

STAVIS NRCA  
NEARSHORE RESTORATION PROJECT

Monitoring Report  
Year 1: 2010



Prepared for:  
Washington State Department of Natural Resources  
Michele Zukerberg, 1111 Washington Street SE, WA 98504  
360-790-9770



Prepared by:  
**Smayda Environmental Associates, Inc.**  
139 NE 61st Street, Seattle, WA 98115  
206-522-6199

January 13, 2011



## **Introduction**

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This report summarizes monitoring observations at the Stavis NRCA site between the end of construction (fall 2009) and the end of year 1 (fall 2010).

Construction of the realigned creek and estuary was completed in late September 2009. Installation of rooted plants in the upland areas was initiated in December 2009 and completed in January 2010. Monitoring visits were made to the site in January, March, April, May, August, and September 2010.

On November 20, 2009, an extreme high tide occurred. An unusually low pressure trough associated with a major storm caused high tide to exceed predicted levels by two feet, as measured at the Port Townsend gage. There are no real-time gaging data in the project vicinity; however, the high tide caused flooding of waterfront homes along portions of Hood Canal, including the Duckabush River estuary. In addition, a series of rainstorms occurred during the fall of 2009, including two large events with approximately 2-yr and 10-yr recurrence intervals (20 to 40 cfs). After this series of events, inspection of the site revealed that the lowest 75 feet of the creek channel had been realigned to a slightly straighter, more northerly configuration. A central portion of the spit had been overtopped by waves, and several logs had been adjusted or relocated. Because these adjustments occurred prior to completion of the as-built drawings, the as-builts reflect this condition as the baseline.

## **Monitoring Objectives**

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The primary objectives of the monitoring are to:

- A. Establish whether or not ecological functioning has been restored at the site, and
- B. Determine the time to proceed with Phase 2 construction that will result in road obliteration and will block vehicle access to the site.

## **Photographic Monitoring**

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1. Aerial Photographs. Oblique aerial photographs were acquired by DNR during a flight on December 9, 2009 to show the site baseline after construction (Figure 1). Figure 1 was taken after the extreme high tide of November 20, 2009 and shows the creek entering the estuary approximately 50 feet to the north of where it was constructed. The as-built drawing for the site (Attachment 1) represents the same baseline.

No sources of aerial photos for other months in 2010 were located.

2. Hand-held cameral photo points. A set of photo-points were established at the site to show changes in the creek and estuary physical properties and vegetation. Key photopoints are shown in the in the following sections on Physical Condition and Vegetation Monitoring.



Figure 1. Oblique aerial photo of the site December 9, 2009

### **Terrestrial and Aquatic Life Monitoring**

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A variety of wildlife and their sign have been observed at the site since construction. Raccoon, coyote, and deer tracks are frequently observed. In October 2009, Dave Carnes of DNR photographed black bear tracks in the estuary (Figure 2). Amphibian egg masses and a dead rough-skinned newt were observed in the small created pond at the south edge of the site in April. Killdeer are frequently observed in the estuary, as well as gulls and great blue heron.

No anadromous fish have been observed to date in the estuary or creek.





Figure 2. Black bear and raccoon tracks

## Water Quality Monitoring

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The creek was observed flowing with clear water in September 2010, as well as during other site visits (Figure 3). A 50-foot long portion of the creek near the estuary downcut a bit initially in the fall of 2009, but has not showed continued downcutting. A small alluvial fan has developed at the lower edge of the creek/upper end of the estuary. Willow stakes installed along the creek showed good survival, and volunteer salmonberry and red alder are also taking hold along the banks. None of the creek LWD has moved.

