Collaborative Effort to Restore Eelgrass in Puget Sound, WA

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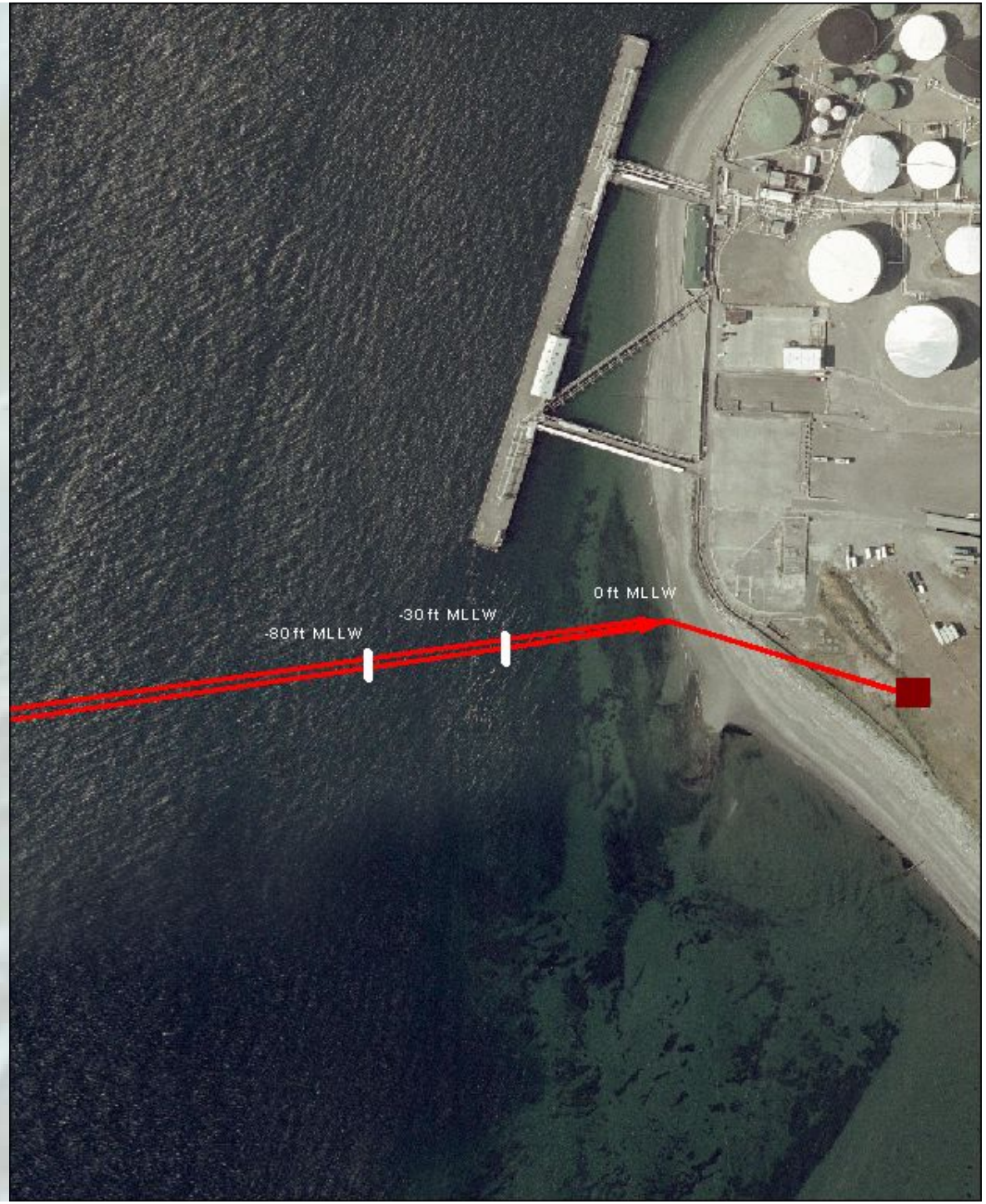
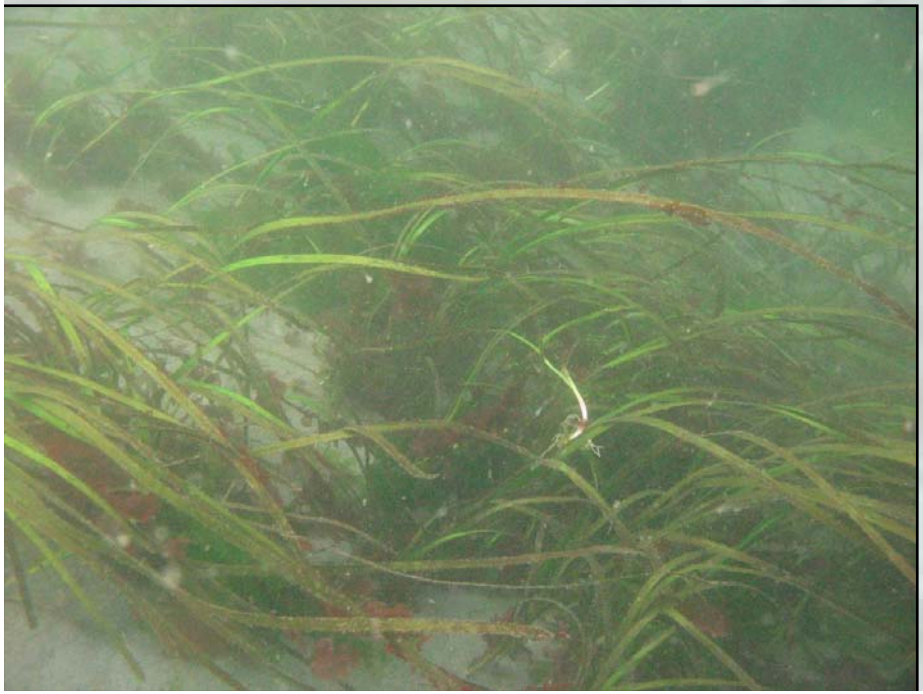
Why & Where?

