoration sites

8 – minimum # of large scale sites
2,025 m^2 – minimum area of large scale site
20 – minimum shoot density per meter squared (20 shoots m^{-2})
1,013 – minimum # area planted (m^2)
20,260 – minimum # of shoots planted at each large scale site
162,080 – minimum # of total eelgrass plants planted at eight (8) large scale sites

Task 4 - Monitor Eelgrass at Donor and Transplant Sites

The Contractor will provide a document that summarizes the monitoring efforts and data analyses from the donor and transplant sites. Monitoring will occur at the following sites:

a) five (5) donor sites
b) thirty (30) test plots (three (3), 25 m^2 test plots in each of the ten (10) test sites)
c) eight (8) large scale eelgrass restoration sites (2,025 m^2 in area for each site)

The eelgrass monitoring methods for shoot density and expansion (area or distribution) will be agreed upon through discussions between DNR and the Contractor. Monitoring will occur every 2-3 months between April and November, preferably in April, July, and October. A January monitoring may be necessary to determine the success of eelgrass transplants at test plots in preparation for a large scale transplant effort. The total number of monitoring events for the duration of the contract will not exceed four (4) events. The goal of monitoring is to determine donor site recovery and transplant success using a statistically robust sampling design. The summary report will include temporal and spatially explicit data on all monitoring locations. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describe in detail the site and performance of the transplanted eelgrass and recovery of harvested eelgrass.

Task 5 - Water Quality Monitoring

The Washington State Department of Natural Resources will provide the Contractor with pre-calibrated and launched water quality instruments (e.g., PAR, temperature, and pH sensors) and equipment and instructions on deployment procedures. The contractor is not responsible for field calibration or data download. Water quality instruments will be deployed and serviced (i.e., cleaned, swapped) on a 3 – 6 month basis to match frequency of eelgrass transplant monitoring events (Task 4). The Contractor will collect water samples at the pH sensors during sensor retrieval. Water samples will be fixed on site using approximately 50 µl of mercuric chloride ($HgCl_2$) provided by DNR or by dispensing the collected water sample into pre-fixed sample bottles containing approximately 50 µl of mercuric chloride. The Washington State Department of Natural Resources will take possession of collected water quality instruments at the end of each field campaign when the Contractor is demobilizing from site. Water quality monitoring data will be downloaded and reviewed by DNR and shall be provided to the Contractor in Excel or Access database no later than October 1, 2017, for use in Final Report (Task 6). Water quality monitoring will occur in concert with the effort outlined in Task 4 at the following sites:

a) five (5) donor sites

b) thirty (30) test plots (three (3), 25 m^2 test plots in each of the ten (10) test sites)
c) eight (8) large scale eelgrass restoration sites (2,025 m^2 in area for each site)

The goal of monitoring is to track water quality parameters at donor and transplant sites over time. The Contractor will provide a field data summary for Task 5 within the summary report associated with Task 4. That summary report will include temporal and spatially explicit data on all monitoring locations and instrument deployment periods. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describe in detail the site relative to the deployment locations and timeline of the water quality instruments at donor and transplant sites.

Task 6 - Final Report

The Contractor will produce a final report that summarizes the eelgrass harvest and transplant effort for all the transplant sites (test plots and large scale sites). The report will summarize survival and recovery trajectories of the eelgrass at donor sites and restoration sites along with the results of the water quality monitoring data. The report should include statistically robust analyses of data with spatially explicit visualization of harvest and transplant locations, shoot densities, eelgrass distribution and water quality results.

All required products shall be delivered to the DNR Project Manager. All oral reports must be presented at the location requested by the DNR.

Attachment B contains the detailed Scope of Work with expected dates for completion of deliverables.

The Contractor shall complete all specified Contract work including submission of reports, and/or other required documentation within the time periods set forth in the Contract.

3.01 Conduct of Work. The Contractor shall furnish all necessary qualified personnel, material, and equipment, and manage and direct the same to timely complete the work described in this Contract.

4.01 Period of Performance.

The period of performance under this contract will be from the date of the last signature through November 30, 2017.

5.01 Compensation and Payment.

(1) Amount of Compensation: Compensation including expenses payable to Contractor for satisfactory performance of the work under this Contract shall not exceed Four hundred thirty eight thousand dollars ($438,000) for the Eelgrass Stressor Response Program (ESRP) support. Any work requested by DNR is contingent upon the availability of funding.

(2) Time of Payment: Payment for work performed shall be made upon satisfactory progress towards partial completion or full completion of the tasks outlined in Attachment B. An invoice for services completed or effort expended towards partial completion of the tasks outlined in Attachment B is acceptable.

Payment is timely if DNR pays within 30 days after receiving properly completed invoice vouchers. Payments shall be sent to the address designated by the Contractor. The DNR may terminate the Contract or withhold payments claimed by the Contractor for services rendered if the Contractor fails to satisfactorily comply with any term or condition of this Contract.

(3) Invoices: Payment for services rendered shall be payable when the Contractor submits properly completed invoice vouchers. The Contractor shall submit invoices monthly with appropriate documentation (e.g., progress report) with appendices that include copies of field notes and any other data that demonstrates services completed and effort expended.

The Contractor shall make requests for payment by submitting an invoice to DNR's project manager. Invoices shall include information necessary for the DNR to determine the exact nature of all expenditures and shall identify all personnel for whom compensation is sought, the amount of hours each individual worked, and the rate of compensation for each. The rate of compensation for each of the Contractor's personnel shall not exceed the amount agreed to. Each voucher will clearly indicate that it is for the services rendered in performance under this Contract. Requests for payment shall be submitted to the DNR Project Manager.

(4) Expenses: No additional costs or expenses are allowable. All costs and expenses associated with the Contractor fulfilling the terms and conditions of the contract are included in the amount of payment stated in Section 5.01(1) and no additional payment shall be made under this Contract.

(5) Biennial Closures: Under biennial closing procedures, the Contractor must submit all invoices and/or billings for services or material supplied under the first biennium (2015-2017) of this Contract through June 30, 2017, to DNR no later than July 10, 2017. If DNR does not receive invoices and bills by July 10, 2017, a considerable delay in payment may result. The Contractor must submit all invoices and/or billings for services or material supplied under the second biennium (2017-2019) of this Contract through November 30, 2017 to DNR no later than January 10, 2018. If DNR does not receive

invoices and bills by January 10, 2018, a considerable delay in payment may result.

6.01 Federal Subcontract. When the DNR is passing federal funds to the Contractor, the Contractor will be considered a "sub-recipient", and shall

(1) Adhere to the Federal Office of Management & Budget (OMB) Circular A-133 and other applicable federal and State regulations;

(2) Provide access to independent auditors to its financial records.

The Contractor may obtain a copy of the federal agreement governing this Contract by contacting the DNR Project Manager.

7.01. Acceptance. Progress payments shall become due and payable when the Contractor delivers each product and DNR favorably accepts the product. If a product is not acceptable to DNR, the DNR shall within ten (10) working days from receipt, notify the Contractor in writing of the nature of defects in the product and any proposed remedy. The Contractor shall respond to this notice in writing within ten (10) working days specifying the action to be taken to make the product acceptable to the DNR.

8.01 General Insurance Requirements At all times during the term of this contract, the Contractor shall, at its cost and expense, buy and maintain insurance of the types and amounts listed below. Failure to buy and maintain the required insurance may result in the termination of the contract at DNR's option.

All insurance shall be issued by companies admitted to do business in the State of Washington and have a rating of A-, Class VII or better in the most recently published edition of Best's Reports unless otherwise approved by DNR. Any exception must be reviewed and approved by the DNR Risk Manager or in the absence of, the DNR Contracts Specialist, before the contract is accepted. If an insurer is not admitted, all insurance policies and procedures for issuing the insurance policies must comply with Chapter 48.15 RCW and 284-15 WAC.

Before starting work, Contractor shall furnish DNR, with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements specified in the bid/proposal, if applicable, and Contract. Said certificate(s) shall contain the Contract number (SC 16-17), name of DNR Project Manager, a description, and include the State of Washington, DNR, its elected and appointed officials, agents, and employees as additional insured on all general liability, excess, umbrella and property insurance policies.

Contractor shall include all subcontractors as insured under all required insurance policies, or shall furnish separate certificates of insurance and endorsements for each subcontractor. Subcontractor(s) must comply fully with all insurance requirements stated herein. Failure of subcontractor(s) to comply with insurance requirements does not limit Contractor's liability or responsibility.

All insurance provided in compliance with this contract shall be primary as to any other insurance or self-insurance programs afforded to or maintained by DNR. Contractor waives all rights against the DNR for recovery of damages to the extent these damages are covered by general liability or umbrella insurance maintained pursuant to this Contract.

DNR shall be provided written notice before cancellation or non-renewal of any insurance referred to therein, in accord with the following specifications.

(1). Insurers subject to Chapter 48.18 RCW (Admitted and Regulated by the Insurance Commissioner): The insurer shall give the DNR 45 days advance notice of cancellation or non-renewal. If cancellation is due to nonpayment of premium, the DNR shall be given 10 days advance notice of cancellation.

(2). Insurers subject to Chapter 48.15 RCW (Surplus lines): The DNR shall be given 20 days advance notice of cancellation. If cancellation is due to nonpayment of premium, the DNR shall be given 10 days advance notice of cancellation.