The gradient of salinity in the estuary is evident from the vegetation that is becoming established. The pattern of ice in Figure 1 also shows the location of the fresh water at the stream outlet and inner estuary. The upper end of the estuary, along the creek's alluvial fan, and along the northeastern, higher elevation edge, is being populated primarily by volunteer red alder, with scattered clumps of *Juncus ensifolius*, *Juncus effusus*, and unidentified seedling grasses. The southwestern end of the estuary, outside of the channel, is showing establishment of *Scirpus maritimus* and *Triglochin maritimum*, as well as *Deschampsia cespitosa*, all brackish water species (Figure 4). A second area of *Scirpus maritimus* is located along the east central portion of the estuary, at an elevation above the main channel. From the center of the estuary downslope, *Salicornia virginica* is present, in the form of transplants and abundant numbers of seedlings. *Atriplex patula* is also present on the lower estuary benches.



Figure 3. Realigned stream



Figure 4. *Scirpus maritimus* and *Triglochin maritimum* in southwest corner of estuary; red alder at stream outlet in upper right corner of photo.

## **Physical Condition**

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Oblique photos were taken in December 2009 (baseline) and in September 2010 (year 1) to assess the changes in physical habitat of the creek, sand spit, and estuary.

Figure 5 shows a lower reach of the realigned creek. Downcutting and limited lateral migration that occurred during the fall 2009 storms are evident. Individual pieces of large woody debris can be identified at the same locations in both photos, indicating that the wood has stayed put. Willow and red alder are quickly becoming established along the banks. The lowest reach of the creek shifted during the fall 2009 storms (see Figure 1 for its current location); it straightened and removed the final meander, repositioning the outlet of the creek into the upper estuary about 50 feet north of the constructed site. No barriers to fish passage or other deleterious effects of this realignment were noted. WDFW biologists have expressed concern that entrance into the creek is difficult for fish except at high tides. We believe that as intertidal vegetation becomes more well-established, the stream channel will become passable to fish during a greater range of tidal levels.

Figure 6 shows the sandspit as viewed from the location of the former flume outlet. Despite some overtopping of the central spit by waves during the very high tide event in November 2009, the large woody debris has stayed in place.

Figure 7 shows the outlet (northern) end of the estuary. The sandspit is intact, the estuary channel has remained in its constructed alignment, and saltmarsh vegetation is beginning to become established in the estuary after one growing season. Currently the saltmarsh vegetation shows a good distribution of individual and moderately dense patches of young plants, interspersed with open channel and unvegetated areas. We expect to see continued growth and expansion of the saltmarsh vegetation in the next growing season.

Overall, the creek, sandspit, and estuary have remained stable during year 1. Large woody debris has shown only minor readjustment. Vegetation is quickly becoming established along these locations and will contribute to stabilizing the site.

## **Physical Condition : Maintenance Recommendations**

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The physical restoration of the creek, estuary, and sandspit, including the logs that were placed in the landscape, have achieved the intended reconnection of the creek with the estuary and Hood Canal. No maintenance actions are recommended at this time. Full ecological functioning at all trophic levels has not yet been achieved, as the vegetation at the site is still immature (refer to following section). Continuation of monitoring inspections is recommended to evaluate both physical stability and vegetation establishment, prior to progressing to Phase 2, road obliteration.





Figure 5a. Lower creek, December 2009



Figure 5b. Lower creek, September 2010



Figure 6a. Sandspit, December 2009



Figure 6b. Sandspit, September 2010





Figure 7a. Lower orchard and estuary outlet, December 2009



Figure 7b. Lower orchard and estuary outlet, September 2010



## Vegetation Monitoring

**Restored Upland Forest.** Two belt transects, 100 feet by 10 feet, were established along a baseline transect through the center of each of the four upland planting zones. The sampling transects were located at random points along the baseline for the Upper and Lower Orchard zones. Due to the narrowness of the North and South Pasture zones, the sampling transects in these areas were located to fit within the habitat. Attachment 2 shows the locations of the monitoring transects. Data are presented in Attachment 3.