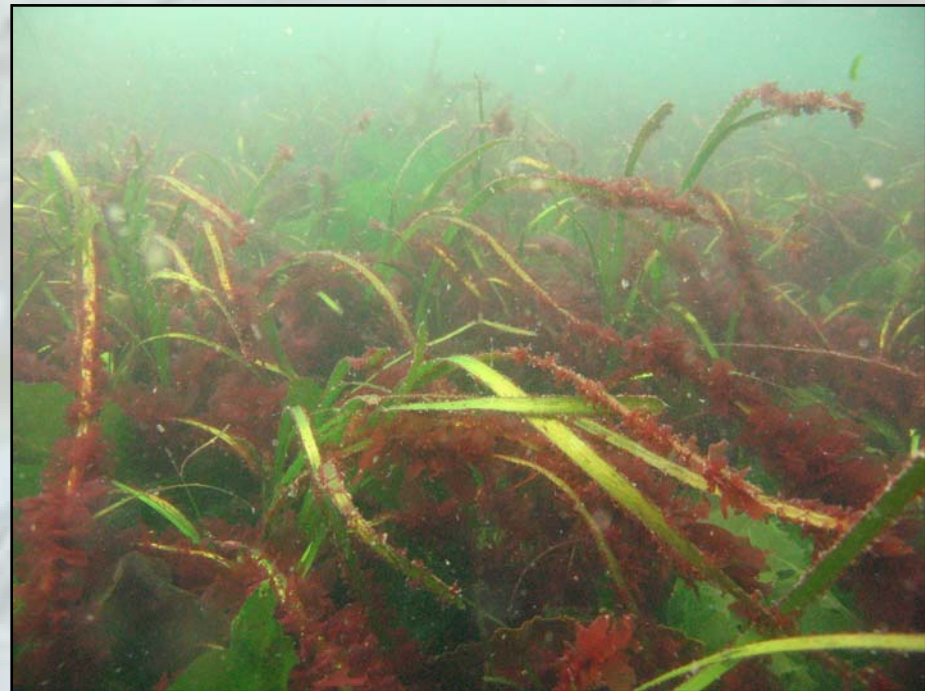
WTD will be building a new wastewater treatment plant that will discharge effluent through a marine outfall into Puget Sound



Why Care?