In lieu of the coverages required under this section, DNR at its sole discretion may accept evidence of self-insurance by the Contractor, provided Contractor provides the following:

Contractor shall provide a statement by a CPA or actuary, satisfactory to the DNR that demonstrates Contractor's financial condition is satisfactory to self-insure any of the required insurance coverages.

DNR may require Contractor to provide the above from time to time to ensure Contractor's continuing ability to self-insure. If at any time the Contractor does not satisfy the self-insurance requirement, Contractor shall immediately purchase insurance as set forth under this section.

By requiring insurance herein, DNR does not represent that coverage and limits will be adequate to protect Contractor and such coverage and limits shall not limit Contractor's liability under the indemnities and reimbursements granted to DNR in this contract.

The limits of insurance, which may be increased by DNR, as deemed necessary, shall not be less than as follows:

(1) Commercial General Liability (CGL)/Marine General Liability (MGL) Insurance. Purchaser shall maintain commercial general liability (CGL) insurance or marine general liability (MGL) insurance covering claims for bodily injury, personal injury, or property damage arising on the property and/or out of Contractor's operations and, if necessary, commercial umbrella insurance with a limit of not less than $1,000,000 per each occurrence. If such CGL or MGL insurance contains aggregate limits, the General Aggregate limit shall be at least twice the "each occurrence" limit. CGL or MGL insurance shall have products-completed operations aggregate limit of at least two times the "each occurrence" limit.

CGL insurance shall be written on Insurance Services Office (ISO) occurrence form CG

00 01 (or a substitute form providing equivalent coverage). All insurance shall cover liability arising out of premises, operations, independent contractors, products completed operations, personal injury and advertising injury, and liability assumed under an insured contract (including the tort liability of another party assumed in a business contract), and contain separation of insured (cross liability) condition. MGL insurance shall have no exclusions for non-owned watercraft.

(2) Protection and Indemnity Insurance.
Contractor shall procure and maintain, or require its subcontractors to procure and maintain, Protection and Indemnity (P and I) insurance, including hull coverage. This insurance will cover all claims with respect to injuries or damages to persons or property, including nets and fishing lines, sustained in, on, or about the property, including while at a marina and in transit, with limits of liability not less than $1,000,000. If necessary, commercial umbrella insurance covering claims for these risks shall be procured and maintained.

(3) Employers Liability (Stop Gap) Insurance.
If Contractor shall use employees to perform this contract, Contractor shall buy employers liability insurance, and, if deemed necessary as determined by the DNR, commercial umbrella liability insurance with limits not less than $1,000,000 each accident for bodily injury by accident or $1,000,000 each employee for bodily injury by disease.

(4) Workers' Compensation Coverage.
Contractor shall comply with all State of Washington workers' compensation statutes and regulations. Workers' compensation coverage shall be provided for all employees of Contractor and employees of any subcontractor or sub-subcontractor. Coverage shall include bodily injury (including death) by accident or disease, which exists out of or in connection with the performance of this agreement. Except as prohibited by law, Contractor waives all rights of subrogation against State for recovery of damages to the extent they are covered by workers' compensation, employer's liability, commercial general liability, or commercial umbrella liability insurance.

If Contractor, subcontractor or sub-subcontractor fails to comply with all State of Washington workers' compensation statutes and regulations and State incurs fines or is required by law to provide benefits to or obtain coverage for such employees, Contractor shall indemnify State. Indemnity shall include all fines, payment of benefits to Contractor or subcontractor employees, or their heirs or legal representatives, and the cost of effecting coverage on behalf of such employees.

(5) Longshore and Harbor Worker's Insurance.
Certain work or services under this agreement may require insurance coverage for longshore and harbor workers other than seaman as provided in the Longshore and Harbor Worker's Compensation Act [33 U.S.C.A. Section 901 et seq.]. Failure to obtain coverage in the amount required by law may result in civil and criminal liabilities.

Contractor is fully responsible for ascertaining if such insurance is required and shall maintain insurance in compliance with this Act. Contractor is responsible for all civil and criminal liability that may arise from the failure to maintain such coverage.

(6) Jones Act.
Certain work or services under this agreement may require insurance coverage for seaman injured during employment resulting from negligence of the owner, master or fellow crew members as provided in 46 U.S.C.A. Section 688. Failure to obtain coverage in the amount required by law may result in civil and criminal liabilities. Contractor is fully responsible for ascertaining if such insurance is required and shall maintain insurance in compliance with this Act. Contractor is responsible for all civil and criminal liability that may arise from the failure to maintain such coverage.

(7) Marine Vessel Pollution Liability Insurance.
Contractor shall obtain, or require its subcontractors to obtain, for the duration of the agreement marine vessel pollution liability, including investigation and defense costs, for bodily injury and property damage, including loss of use of damaged property or of property that has been physically damaged or destroyed. Failure to buy and maintain the required insurance may result in a breach and/or termination of the contract at State's option. Such coverage must provide coverage for on-site clean-up costs and cover gradual and sudden pollution, and includes in its scope of coverage, natural resource damage claims. The State of Washington, Department of Natural Resources shall be named as additional insured. Coverage shall be maintained in an amount of at least:

a. $1,000,000 each occurrence for contractor's operations at the site(s) identified above, and
b. If the policy contains a general aggregate limit or policy limit, it shall be at least $1,000,000.

Such insurance may be provided on an occurrence or claims-made basis. If such coverage is obtained as an endorsement to the CGL and is provided on a claims-made basis, the following additional conditions must be met:

a. The Insurance Certificate must state that the insurer is covering hazardous substance removal.
b. The policy must contain no retroactive date, or the retroactive date must precede abatement services.
c. Coverage must be continuously maintained with the same insurance carrier through the official completion of any work on the agreement Area.
d. The extended reporting period (tail) must be purchased to cover a minimum of 36 months beyond completion of work.

(8) Business Auto Policy (BAP) Insurance.
Contractor shall maintain business auto liability and, if necessary, commercial umbrella liability insurance with a limit not less than $1,000,000 per accident. Such insurance shall cover liability arising out of "Any Auto." Business auto coverage shall be written on ISO form CA 00 01, or substitute liability form providing equivalent coverage. If necessary,

the policy shall be endorsed to provide contractual liability coverage and cover a "covered pollution cost or expense" as provided in the 1990 or later editions of CA 00 01. Contractor waives all rights against State for the recovery of damages to the extent they are covered by business auto liability or commercial umbrella liability insurance."

9.01 Project Manager.

(1) The Project Manager for the Contractor is Jason Stutes, Telephone Number (425) 210-7784.

(1) The Project Manager for the DNR is Jeffrey Gaeckle. Telephone Number (360) 902-1030.

IN WITNESS WHEREOF, the parties have executed this Agreement.

HART CROWSER, INC.

Dated: 10/7/, 20 15

By: J C Barrett
Jeffrey C. Barrett

Title: Principal, Ecologist

Address: 1700 Westlake Avenue North, Suite 200
Seattle, WA 98109

Telephone: 206-324-9530

FTIN: 91-0918895

UBI Number: 600134942

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

Dated: 11/24, 20 15

By: L. S. Y
Lenny Young

Title: Department Supervisor

Address: 1111 Washington Street SE
Box 47001
Olympia, WA 98504-7001

GENERAL TERMS AND CONDITIONS

1.01 Identification. The Contract number must appear on all documents, correspondence, invoices and all other written material submitted or prepared in conjunction with this Contract.

2.01 Independent Capacity of Contractor. The Contractor and its employees or agents performing under this Contract are not employees or agents of the DNR. The Contractor will not represent itself nor claim to be an officer or employee of the DNR or of the State of Washington by reason hereof, nor will the Contractor make any claims of right, privilege or benefit which would accrue to an employee under Washington law.

3.01 Deductions. The DNR shall make no deductions from the stated amount of compensation for income tax, social security taxes, medical insurance, industrial insurance, license fees or deductions of any other kind. Contractor is responsible for all deductions for which the Contractor may be liable.

4.01 Retention of Records. The Contractor shall maintain books, records, documents and other materials which sufficiently and properly reflect all direct and indirect costs of any nature expended in the performance of this Contract. These materials shall be available at all reasonable times for inspection, review, or audit by personnel duly authorized by the DNR, and State or federal officials so authorized by law, rule, regulation or contract. The Contractor will retain these materials for six (6) years after settlement or termination.

If any litigation, claim or audit is started before the expiration of the six (6) year period, the records shall be retained until all litigation, claims, or audit findings involving the records have been resolved.

5.01 Right of Inspection. The Contractor shall provide right of access to its facilities to the DNR, any of its officers, or to any other authorized agent or official of the State of Washington or the federal government at all reasonable times, in order to monitor and evaluate performance, compliance, and/or quality assurance under this Contract.

6.01 Treatment of Assets. Title to all property furnished by the DNR shall remain property of the DNR. Title to all property furnished by the Contractor, the cost of which the Contractor is entitled to be reimbursed as a direct item of cost under this Contract, shall pass to and vest in the DNR upon delivery of such property by the Contractor.

Any property of the DNR furnished to the Contractor shall, unless otherwise provided herein or approved by the DNR, be used only for the performance of this Contract.

The Contractor shall be responsible for any loss or damage to DNR property resulting from the contractor's negligence or which results from the contractor's failure to maintain and administer that property according to sound management practices. If there is loss or damage to DNR

property, the Contractor shall notify the DNR of the loss and shall take all reasonable steps to protect that property from further damage.

The Contractor shall surrender to the DNR all property of the DNR prior to settlement upon completion, termination or cancellation of this Contract.