Native trees, shrubs, and ferns within the belt transects were counted, identified to species, and categorized as live or dead. Stem density of live native trees, shrubs, and ferns was calculated for each upland planting zone based on the belt transect samples. Table 1 shows the result of year 1 monitoring conducted on September 27, 2010. Stem densities are displayed as the averaged values of the two transects within each zone, for installed plants and for all native trees, shrubs, and ferns tallied; the latter includes existing native vegetation in the Upper Orchard, and volunteer seedlings in other zones.

Table 1. Restored Upland Forest Planting Zones: Year 1 Monitoring Results

Planting Zone	Installed Plant Materials	Installed Plant Density (spacing and stems/acre)	Year 1 and 2 Target Stem Density Native Trees, Shrubs and Ferns (stems/acre)	Year 1 Stem Density, Installed Plants (stems/acre)	Year 1 Stem Density, All Native Trees, Shrubs, Ferns (stems/acre)
Upper Orchard	trees and shrubs	12-ft centers / 303	242	327	1960
Lower Orchard	trees and shrubs	4-ft centers / 2723	2178	2265	6904
North Pasture	trees and shrubs	4-ft centers / 2723	2178	1612	3550
South Pasture (excluding wetland)	trees and shrubs	4-ft centers / 2723	2178	893	9997

The target for year 1 monitoring was set at 80 percent of the installation density (stems/acre). All of the zones exhibited mortality of installed plants, which may reflect the very cold conditions when the plants were stockpiled prior to installation, the very wet winter and spring, and the poor soil conditions in zones where fill was placed from excavation of the original homesite. The survival of installed plants in the North and South pastures was below 80 percent. However, when volunteer seedlings (and existing native vegetation in the Upper Orchard) were counted, all of the zones exceeded their respective targets for stem density.

Species with high survival rates included *Pinus contorta*, *Picea sitchensis*, *Rosa nutkana*, *Symphoricarpos albus*, and *Rubus spectabilis*. Species with intermediate survival rates included *Pseudotsuga menziesii*, *Thuja plicata*, *Tsuga heterophylla*, *Mahonia nervosa*, and *Crataegus douglasii*. Species with low survival rates included *Malus fusca*, *Sambucus racemosa*, *Oemleria cerasiformis*, and *Acer macrophyllum*. Volunteers were dominated by red alder seedlings, and also included conifer and big-leaf maple seedlings, and salmonberry.

Figures 8 through 13 present photos of the upland forest planting zones immediately post-planting (January 2010) and in September 2010.



Figure 9a. Lower orchard and estuary, January 2010



Figure 9b. Lower orchard and estuary, September 2010



Figure 10a. Lower orchard, January 2010



Figure 10b. Lower orchard, September 2010





Figure 11a. Upper orchard, January 2010



Figure 11a. Upper orchard, September 2010



Figure 12a. North pasture, January 2010



Figure 12b. North pasture, September 2010





Figure 13a. South pasture, January 2010



Figure 13b. South pasture, September 2010



**Restored/Created Wetlands.** Visual inspection of the freshwater wetland habitat surrounding the pond in the Lower Pasture, and brackish and estuarine habitats in the inlet was conducted on September 27, 2010. The freshwater wetland was revegetated with a small number of transplants and was seeded with native species. Figure 14a shows the condition of the site in January 2010, after installation. Figure 14b shows the site in September 2010: cover is greater than 80 percent, and is dominated by volunteer *Scirpus microcarpus*, *Equisetum arvense*, *Ranunculus repens*, *Rubus spectabilis*, and *Alnus rubra*, as well as installed *Carex obnupta*. The year 1 target of at least 10 percent cover of native wetland species has been achieved.

Visual inspection of the upper, brackish marsh and the estuary also confirmed that the year 1 target of 10 percent cover of native species has been achieved. In the highest edges of the marsh, where freshwater seeps and drainages enter, seedlings of *Alnus rubra* are numerous. Seeded and volunteer species, including *Triglochin maritimum*, *Scirpus maritimus*, *Deschampsia cespitosa*, and *Juncus ensifolius* are present in the middle elevations. In the lower elevations, *Salicornia virginica* and *Atriplex patula* are becoming established. Figure 15 shows the post-construction and year 1 condition of the estuary; figures 16 through 18 show details of salt marsh plant establishment in the estuary.