- Native perennial plant (*Zostera marina*) that forms meadows
- Nursery area for fish and shellfish
- Provides food & spawning habitat





Conceptual Framework Planning

- King County Wastewater Treatment Division
- King County Water & Land Resources Division
- Washington Dept. of Natural Resources
- Washington Dept. of Fish & Wildlife
- Battelle Marine Sciences Laboratory/PNNL
- Grette & Associates
- Sea-run Consulting

Restoration Goal

To restore intertidal and shallow subtidal eelgrass habitat to pre-construction conditions

Objectives

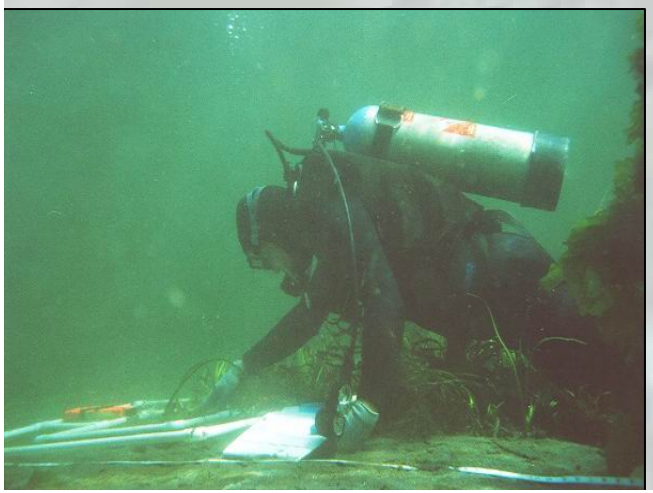
- Replace excavated substrate with native material
- Restore eelgrass in trenched area and any additional areas disturbed
- Maximize probability of transplant success by planting when plants are healthiest and substrate has stabilized

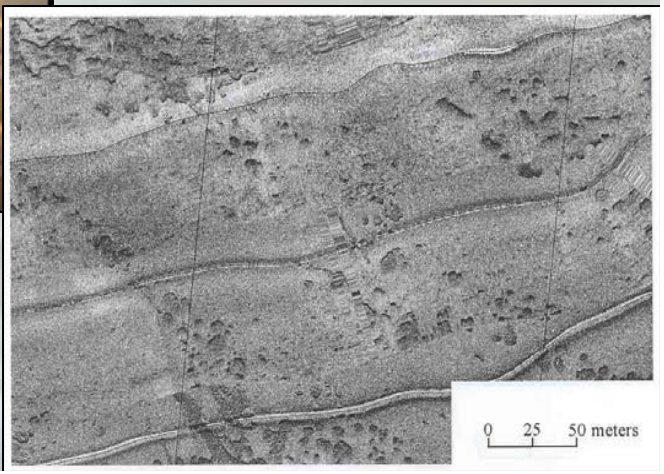
Plan Elements

- Pre-construction surveys
- Pre-construction harvesting & propagation
- Experimental harvest plots
- Transplant
- Post-construction surveys
- Contingency plan (will be developed in 2010)

Pre-construction Surveys

- Document extent & mean densities of eelgrass
- Assess inter-annual variation
- Combination of methods: SCUBA divers, underwater video & side-scan sonar