7.01 Close-out. The Contractor must submit all requests for reimbursement for work performed under this Contract to the DNR so that they are received no later than thirty (30) days following the termination of this Contract. If an earlier date is specified in this Contract, the earlier date shall take precedence.

8.01 Non-discrimination. During the performance of this Contract, the Contractor shall comply with all federal and State nondiscrimination laws, regulations and policies. In the event of the Contractor's noncompliance or refusal to comply with any nondiscrimination law, regulation, or policy, this Contract may be rescinded, canceled or terminated in whole or in part, and the Contractor may be declared ineligible for further contracts with the DNR.

9.01 Assignability. This Contract, and any claim arising under this Contract, is not assignable or delegable by the Contractor either in whole or in part.

10.01 Subcontracting. Neither the Contractor nor any Subcontractor shall enter into subcontracts for any of the work contemplated under this contract without obtaining prior written approval of the DNR.

11.01 Changes/Extras. The DNR may at any time, by written order, make changes within the general scope of this Contract. No payment for changes or extras shall be made unless such changes or extras and the price have been authorized in advance in writing by the DNR Project Manager. No extension of time because of changes or extras will be allowed, unless such extension has been authorized by the DNR Project Manager.

No contract work shall be commenced nor any payment rendered for any work or services to be performed in connection with this Contract until a contract amendment has been signed by both parties.

12.01 Disputes. The DNR Project Manager shall decide disputes concerning questions of fact that are not resolved by agreement. The DNR Project Manager shall furnish the Contractor a written, signed copy of the decision. The DNR Project Manager's decision is final unless the Contractor appeals in writing to the DNR Project Manager within 30 days of receiving the latter's decision. The Commissioner of Public Lands or his authorized representative will decide the appeal. The decision will be final.

This dispute resolution process shall precede any action in a judicial or quasi-judicial tribunal. The Contractor does not waive any right to seek review of the DNR's decision. The Contractor may seek review only in the Superior Court of Thurston County. Pending final decision, the Contractor shall proceed diligently to perform according to the contract and to DNR's decisions.

13.01 Conflict of Interest. The DNR may, by written notice to the Contractor, terminate this Contract if it is found that there is a violation of the State Ethics Law, chapter 42.52 RCW or any similar statute involving the Contractor in the procurement of, or performance under, this Contract.

In the event this Contract is terminated as provided above, the DNR shall be entitled to pursue the same remedies against the Contractor as it could pursue in the event of a breach of the Contract by the Contractor. The rights and remedies of the DNR provided for in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law.

14.01 Termination of Contract for Cause. The DNR may terminate this Contract in whole, or in part, at any time after thirty (30) days' notice whenever it is determined that the Contractor has failed to comply with the terms and conditions of the Contract. The DNR shall promptly notify the Contractor in writing of the termination and the reasons for termination, together with the effective date of termination.

15.01 Termination for Funding Reasons. The DNR may unilaterally terminate this Contract in the event that funding from federal, State or other sources becomes no longer available to the DNR, or is not allocated for the purpose of meeting the DNR's obligation hereunder. Such action is effective when the DNR sends written notification of termination.

16.01 Termination for Convenience. The DNR may terminate this Contract in whole or in part by giving fifteen (15) days' written notice to the Contractor when it is in the best interest of the DNR. If this Contract is so terminated, the DNR shall be liable only for payment in accordance with the terms of this Contract for services rendered prior to the effective date of termination.

17.01 Hold Harmless and Indemnification. To the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless DNR, its officials, agents and employees, from and against all claims arising out of or resulting from the performance of the contract. "Claim" as used in this agreement means any financial loss, claim, suit, action, damage, or expense, including but not limited to attorneys' fees, attributable for bodily injury, sickness, disease or death, or injury to or destruction of tangible property including loss of use resulting therefrom. Contractor's obligation to indemnify, defend, and hold harmless includes any claim by contractor's agents, employees, representatives, or any subcontractor or its employees. Contractor expressly agrees to indemnify, defend, and hold harmless DNR for any claim arising out of or incident to contractor's or any subcontractor's performance or failure to perform the contract. Contractor's obligation to indemnify, defend, and hold harmless DNR shall not be eliminated or reduced by any actual or alleged concurrent negligence of DNR or its agents, agencies, employees and officials. Contractor's duty to indemnify, defend, and hold harmless DNR shall not include claims arising from DNR's sole negligence or DNR's proportionate share of any concurrent negligence. Contractor waives its immunity under Title 51 RCW to the extent it is required to indemnify, defend and hold harmless DNR and its officials, agents or employees.

18.01 Publication Rights, and Rights to Data, Patents and Inventions. The Contractor shall

not publish any of the results of the contract work without the advance written permission of the DNR. DNR will not unreasonably withhold permission and will respond to publishing request within thirty (30) days.

Unless otherwise provided, data which originates from this Contract shall be "works for hire" as defined by the U.S. Copyright Act of 1976 and shall be owned by the DNR. Data shall include, but not be limited to, reports, documents, pamphlets, advertisements, books, magazines, surveys, studies, computer programs, films, tapes and sound reproductions. Ownership includes the right to copyright, patent, register and the ability to transfer these rights. DNR recognizes all Works for Hire provided by Contractor's efforts are intended solely for DNR for purposes of this Contract. Any reuse by DNR or others for purposes outside this Contract or revisions to Works without Contractor's written authorization shall be at user's sole risk.

Data which is delivered under the Contract, but which does not originate therefrom, shall be transferred to the DNR with a nonexclusive, royalty-free, irrevocable license to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others to do so; provided, that such license shall be limited to the extent which the Contractor has a right to grant a license.

In accordance with Chapter 39.29 RCW, Contractor shall not charge additional costs to the DNR, the Joint Legislative Audit and Review Committee (JLARC) or the Office of the State Auditor for access to data generated under this contract. Contractor shall provide access to data generated under this contract to the DNR, the Joint Legislative Audit and Review Committee (JLARC), and the Office of the State Auditor during the term of this Contract and thereafter. For purposes of this section, data includes all information that supports the findings, conclusions, and recommendations of the contractor's reports, including computer models and the methodology for those models.

19.01 Licensing, Accreditation and Registration. The Contractor shall comply with all applicable local, State, and federal licensing, accreditation and registration requirements or standards necessary for the performance of this Contract.

20.01 Confidentiality. Contractor shall not disclose to any third party any proprietary or confidential information received from the DNR, or acquired during the course of work under this Contract and shall not use for its own benefit or that of others, any such information, whether developed in the course of this Contract or derived from the DNR, except as may be authorized by the DNR in writing. All information developed in the performance of this Contract shall be considered the DNR's proprietary information.

21.01 Governing Law. This Contract shall be governed by the laws of the State of Washington. In the event of an inconsistency in this Contract, unless otherwise provided herein, the inconsistency shall be resolved by giving precedence in the following order:

(1). Applicable federal and State statutes and regulations;
(2) The Special Terms and Conditions as contained in the main contract instrument;
(3) The General Terms and Conditions contained in this Attachment A;

(4). Any Statement of Work attached hereto and incorporated by reference herein; and
(5) Any other provisions or attachments of the Contract whether incorporated by reference or otherwise.

22.01 Jurisdiction/Venue. This Contract shall be construed and interpreted under the laws of the State of Washington and the venue of any action brought under this Contract shall be in the Superior Court for Thurston County. The Contractor, by execution of this Contract, acknowledges the jurisdiction of the courts of the State of Washington in this matter.

23.01 Waiver. A failure by the DNR to exercise its rights shall not constitute a waiver of any rights under this Contract unless Stated to be such in writing signed by an authorized representative of the DNR and attached to the original Contract.

24.01 Entire Contract. This document contains all covenants, stipulations and provisions agreed by both parties. No agent or representative of either party has authority to make, and the parties shall not be bound by or be liable for, any Statement representation, promise or agreement not set forth herein except for extension of the completion date. No changes, amendments or modifications of the terms hereof shall be valid unless reduced to writing and signed by the parties as an amendment to this Contract.

25.01 Severability. If any provision of this Contract or any provision of any document incorporated by reference shall be held invalid, such invalidity shall not affect the other provisions of this Contract which can be given effect without the invalid provision, and to this end the provisions of this Contract are declared to be severable

SCOPE OF WORK

1.01 General Summary

The Washington State Department of Natural Resources has sought to achieve measurable increases in Puget Sound eelgrass (*Zostera marina* L.) area by strategically targeting eelgrass plantings at sites that have a strong likelihood for restoration success. Sites with a high probability of restoration success have been identified through an eelgrass transplant suitability model developed to address the Puget Sound Partnership's "20% More Eelgrass by 2020" goal. In addition to transplanting eelgrass at test sites and large scale restoration sites, the project will monitor eelgrass area and shoot density at donor and transplant sites to assess the effects of harvest and track transplant success, respectively. The project will also monitor water quality parameters (e.g., PAR, temperature, and pH) to assess the potential of restored eelgrass beds to ameliorate the effects of ocean acidification.