**Sandspit.** A full census of rooted plants installed along the sandspit was conducted during late September in year 1. Mortality of *Elymus mollis* and *Rosa nutkana* occurred over the winter, primarily in the central reach of the spit which received the greatest effects of wave action. Monitoring results showed survival of approximately 66 percent of *Elymus* seedlings and 58 percent of *Rosa* transplants. Surviving *Elymus* showed growth and spread of rhizomes, and several produced seed heads. Seeding resulted in successful establishment of several species particularly along the northern spit. These species include *Ambrosia chamissonis*, *Atriplex patula*, *Grindelia integrifolia*, and *Achillea millefolium*. Figure 19 shows a view of the sandspit post-construction and year 1. Figure 20 shows *Grindelia integrifolia* seedlings becoming established on the inner side of the sandspit.

The monitoring objective of establishment of at least 43 plants was achieved (Appendix 1), based on survival of 32 installed plants plus a count of 132 plants from seed.

**Riparian Shrub.** Livestakes installed along the reconstructed and tributary streams were subsampled to determine survival in year 1. Three samples of ten livestockes were counted. The target survival for livestockes is 50 percent; the monitoring results showed a survival rate of 87 percent (Attachment 3). No areas of bare soil greater than 100 square feet were observed.



Figure 14a. Pond and wetland in South Pasture, January 2010



Figure 14b. Pond and wetland in South Pasture, September 2010



Figure 15a. Estuary, January 2010



Figure 15b. Estuary, September 2010





Figure 16. Southwest estuary detail with *Triglochin maritimum*



Figure 17. East-central estuary detail with *Scirpus maritimus*



Figure 18. Estuary channel detail with *Salicornia virginica*





Figure 19a. Sandspit, January 2010



Figure 19b. Sandspit, September 2010



Figure 20. Sandspit detail with *Grindelia integrifolia*





Figure 21a. Willow livestakes, January 2010



Figure 21b. Willow livestakes, September, 2010

## **Vegetation Maintenance Recommendations**

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**Upland Forest Planting Zones.** Recommended maintenance activity for the upland planting zones includes the following:

1. Manage weeds as described in the April 27, 2010 Weed Summary report; refer also to September 2010 updates to weed occurrences in Appendix A. The priority for weed management in winter 2010-2011 is herbicide treatment of the *Lamiastrum* site. Small patches of non-natives to be removed by hand digging can also be accomplished in the fall. Mowing and/or herbicide treatment of other species should be conducted in spring 2011.
2. If weed-whacking/mowing in the Upper Orchard is not performed, consider applying arborists chip mulch to the installed plants in this zone to reduce competition from pasture grasses. Based on an estimate of 300 installed plants surviving (75%) and an application rate of four 5-gallon buckets of wood chip mulch to each plant (approximately 5 cubic feet per plant), approximately 55 cubic yards of mulch would be needed. One load of arborist's chips is 40 cubic yards; the application rate could be adjusted to equal one truckload, or two truckloads could be delivered and the remaining chips could be applied to other sites, such as the treated *Lamiastrum* site, treated *Vinca* site, and applied to installed plants in other zones as needed.
3. Install approximately 100 native trees and 150 native shrubs provided by DNR as surplus from another project. Install in winter 2010-2011. Apply wood chip mulch. Approximately 6 person days of labor will be required, plus the cost of mulch delivered to site, and transport of plants from Quilcene.

**Restored/Created Wetlands.** No maintenance is proposed for these habitats, other than management of non-native species as proposed in the April 2010 Weed Summary Report.