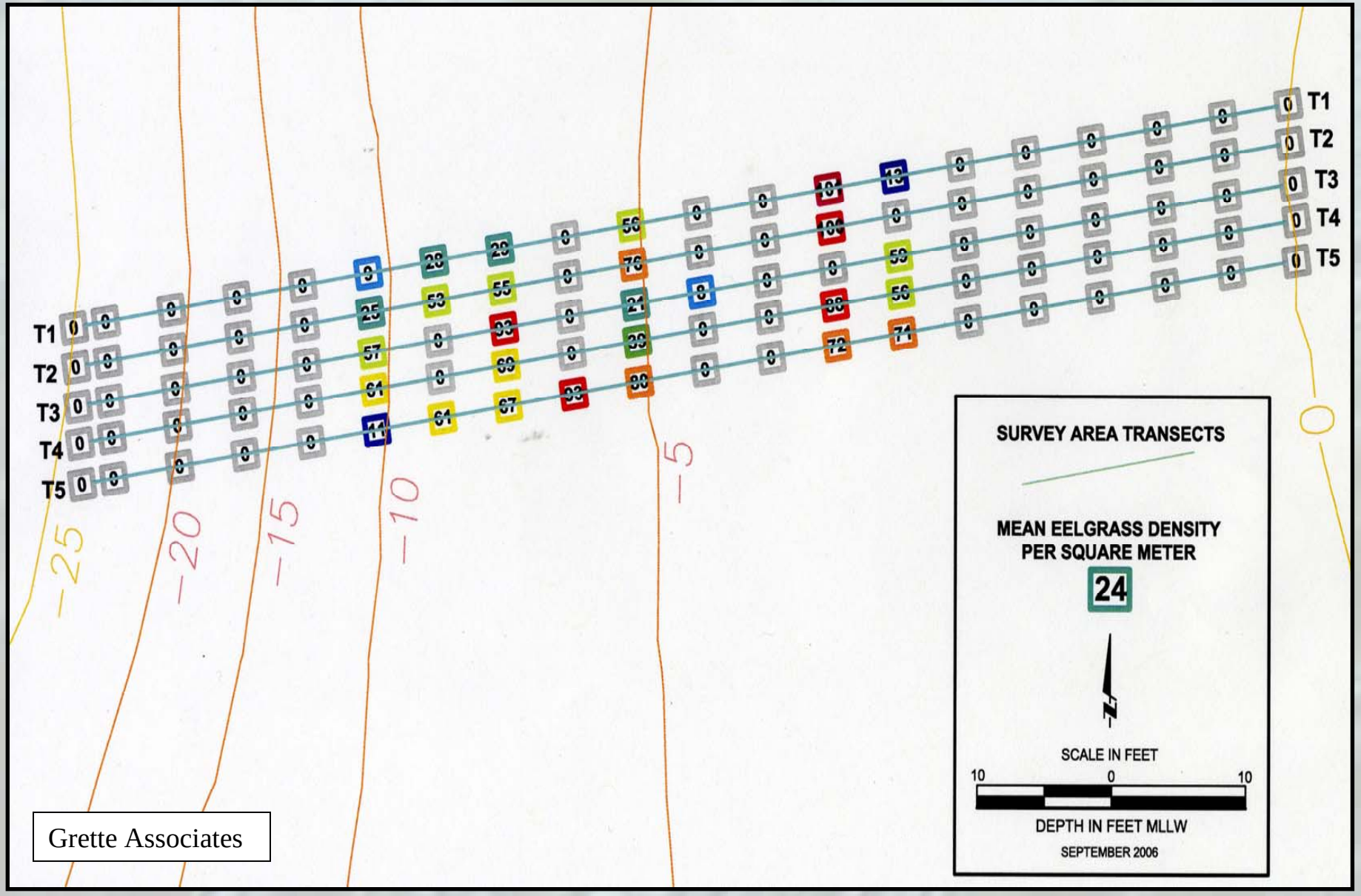


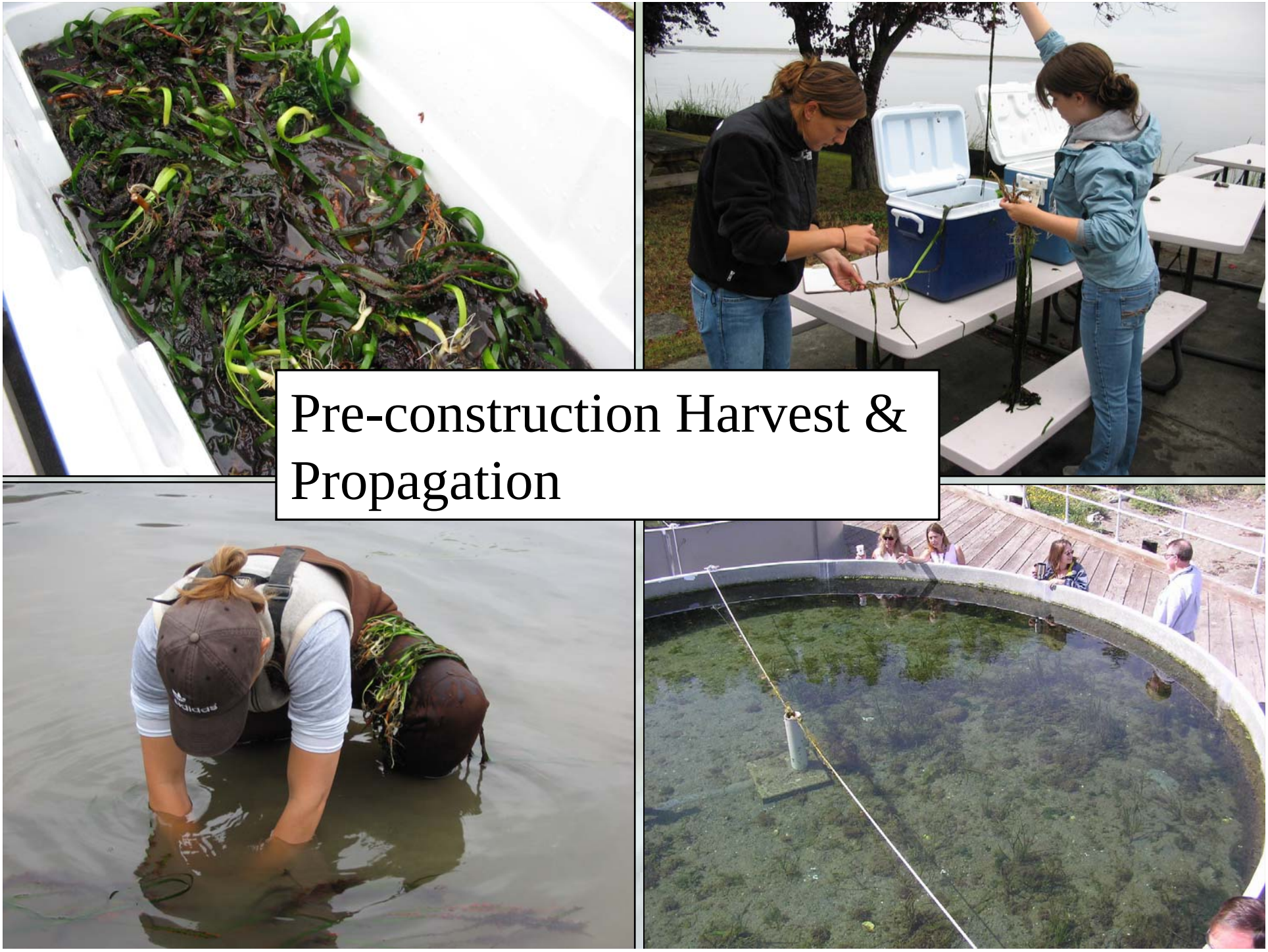
Site divided into distinct areas:

- outfall corridor
- study area
- reference area
- donor site (not shown)

Pre-construction

	2004	2005	2006	2007	2008
	Year - 5	Year - 4	Year - 3	Year - 2	Year -1
Marine Outfall Corridor	divers sonar UW video	---	divers	---	divers sonar UW video
Study Area	sonar UW video	---	---	---	divers sonar UW video
Reference Area	divers sonar UW video	---	divers	---	divers sonar UW video
Donor Site	sonar UW video	---	---	---	---