The objectives of the proposed project are to:

- Implement the results of the "20% More Eelgrass by 2020" project and conduct eelgrass restoration test plantings at select locations throughout Puget Sound to identify additional areas with the potential for successful large scale eelgrass restoration.
- Conduct eelgrass transplantation at test sites.
- Conduct large scale eelgrass restoration plantings.
- Monitor restoration performance at test sites and large scale sites through documenting shoot survival (density) and natural expansion (distribution) over regular intervals of time.
- Monitor shoot density recovery at donor sites over regular intervals of time.
- Install and monitored autonomous sensor packages programmed and prepped for deployment by DNR science staff.
- Produce a final report summarizing the project, methods, results and conclusions

2.01 Deliverables

Hart Crowser, Inc., (the Contractor) shall provide for-hire all equipment and services specified in their project proposal in response to RFQQ 15-103 and any other equipment, services or staff necessary to complete the tasks and produce the deliverables outline in SC 16-17.

If a deliverable is not acceptable to DNR, the DNR shall, within ten (10) working days from receipt, notify the Contractor in writing of the nature of defects in the product and any proposed remedy. The Contractor shall respond to this notice in writing within ten

(10) working days specifying the action to be taken to make the product acceptable to the DNR. The specific deliverables for SC 16-17 are as follows:

Task #1 – Donor and restoration site identification

a) The Contractor will provide a list of candidate donor sites and transplant sites for eelgrass restoration. The Contractor will identify at a minimum five (5) eelgrass donor sites for a total harvest potential of 170,000 shoots. The Contractor will also identify ten (10) suitable test sites that can support three (3) test plots (25 m^2 in area) in each of the ten (10) test sites and eight (8) suitable large scale restoration sites (2,025 m^2 in area for each site) on subtidal aquatic lands (deeper than -1.4 m relative to Mean Lower Low Water, MLLW).

Test and large scale sites can be entire embayments (e.g., Quartermaster Harbor, Westcott Bay-Garrison Bay complex) or stretches of suitable subtidal areas as long as three (3) test plots and the large scale restoration area (2,025 m^2 per large scale site) can be successfully transplanted with eelgrass. The large scale restoration area can be subdivided into multiple smaller areas as long as the sum of the smaller areas is a minimum of 2,025 m^2 and that a minimum of 20,260 eelgrass shoots are planted at a minimum density of 20 shoots m^{-2}. The list of proposed sites will be reviewed and prioritized through discussions with DNR. The final locations of the eelgrass donor and harvest sites will be agreed upon through between DNR and the Contractor.

<u>Deliverable</u>: The Contractor will provide DNR with a detailed list of candidate suitable subtidal (deeper than -1.4 m, MLLW) donor and transplant sites for eelgrass restoration throughout Puget Sound. <u>At a minimum</u>, the list will include five (5) eelgrass donor sites for a total harvest potential of 170,000 shoots, ten (10) suitable test sites that can support a minimum of three (3) 25 m^2 test plots at each site (total of 7,800 shoots), and eight (8) suitable large scale sites that can support a minimum of 2,025 m^2 in eelgrass restoration area for each site (total of 162,080 shoots for all sites). The information required includes geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data for the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) restoration sites that describe, in detail, the subtidal eelgrass restoration donor and transplant sites. The Contractor should also provide any additional data (e.g., photographs, video, field notes) in an appendix that supports restoration at the proposed sites and a prioritization of the restoration sites. The site list and all ancillary data will be provided to DNR digitally.

Estimated Due Date: February 28, 2016.

TASK #2 – Project plan and timeline

The Contractor will meet (e.g., in person or remotely) and discuss the results of Task 1 (candidate donor and restoration sites) with DNR staff to determine optimal restoration sites (e.g., test sites and large scale sites) and donor sites for eelgrass restoration in Puget Sound. After development of a final list of restoration sites and donor sites, the Contractor will propose a restoration plan and schedule to demonstrate the restoration of eelgrass at the ten (10) test sites and eight (8) large scale sites in the time frame for optimal eelgrass restoration (March – June) within the project period (1 September 2015 – 30 November 2016). The timeline needs to consider the setup of the monitoring experiment at the donor sites (see Task 3.1e) and the setup of the test and large scale restoration sites (3.1d and 3.1e). In addition, the timeline shall account for monitoring the donor sites and restoration sites (e.g., test and large scale sites) following all harvest and restoration work (Tasks 3.2 and Task 3.3).

Deliverable: The Contractor will provide DNR a detailed restoration and monitoring plan and timeline for donor and restoration site setup, pre-harvest data collection, eelgrass restoration at test and large scale sites, and eelgrass monitoring at donor and restoration sites (see Tasks 3). The monitoring plan needs to include eelgrass monitoring (Task 4) and water quality monitoring (Task 5). The restoration plan and timeline needs to include ten (10) test sites that can support three (3) 25 m^2 test plots, and eight (8) large scale sites that are, at a minimum, 2,025 m^2 in area for each site, the number of eelgrass donor sites determined from discussions within this Task and the frequency of monitoring donor and restoration sites through November 30, 2016. The detailed restoration plan and timeline will be provided to DNR digitally.

Estimated Due Date: February 28, 2016.

TASK #3 – Eelgrass (*Zostera marina* L.) restoration

a) The Contractor will setup sites and transplant eelgrass at three (3) test plots in each of the ten (10) test sites. Each of the three (3) test plots will be a minimum of 25 m^2 in area and planted in a checkerboard pattern (13 m^2 planted) at a density of 20 shoots m^{-2} for a total of 260 shoots test $plot^{-1}$. The total minimum number of transplanted shoots at each test site will be 780 (3 test plots * 13 m^2 * 20 shoots m^{-2} = 780 shoots for each test site). The total number of shoots planted at all thirty (30) test plots will be a minimum of 7,800 eelgrass shoots.

Eelgrass will be transplanted using the bare root method. The anchor system for each planting unit will be determined and agreed upon through discussions between DNR and the Contractor. Current practices include: landscape staples (bamboo or metal), washers, tortilla method, or TERFS. The Contractor can consider testing a few methods for experimentation purposes with the sole objective to improve transplant success and feasibility.

Deliverable: The Contractor will provide DNR a detailed summary of the eelgrass test plot restorations conducted at each of the ten (10) test sites. The summary of work should include temporal and spatially explicit data on the test site and test plots

restoration efforts. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describes, in detail, the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) restoration plots (test plots). A summary report and all data will be provided to DNR digitally.

Estimated Due Date: October 31, 2016.

b) The Contractor will setup sites and transplant eelgrass at eight (8) large scale sites. Each of the eight (8) large scale sites will be a minimum of 2,025 m^2 in area and planted in a checkerboard pattern (1,013 m^2 planted) at a density of 20 shoots m^{-2} for a total of 20,260 shoots large scale $site^{-1}$. The total minimum number of transplanted shoots at all eight (8) large scale sites will be 162,080 (8 large scale sites * 1,013 m^2 * 20 shoots m^{-2} = 162,080 shoots).

Eelgrass will be transplanted using the bare root method. The anchor system for each planting unit will be determined based on the monitoring results of the eelgrass test transplant plots (Task 3.1a). The monitoring effort to determine the results of the test plots and the optimal anchor system will be conducted in March – April 2017.

The Contractor will harvest eelgrass for the eight (8) large scale sites from donor sites identified in Tasks 1 and 2. Donor sites will be monitored to assess recovery from harvest activities for the large scale transplant sites. To monitor the donor sites effectively, the Contractor will sufficiently delineate donor areas within each donor site for monitoring pre- and post-harvest shoot densities over time (Task 3.2a) to track a trajectory of recovery at donor sites.

<u>Deliverable</u>: The Contractor will provide DNR a detailed summary of the eelgrass harvest efforts at the donor sites and restoration conducted at each of the eight (8) large scale sites. The summary of work should include temporal and spatially explicit data on the donor sites and the large scale site restoration efforts. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describes, in detail, the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) donor and restoration sites. A summary report and all data will be provided to DNR digitally.

Estimated Due Date: August 31, 2017.

TASK #4 - Eelgrass donor and restoration site monitoring

a) The Contractor will monitor shoot density in thirty (30) to fifty (50), 0.25 m^2 quadrats within each donor site to track donor site recovery. Sample size and design will depend upon donor site characteristics and will be determined through discussions between the Contractor and DNR. Monitoring will occur once every 2-3 months through November

2017. Preferred monitoring will occur in April, July and October of each year of the project (2016 and 2017). Quadrat selection and monitoring interval will be determined and agreed upon through discussions between the Contractor and DNR.

Deliverable: The Contractor will provide DNR a detailed summary of the eelgrass monitoring efforts at the donor sites through November 2016. The summary of work should include temporal and spatially explicit data on the donor sites and shoot densities. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describes, in detail, the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) donor sites. A summary report and all data will be provided to DNR digitally.

Estimated Due Date: October 31, 2017.

b) The Contractor will monitor shoot density in all of the 1 m^2 quadrats planted with eelgrass in each of the three (3) test plots at all ten (10) test sites. Thirteen (13), 1 m^2 quadrats were planted with eelgrass in Task 3.1a. Therefore, shoot density will be quantified in a total of 390, 1 m^2 quadrats across the thirty (30) test plots at the ten (10) test sites. Monitoring, determined through discussions between the Contractor and DNR, will occur once every 2-3 months through November 2016. However, it is preferred that monitoring occur in April, July and October of each year of the project (2016 and 2017).

Deliverable: The Contractor will provide DNR a detailed summary of the eelgrass density at all the test plots through October 2017. The summary of work should include temporal and spatially explicit data on the donor sites and shoot densities. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describes, in detail, the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) donor sites. A summary report and all data will be provided to DNR digitally.