**Sandspit.** Recommended maintenance for the sandspit area includes removal of a small number of the invasive species *Rubus laciniatus*.

**Riparian Shrub.** No supplemental livestaking or maintenance activity is proposed.



### TIDE ELEVATIONS AND STREAM FLOW

MHW	11.64'	100-YR PEAK	60.0 CFS
MTL	6.87'	ORDINARY HIGH WATER	14.1 CFS
MLLW	0.00'	SUMMER LOW	0.2 CFS

### PROJECT STATISTICS

BULKHEAD REMOVED	FEET	765
FILL SOIL EXCAVATED	ACRE	1.65
FILL SOIL EXCAVATED	CU YARDS	10,600
UPLAND PLACEMENT OF FILL SOIL	ACRE	1.95
UPLAND PLACEMENT OF FILL SOIL	CU YARDS	10,500
CONCRETE RUBBLE DISPOSED OFFSITE	TONS	160
CULVERTS AND BRIDGES REMOVED	EACH	2
MANMADE PONDS OBLITERATED	EACH	8
VAULTS REMOVED	EACH	4
8" PIPELINE REMOVED	FEET	2400
2" TO 6" PIPELINE REMOVED	FEET	2400
FENCE REMOVED	FEET	1610
BUILDINGS REMOVED *	EACH	5
LENGTH OF STREAM ENHANCEMENT	FEET	700
BEACH HABITAT LOGS	EACH	110
CREEK HABITAT LOGS	EACH	50
UPLAND HABITAT LOGS	EACH	60
BIRD PERCHES	EACH	15
TRANSPLANTED PLANTS	EACH	100
NATIVE PLANTS INSTALLED	EACH	4,230
NATIVE SEED INSTALLED	POUNDS	50
ARBORIST CHIPS MULCH	CU YARDS	300
INTERTIDAL ESTUARY CREATED	ACRE	1.08
NATIVE PLANTING AREA	ACRE	2.71

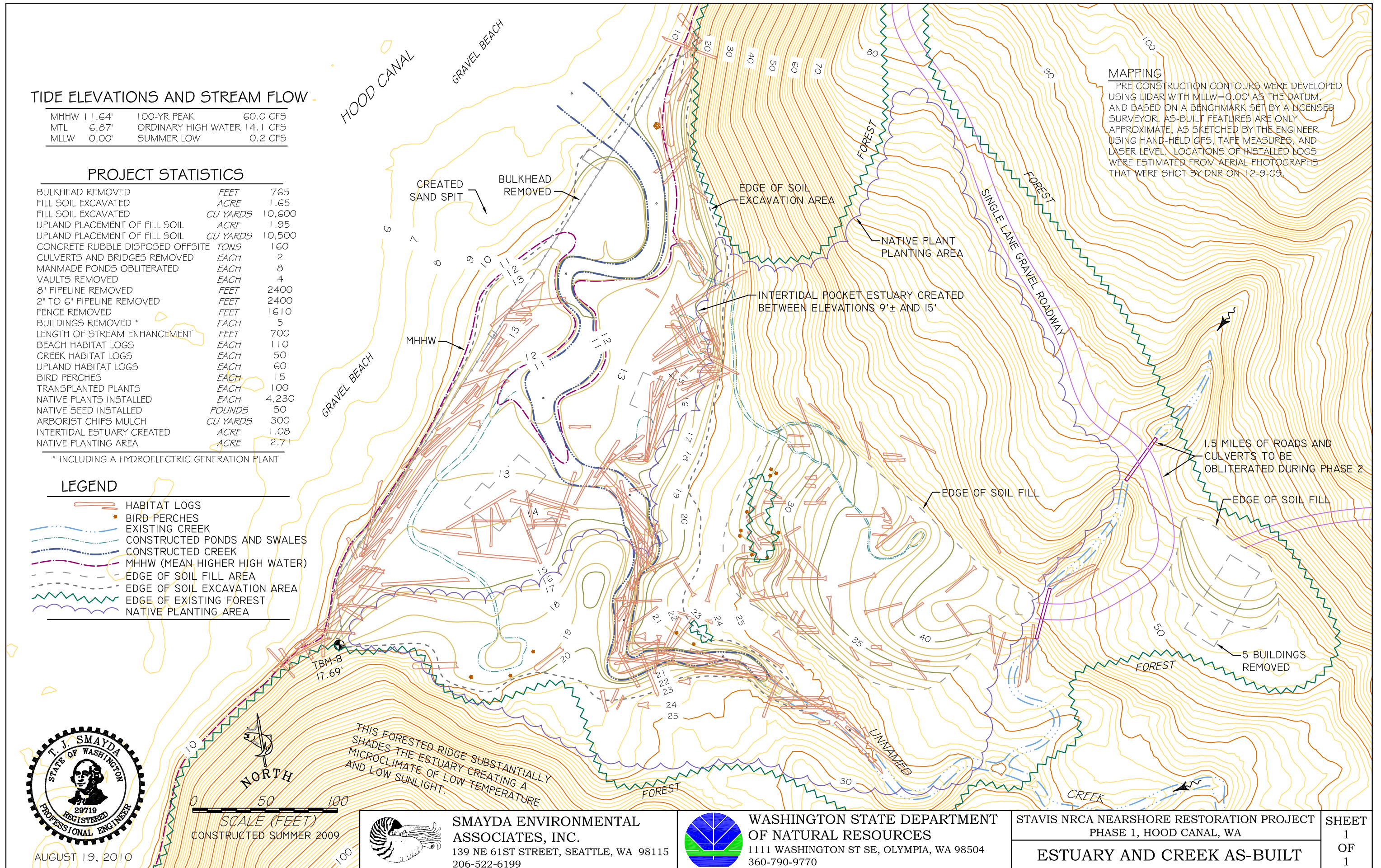
\* INCLUDING A HYDROELECTRIC GENERATION PLANT