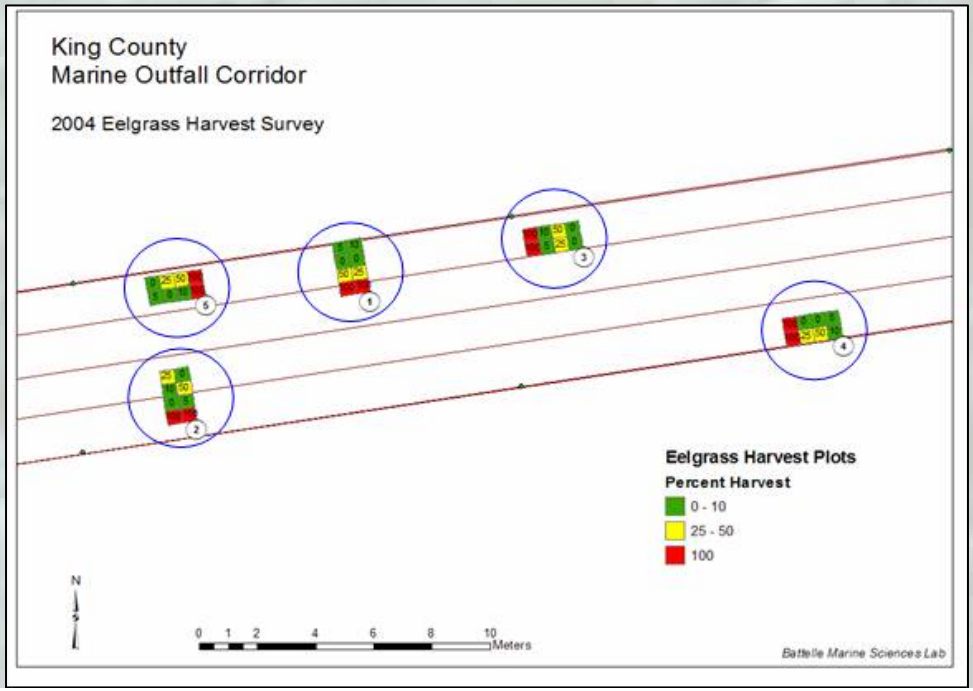

T1
T2
T3
T4
T5
-25
-20
-15
-10
-5
0
SURVEY AREA TRANSECTS
MEAN EELGRASS DENSITY
PER SQUARE METER
24
N
SCALE IN FEET
10
0
10
DEPTH IN FEET MLLW
SEPTEMBER 2006
Grette Associates



Pre-construction Harvest & Propagation

Experimental Harvest Plots

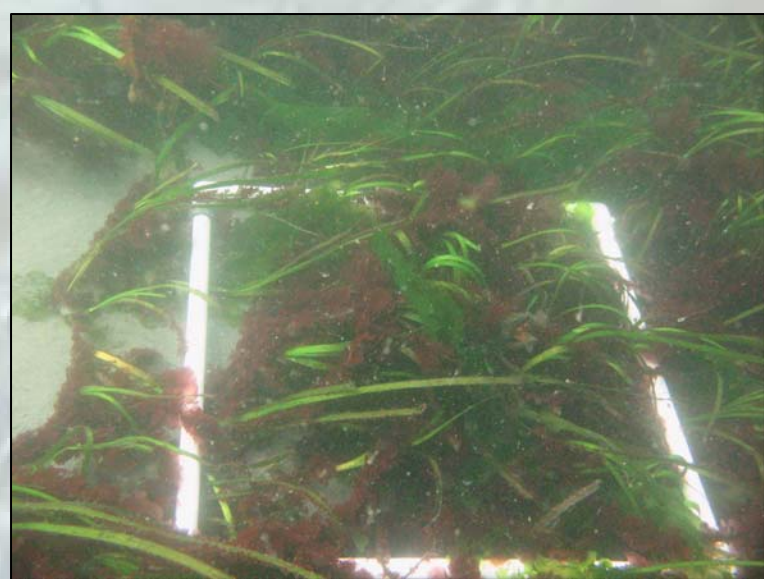
- Five 2.0 m^2 rectangular plots established in 2004
- Each plot divided into 8 sub-plots
- Six harvest treatments: 0,5,10,25,50,100 %
- Monitored post-harvest in 2005,2006, & 2007



Transplant

Post-construction surveys

- Identify the spatial extent of eelgrass affected by construction within the Study Area
- Document eelgrass recovery
- Detect adverse developments in a timely manner



Post-transplant Monitoring

	2009	2010	2011	2012	2013	2014
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5 **
Marine Outfall Corridor	divers sonar UW video-quarterly	divers sonar UW video-quarterly	nm	UW video	nm	divers sonar UW video
Study Area *	sonar UW video	sonar UW video	nm	UW video	nm	sonar UW video
Reference Area	divers sonar UW video	divers sonar UW video	nm	nm	nm	divers sonar UW video
Donor Site	nm	nm	nm	nm	nm	nm

* Only if Study Area receives transplants

** If performance standards aren't met in 2014, monitoring will be done in 2019

Lessons Learned So far

Must have a flexible plan!

and….

Acknowledgements

- Pam Erstad, WDFW
- Chance Asher, WDOE (formerly WDNR)
- Jeff Lundt, King County WTD

http://dnr.metrokc.gov/wlr/waterres/marine/Reports.htm