Estimated Due Date: October 31, 2017.

c) The Contractor will monitor shoot density in thirty (30) to fifty (50) of the 1,013, 1 m^2 quadrats planted with eelgrass in each of the eight (8) large scale restoration sites as part of Task 3.1b. Therefore, shoot density will be quantified in a total of 240-400, 1 m^2 quadrats across the eight (8) large scale sites. Monitoring will occur once every 2-3 months through November 2017. However, it is preferred that monitoring occur in April, July and October of each year of the project (2016 and 2017). Quadrat selection and monitoring interval will be determined and agreed upon through discussions between the Contractor and DNR.

Deliverable: The Contractor will provide DNR a detailed summary of the eelgrass density at all the quadrats, ranging from 240-400, selected based on discussions

between the Contractor and DNR through October 2017. The summary of work should include temporal and spatially explicit data on the donor sites and shoot densities. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describes, in detail, the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) large scale eelgrass restoration sites. A summary report and all data will be provided to DNR digitally.

Estimated Due Date: October 31, 2017.

TASK #5 - Water quality monitoring

a) The Contractor will deploy water quality sensors (e.g., pH probes, temperature sensors, PAR sensors) in areas with transplanted eelgrass (vegetated) and areas without eelgrass (unvegetated) at donor sites, test sites, and large scale restoration sites. DNR will provide the Contractor the water quality sensors and the equipment required to deploy the sensors (e.g., helical anchors, hose clamps, nut drivers, zip ties, etc.), including instructions on how and where to deploy sensors. The total number of sensor deployments will not exceed 30. Each deployment could consist of a pH probe, and temperature and PAR sensors).

Deliverable: The Contractor will provide DNR a detailed summary of the sensor deployment work with temporal and spatially explicit data. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) that describes, in detail, the location of the sensor in the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) donor sites, test sites, and large scale restoration sites. A summary report and all data will be provided to DNR digitally.

Estimated Due Date: October 31, 2017.

b) The Contractor will clean, maintain, and replace water quality sensors (e.g., pH probes, temperature sensors, PAR sensors) in areas with transplanted eelgrass (vegetated) and areas without eelgrass (unvegetated) at donor sites, test sites, and large scale restoration sites. The sensor maintenance schedule will be every 2-3 months and will coincide with other monitoring efforts at donor sites, test sites, and large scale restoration site monitoring (e.g., Tasks 3 and 4). The Contractor will collect in-situ parameters (e.g., pH, temperature, and PAR) and water samples adjacent to and at the same depth as pH sensors during sensor retrieval. Water samples will be fixed (treated) on site using approximately 50 µl of mercuric chloride ($HgCl_2$) provided by DNR or by dispensing the collected water sample into pre-fixed sample bottles containing approximately 50 µl of mercuric chloride. DNR will take possession of collected water quality instruments at the end of each field campaign when the Contractor is demobilizing from site.

Deliverable: The Contractor will provide DNR a detailed summary of the sensor maintenance and cleaning work with temporal and spatially explicit data. Data should include, but not be limited to, geographic coordinates (Latitude / Longitude), maps, bathymetric contours, sediment type and any other pertinent data (e.g., photographs, video, field notes) about the maintenance preformed on the sensor in the subtidal (deeper than -1.4 m, relative to Mean Lower Low Water, MLLW) donor sites, test sites, and large scale restoration sites. The Contractor will provide DNR fixed (treated) water samples and sensors when demobilizing from the site. A summary report and all other data will be provided to DNR digitally.

Estimated Due Date: October 31, 2017.

Task #6 - Final report

The Contractor will summarize the project, including the methods, the work completed, the data collected, the results and conclusions, and suggestions for future areas of work or research in a final report. The report will provide an analysis of the restoration effort, donor site recovery, water quality data, and outcomes that will inform and support future eelgrass recovery work across the region.

Deliverable: The final report and all associated data and analyses will be provided to DNR digitally. In addition, three (3) printed copies of the report will be provide to DNR.

Estimated Due Date: November 30, 2017.

Table 2 provides a summary of the Scope of Work outlined in Attachment B (Scope of Work), Section 2.01.

Table 2. Summary of Scope of Work.

TASK	SUBTASK	DELIVERABLES	APPROXIMATE DUE DATE
1		Donor and restoration site identification	28 Feb 2016
2		Project plan and timeline	28 Feb 2016
3		Eelgrass restoration	
	a	30 test plots	31 Oct 2016
	b	8 large scale sites	31 Aug 2017
4		Eelgrass donor and restoration site monitoring	
	a	Donor sites	31 Oct 2017
	b	30 test plots	31 Oct 2017
	c	8 large scale sites	31 Oct 2017
5		Water quality monitoring	
	a	Sensor deployment	31 Oct 2017
	b	Sensor maintenance	31 Oct 2017
6		Final report	30 Nov 2017

Appendix C. Timeline: Puget Sound Eelgrass (*Zostera marina*) Restoration and Monitoring Timeline

Restoration Plan and Timeline

Puget Sound Eelgrass (*Zostera marina*) Restoration and Monitoring

Prepared for

Washington State Department of Natural Resources

April 29, 2016
1205905

HARTCROWSER

Restoration Plan and Timeline

Puget Sound Eelgrass (*Zostera marina*) Restoration and Monitoring

Prepared for
Washington State Department of Natural Resources

April 29, 2016
1205905

Prepared by
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INTRODUCTION AND SCOPE

Hart Crowser's Team has been selected to help the Washington State Department of Natural Resources (DNR) restore *Zostera marina* (eelgrass) to help support target outcomes of the "20% More Eelgrass by 2020" project. The restoration will be conducted at select large-scale and test sites throughout Puget Sound chosen for their strong probability for transplant success of eelgrass shoots from healthy donor beds. This project includes monitoring the recovery of eelgrass at donor sites following harvest activities and the success of the eelgrass plantings within the test and large-scale restoration sites. Hart Crowser will test water quality using sensors provided by DNR in areas with transplanted eelgrass and in areas without eelgrass at the donor, large-scale, and test sites.

This document provides our team's approach to restoration and monitoring and includes a draft schedule for this work.

RESTORATION SITE CRITERIA

DNR has established requirements for the donor, large-scale, and test sites at which the restoration work will be conducted. Across site types, all work must be conducted on state-owned aquatic lands deeper than –1.4 m, relative to mean lower low water (MLLW). Identified test sites must be large enough to support three eelgrass test plots and large-scale sites must be large enough to support a minimum of 2,025 square meters (m^2) of eelgrass restoration area. Large-scale sites can be subdivided into smaller areas as long as the sum of the smaller areas is a minimum of 2,025 m^2, and that a minimum of 20,260 eelgrass shoots are planted at a minimum density of 20 shoots per meter (m).

DNR has established that restoration must occur at a minimum of 10 test sites and 8 large-scale sites, and that shoots for these efforts will be harvested from a minimum of 5 healthy donor beds.

We have already identified candidate donor, large-scale, and test sites using the model output data from Pacific Northwest National Laboratory, data from DNR's Submerged Vegetation Monitoring Program, and our local knowledge. On February 17, 2016, we presented a draft list of candidate sites to DNR for initial review and feedback. After discussion and preliminary field assessments, these sites will be finalized and presented in a subsequent memo as a supplement to this plan.

FIELD PROCEDURES

Donor Site

Site Setup

Donor sites will be selected through a combination of data review and field verification. Information on candidate sites will be researched through the Marine Vegetation Atlas, DNR's eelgrass monitoring data, and local knowledge. Once donor sites are initially selected by screening available documentation, top candidates will be field verified for areal coverage, health of the bed, and dive conditions at the site. Field verification will be largely done through video survey to confirm the general size of the bed and to identify the shallow and deep edges of the bed (Figure 1). If the bed meets the necessary criteria for size and density and the dive conditions are favorable, two divers will deploy a tape between the shallow harvest limit (–1.4 m) and the deep edge, perpendicular to shore. Divers will then mark the center of the bed along that tape.

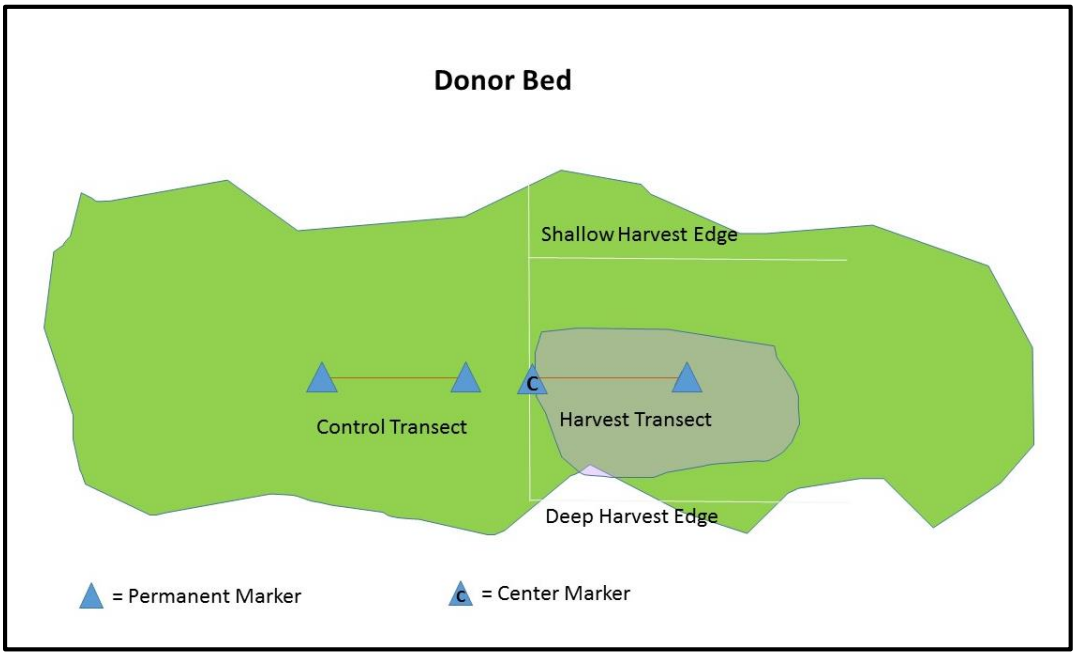

Figure 1 – Donor bed setup

This center point will be permanently marked (denoted with a "C" on Figure 1). From this center point divers will lay a 26-meter transect line parallel to shore and then mark the end (opposite the permanent center point) with another permanent marker. This will serve as the permanent monitoring transect that we will revisit during our monitoring efforts for this project. A second 26-meter transect will be set within the same donor bed but offset from the center marker of the donor harvest transect by a 3-meter buffer and heading in the opposite direction. This will serve as a control. Divers will verify that the depth and density of grass along the control transect is similar to that along the donor harvest transect before placing the permanent monuments at each end. The donor site monitoring transects are illustrated in Figure 1.

The markers will consist of small helical anchors and PVC posts that divers will install into the substrate (WDFW 2015). To facilitate repeat monitoring, coordinates for each marker will be recorded using a survey-grade Global Positioning System (GPS) with a horizontal accuracy of less than 1 meter. Horizontal coordinates will be referenced to DNR's preferred standard of "NAD_1983_HARN_StatePlane_Washington_South_FIPS_4602_Feet."

Transect Sampling

Eelgrass density will be determined within each plot before harvesting to provide a baseline for average shoot density, spatial variability in shoot density, and to help inform how many shoots may be available for harvest. A team of two divers, each with a 1-m^2 quadrat, will count shoots in an offset pattern along each 26-meter transect line, beginning with the first quadrat (Quadrat 1) placed downslope of the transect tape on the deeper harvest edge (Figure 1) at the sampling monument furthest from the center marker (Figure 2). Quadrat 2 will be placed 1 meter away from the sampling monument, but upslope of the transect line. Quadrats 3–26 will be placed on alternating sides of the transect tape according to this pattern. To be consistent, shoots will always be counted beginning with Quadrat 1. The two-person dive team will then survey each of the 26 quads. Each diver (one upslope and one downslope from the transect line) will count 13 quads along the transect line. This practice will be identically repeated along the control transect and in subsequent survey efforts over time.

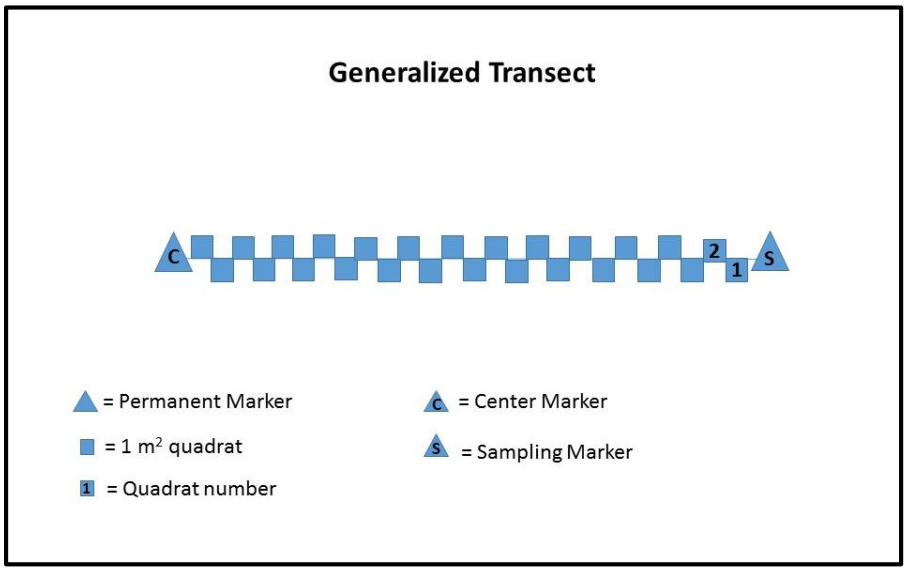

Figure 2 – Generalized monitoring transect placed within harvest portion of donor bed and in control area

Large-scale Transplant Effort

Harvesting Eelgrass

Once the pre-harvest data have been collected along the 26-meter transects in the donor bed as described above, the divers will begin to harvest shoots at a predetermined density along a narrow depth range. The divers will harvest shoots by hand or with light tools (depending on substrate) in order to minimize damage to the plants. These harvested shoots will ideally be bundled in clusters of

100 with a rubber band and then placed in a dive bag. If this bundling cannot be done efficiently, divers will fill the bags with harvested shoots and a processing crew will sort and bundle them on shore. Harvested plant bundles will be deposited into larger, permeable laundry bags when brought to the surface and handed off to a kayak support vessel. The kayaker will take the filled laundry bags to the shore where they will be processed by a designated processing crew.

Processing Eelgrass

All eelgrass processing will be done on shore by taking the diver-filled laundry bags from the kayaker and emptying them into a shaded shallow container of sea water (e.g., a kiddy pool). The bundled shoots will first be trimmed to length and then separated into individual plants. Once separated, the shoots will be "woven" into pre-cut strips of burlap to create discrete planting units. These planting units will have five to ten eelgrass shoots per burlap strip depending on the site they are destined for. These assembled burlap strips will be collected onto a "key ring" so that multiple planting units can be handled with minimal damage. Once a "key ring" is completely loaded with planting units, it will be placed back into a laundry bag, or "purse," which the shore crew will hand off to the kayaker so that it can be stored on a floating buoy system (Figure 3). Processed eelgrass purses will continue to be added to the buoy system until all harvested eelgrass has been processed. We estimate that approximately six purses will fit along each buoy system.

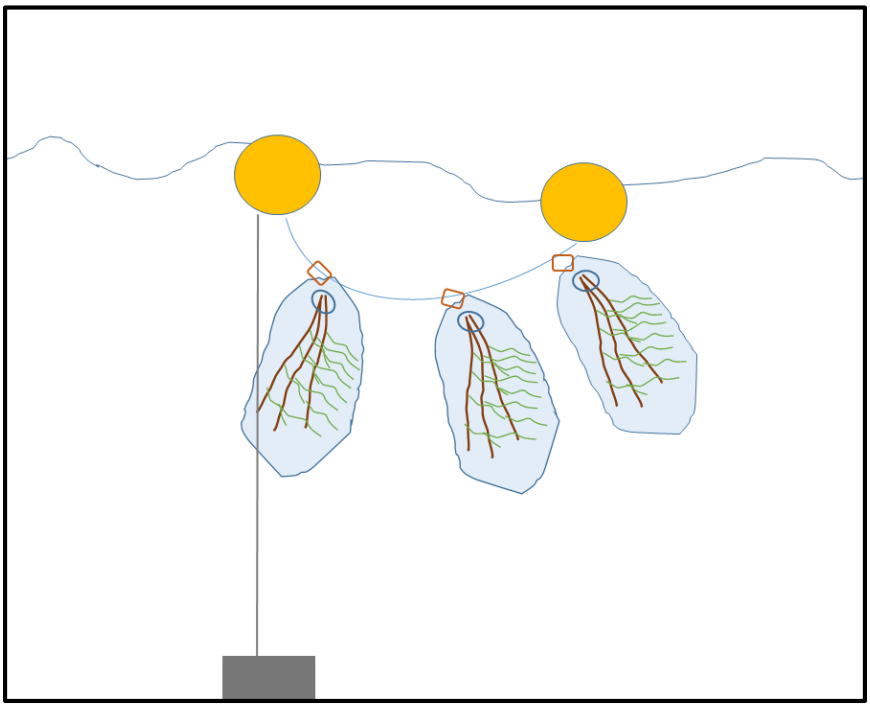

Figure 3 – Buoy system with attached purses and planting units

Transport and Transplanting Eelgrass

Once processing is complete at the donor site, the buoy system (with attached purses) will be pulled out of the water using the A-frame aboard the vessel. Each individual buoy system will be deposited

into a large tote, filled with fresh seawater. These buoy systems can be transported up to six at a time aboard the boat.

Once at the large-scale planting site, the buoy systems will be lifted out of the totes and deployed within the planting area. After unloading the harvested eelgrass, we will locate the minimum and maximum planting depths via diver or video. Transplant sites will be matched with suitable donor sites so that eelgrass is planted along a similar depth range. Transplanting depths will be to the shallow limit of the bed to 20 percent of the deep edge of the donor bed. Teams of two divers will use a 2-m by 3-m PVC grid "jig" as a guide to plant the eelgrass. Beginning on the established deeper edge of the bed, divers will set the jig and install stakes within the inside of each corner and the outside of each corner on the right side as shown in Figure 4. Once the jig is set, kayakers will give each diver a "purse" (permeable laundry bag filled with processed eelgrass; see Figure 3). The divers will begin to install the PU's by fixing the eelgrass woven strips to the substrate with garden stables. Divers will plant within each square of the jig to achieve a density of 20 shoots/m^2. Once the divers are finished planting within the jig, the jig will be moved up slope, guided by the stakes left in place. Once the jig reaches the shallow planting limit, the jig will be moved to the deeper planting limit of the adjacent column, guided by stakes left in place from the previous columns (Figure 5).

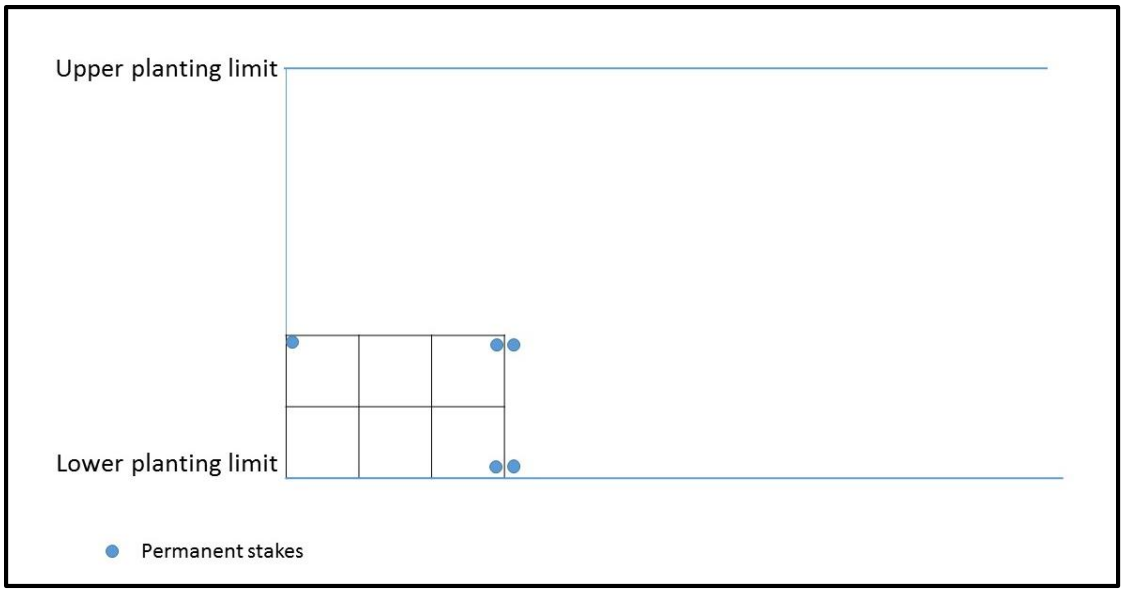

Figure 4 – Transplanting schematic for the initial swath

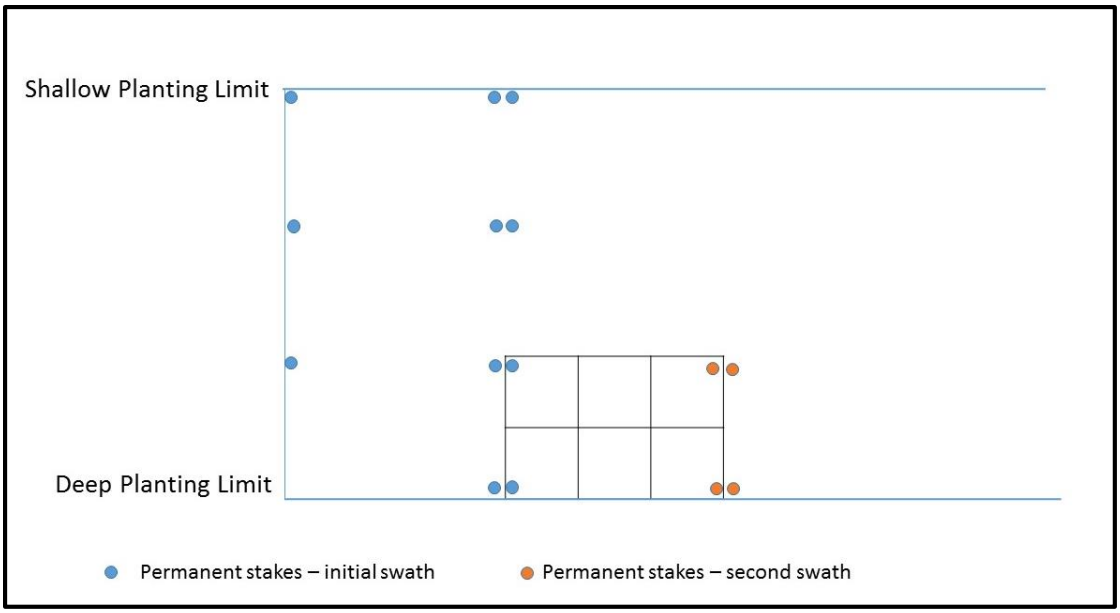

Figure 5 – Transplanting schematic for the second swath

Using stakes left from the previous column will ensure that the bed is planted evenly and consistently. Divers finishing a "purse" will come to the surface for another one so that swimming is minimized. Once the area is completely transplanted, a survey transect will be installed using permanent markers, as previously described for the donor beds (Figures 1 and 2). This will allow for a consistent, repeatable survey methodology for all beds. DNR has established that each large-scale site will have a minimum area of 2,025 m^2 and a planting density of 20 shoots per square meter, for a total of 20,260 shoots at each large-scale site.

Test Site Transplanting Effort

Eelgrass will be harvested, transported, and staged according to the same methodology for the large-scale transplanting sites described above. The difference at test sites is in how the eelgrass will be planted and subsequently monitored. Within each test site will be three test plots and each test plot will be 25 m^2. These test plots will be established along the center transect line with 6 meters of separation between each. Transplant efforts at a test site will begin with the divers establishing a center transect line at a depth similar to that of the plants harvested from within the donor bed (harvest transect line depth). From there, the divers will transplant using the 2-m by 3-m jig to create the checkerboard pattern shown in Figure 6. The jig allows for the planting of two rows and will be flipped a total of 2.5 times from deep to shallow to establish the first swath. To complete the test plot planting area, the jig will then be placed at the same deep edge as the initial swath, to complete a second swath. During the second swath, only two of the three columns of the jig will be used so that only two more columns will be added to the initial swath by flipping the jig 2.5 times from deep to shallow. These test plots will either all be planted upslope or downslope of the transect line, depending on conditions at the test site. Figure 6 illustrates a scenario where all test plots are below the center transect line. DNR has established criteria that 780 shoots will be planted at each test site;

therefore each of the three test plots will require 260 shoots. To achieve this total within the required checkerboard pattern, shoots will be planted at a density of 20 shoots per meter.

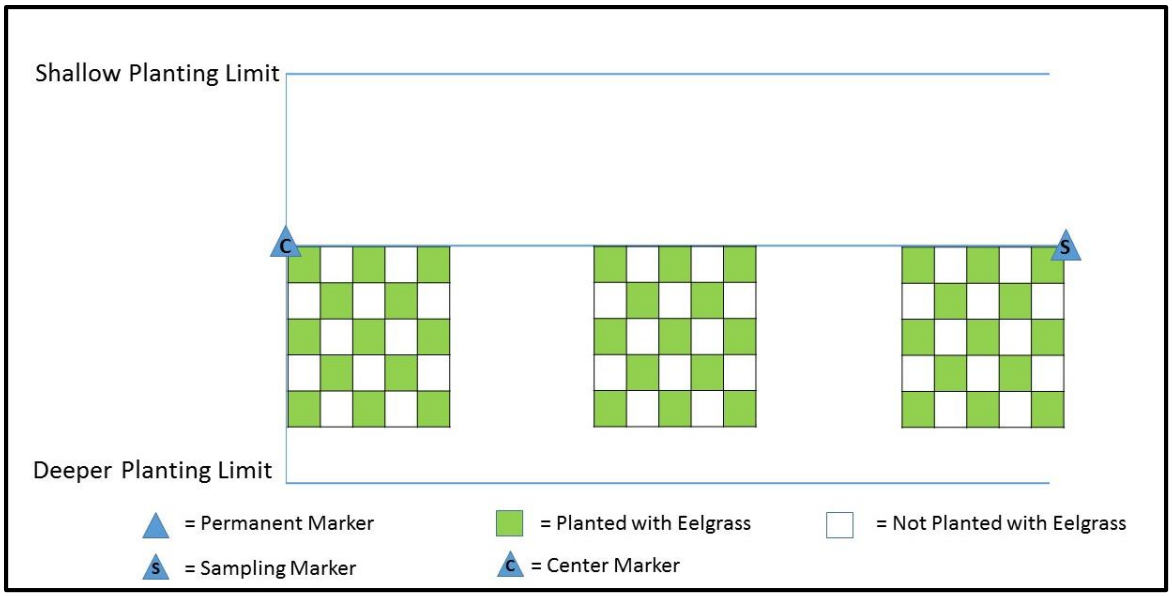

Figure 6 – Example test site planting schematic

RESTORATION MONITORING

Donor Sites

Donor sites will be monitored to quantify the recovery rates within each bed. The recovery of these sites depends on the resilience of the bed and the specific environmental conditions within that area. As described above and shown in Figures 1 and 2, two 26-meter transects will be permanently installed within the donor bed, one within the harvest area and a second adjacent to the harvest area to serve as a control transect. Monitoring will be conducted along each of these 26-meter transects by a team of two divers, each with a 1-m^2 quadrat. Eelgrass shoots will be counted in an offset pattern beginning at the sampling monument furthest from the center monument. To be consistent, shoots will always be counted beginning with Quadrat 1, downslope of the transect tape on the deeper harvest edge (see Figure 2). From there, each diver will count 13 quads so that a total of 26 density counts are collected along the transect line.

Large-scale Sites

Since large-scale sites were transplanted at a density of 20 shoots/m^2, we can employ the same monitoring methodology established for the donor sites. Large-scale sites will be monitored using methods nearly identical to those described for the donor site. Large-scale sites will not have a control transect, however, and density counts will be measured to assess the success and survival of transplants. These density counts will be collected along the 26-meter center transect line by a pair of divers, each with a 1-m^2 quad, to count in an offset pattern beginning at the sampling monument furthest from the center monument. To be consistent, shoots will always be counted beginning with

Quadrat 1, downslope of the transect tape on the deeper harvest edge (see Figure 2). From there, each diver will count 13 quads so that a total of 26 density counts are collected along the transect line.

Test Sites

Test sites will be monitored using the permanent transect established during the initial planting (Figure 6). Divers will match the corner of the 2-m by 3-m jig with the marker to count all shoots within the quad and flip once away from the center line to count the last row. This will be repeated at the remaining two test plots within the test site so that all shoots at an individual test site are counted. The divers will also make qualitative notes on the location and density of shoots that have recruited outside of the originally planted area.

WATER QUALITY MONITORING

DNR will provide the Hart Crowser team with pre-calibrated water quality instruments (e.g., PAR, temperature, and pH sensors), equipment necessary for deployment, and instructions on deployment procedures. These water quality instruments will be placed at locations identified by DNR along the transect(s) at each site. Water quality instruments will be deployed and serviced (i.e., cleaned, swapped) every three to six months during eelgrass transplant monitoring events. Hart Crowser will collect water samples at the pH sensors during sensor retrieval to compare the sensor pH reading with the actual pH of the water. These water samples will be fixed on land (not aboard vessel) using approximately 50 microliters (µl) of mercuric chloride ($HgCl_2$) provided by DNR or by dispensing the collected water sample into pre-fixed sample bottles containing approximately 50 µl of mercuric chloride. DNR will retrieve collected water quality instruments and samples at the end of each field event when the Hart Crowser team is demobilizing. Water quality monitoring data from the instruments will be downloaded and reviewed by DNR and then provided to the Hart Crowser team in Excel spreadsheet or Access database format for use in the Final Report. DNR will process the collected water samples, review the data, and then provide the data to Hart Crowser for use in the final report.

SCHEDULE

The 2016 field schedule will begin in April, when we will start site assessments to identify all donor sites. Our plan for the first season is to identify, set up, and harvest from at least three donor sites and to transplant at ideally seven of the 10 test sites and four of the eight large-scale sites. In-water work will stop in October. Sites not planted during 2016 will be transplanted as early in the field season as possible, ideally at the beginning of May 2017. In addition, the 2016 sites will be monitored in April, July, and October 2017 to evaluate the recovery at the donor sites and the success of the transplants at the large-scale and test sites.

We will complete a draft report by the end of October 2017; DNR will then review the report and provide comments. We will finalize the report by the contract end date of November 30, 2017. This report will summarize the completed work, indicating recovery and survival trajectories of the eelgrass at donor sites, eelgrass growth and survival at the restoration sites, and an analysis of effectiveness of the planting design used at the test sites. Statistical analysis of the data will be conducted as

appropriate, and the report will include maps containing spatially explicit visualization of the shoot density, eelgrass distribution, and water quality results. The report will also include the results of the water quality monitoring data.

PROJECT PERSONNEL AND RESPONSIBILITIES

Key staff members for the work are listed below with their project roles:

- **Jeff Barrett, PhD,** Natural Resource Business Unit Manager at Hart Crowser, will be the Principal in Charge for contracting matters with DNR, and as the senior internal reviewer responsible for all work conducted under the contract.
- **Jason Stutes, PhD,** Marine Ecologist at Hart Crowser, will be the Project Manager. He will manage all office work (project planning and reporting) and assist with managing field efforts.
- **Emily Duncanson,** Environmental Scientist at Hart Crowser, will be the Field Operations Manager, managing field operations and assisting Jason with office work as needed.
- **Amy Leitman, MS,** Marine Biologist and Scientific Diver, Owner of Marine Surveys & Assessments, will assist with transplanting efforts, eelgrass surveys, and water-quality probe deployment.
- **Nam Siu, MS,** Marine Biologist and Scientific Diver at Marine Surveys & Assessments, will implement transplanting efforts, eelgrass surveys, and water-quality probe deployment.
- **Eric Parker,** Vessel and Video Owner/Operator of Research Support Services, will lead all boat and diving operations, managing any staff that assist in boat operation or diving-related surveys.
- **Chris Fairbanks, MS**, Marine Biologist and Scientific Diver at Research Support Services, will assist with transplanting efforts, eelgrass surveys, and water-quality probe deployment.

REFERENCES

WDFW 2015. Hydraulic Project Approval, Eelgrass (*Zostera marina* L.) restoration in Puget Sound. Issued by Washington Department of Fish & Wildlife, Olympia, WA. Application ID: 456.

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Appendix D. Glossary, Acronyms, and Abbreviations

Quality Assurance Glossary

Accuracy - the degree to which a measured value agrees with the true value of the measured property. USEPA recommends that this term not be used, and that the terms precision and bias be used to convey the information associated with the term accuracy. (USGS, 1998)

Analyte - An element, ion, compound, or chemical moiety (pH, alkalinity) which is to be determined. The definition can be expanded to include organisms, e. g. fecal coliform, Klebsiella, etc. (Kammin, 2010)

Bias - The difference between the population mean and the true value. Bias usually describes a systematic difference reproducible over time, and is characteristic of both the measurement system, and the analyte(s) being measured. Bias is a commonly used data quality indicator (DQI). (Kammin, 2010; Ecology, 2004)

Calibration - The process of establishing the relationship between the response of a measurement system and the concentration of the parameter being measured. (Ecology, 2004)

Comparability - The degree to which different methods, data sets and/or decisions agree or can be represented as similar; a data quality indicator. (USEPA, 1997)

Completeness - The amount of valid data obtained from a project compared to the planned amount. Usually expressed as a percentage. A data quality indicator. (USEPA, 1997)

Dataset - A grouping of samples organized by date, time, analyte, etc (Kammin, 2010)

Measurement result - A value obtained by performing the procedure described in a method. (Ecology, 2004)

Method - A formalized group of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, data analysis), systematically presented in the order in which they are to be executed. (EPA, 1997)

Precision - The extent of random variability among replicate measurements of the same property; a data quality indicator. (USGS, 1998)

Quality Assurance Project Plan (QAPP) - A document that describes the objectives of a project, and the processes and activities necessary to develop data that will support those objectives. (Kammin, 2010; Ecology, 2004)

Quality Control (QC) - The routine application of measurement and statistical procedures to assess the accuracy of measurement data. (Ecology, 2004)

Replicate samples - two or more samples taken from the environment at the same time and place, using the same protocols. Replicates are used to estimate the random variability of the material sampled. (USGS, 1998)

Representativeness - The degree to which a sample reflects the population from which it is taken; a data quality indicator. (USGS, 1998)

Sample (field) – A portion of a population (environmental entity) that is measured and assumed to represent the entire population. (USGS, 1998)

Sample (statistical) – A finite part or subset of a statistical population. (USEPA, 1997)

Sensitivity - In general, denotes the rate at which the analytical response (e.g., absorbance, volume, meter reading) varies with the concentration of the parameter being determined. In a specialized sense, it has the same meaning as the detection limit. (Ecology, 2004)

Standard Operating Procedure (SOP) – A document which describes in detail a reproducible and repeatable organized activity. (Kammin, 2010)

Glossary – General Terms

Conductivity: A measure of water's ability to conduct an electrical current. Conductivity is related to the concentration and charge of dissolved ions in water.

Dissolved oxygen (DO): A measure of the amount of oxygen dissolved in water.

Parameter: A physical chemical or biological property whose values determine environmental characteristics or behavior.

pH: A measure of the acidity or alkalinity of water. A low pH value (0 to 7) indicates that an acidic condition is present, while a high pH (7 to 14) indicates a basic or alkaline condition. A pH of 7 is considered to be neutral. Since the pH scale is logarithmic, a water sample with a pH

Acronyms and Abbreviations

Following are acronyms and abbreviations used frequently in this report.

e.g.	For example
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management database
EPA	U.S. Environmental Protection Agency
et al.	And others
GIS	Geographic Information System software
GPS	Global Positioning System
i.e.	In other words
QA	Quality assurance
SOP	Standard operating procedures

Units of Measurement

°C	degrees centigrade
m	meter
mg	milligram
mgd	million gallons per day
mg/d	milligrams per day
mg/Kg	milligrams per kilogram (parts per million)
mg/L	milligrams per liter (parts per million)
mg/L/hr	milligrams per liter per hour
mL	milliliters
mm	millimeter
mmol	millimole or one-thousandth of a mole. A mole is an S1 unit of matter.
psu	practical salinity units
s.u.	standard units
ug/g	micrograms per gram (parts per million)
ug/Kg	micrograms per kilogram (parts per billion)
ug/L	micrograms per liter (parts per billion)
um	micrometer
uM	micromolar (a chemistry unit)
umhos/cm	micromhos per centimeter
uS/cm	microsiemens per centimeter, a unit of conductivity