### LEGEND

- HABITAT LOGS
- BIRD PERCHES
- EXISTING CREEK
- CONSTRUCTED PONDS AND SWALES
- CONSTRUCTED CREEK
- MHHW (MEAN HIGHER HIGH WATER)
- EDGE OF SOIL FILL AREA
- EDGE OF SOIL EXCAVATION AREA
- EDGE OF EXISTING FOREST
- NATIVE PLANTING AREA

### MAPPING

PRE-CONSTRUCTION CONTOURS WERE DEVELOPED USING LIDAR WITH MLLW=0.00' AS THE DATUM, AND BASED ON A BENCHMARK SET BY A LICENSED SURVEYOR. AS-BUILT FEATURES ARE ONLY APPROXIMATE, AS SKETCHED BY THE ENGINEER USING HAND-HELD GPS, TAPE MEASURES, AND LASER LEVEL. LOCATIONS OF INSTALLED LOGS WERE ESTIMATED FROM AERIAL PHOTOGRAPHS THAT WERE SHOT BY DNR ON 12-9-09.



AUGUST 19, 2010

SCALE (FEET)  
CONSTRUCTED SUMMER 2009



**SMAYDA ENVIRONMENTAL ASSOCIATES, INC.**  
139 NE 61ST STREET, SEATTLE, WA 98115  
206-522-6199



**WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES**  
1111 WASHINGTON ST SE, OLYMPIA, WA 98504  
360-790-9770

STAVIS NRCA NEARSHORE RESTORATION PROJECT  
PHASE 1, HOOD CANAL, WA

**ESTUARY AND CREEK AS-BUILT**

SHEET  
1  
OF  
1



**MAPPING**

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**TIDE ELEVATIONS AND STREAM FLOW**

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MTL 6.87'	ORDINARY HIGH WATER	14.1 CFS
MLLW 0.00'	SUMMER LOW	0.2 CFS

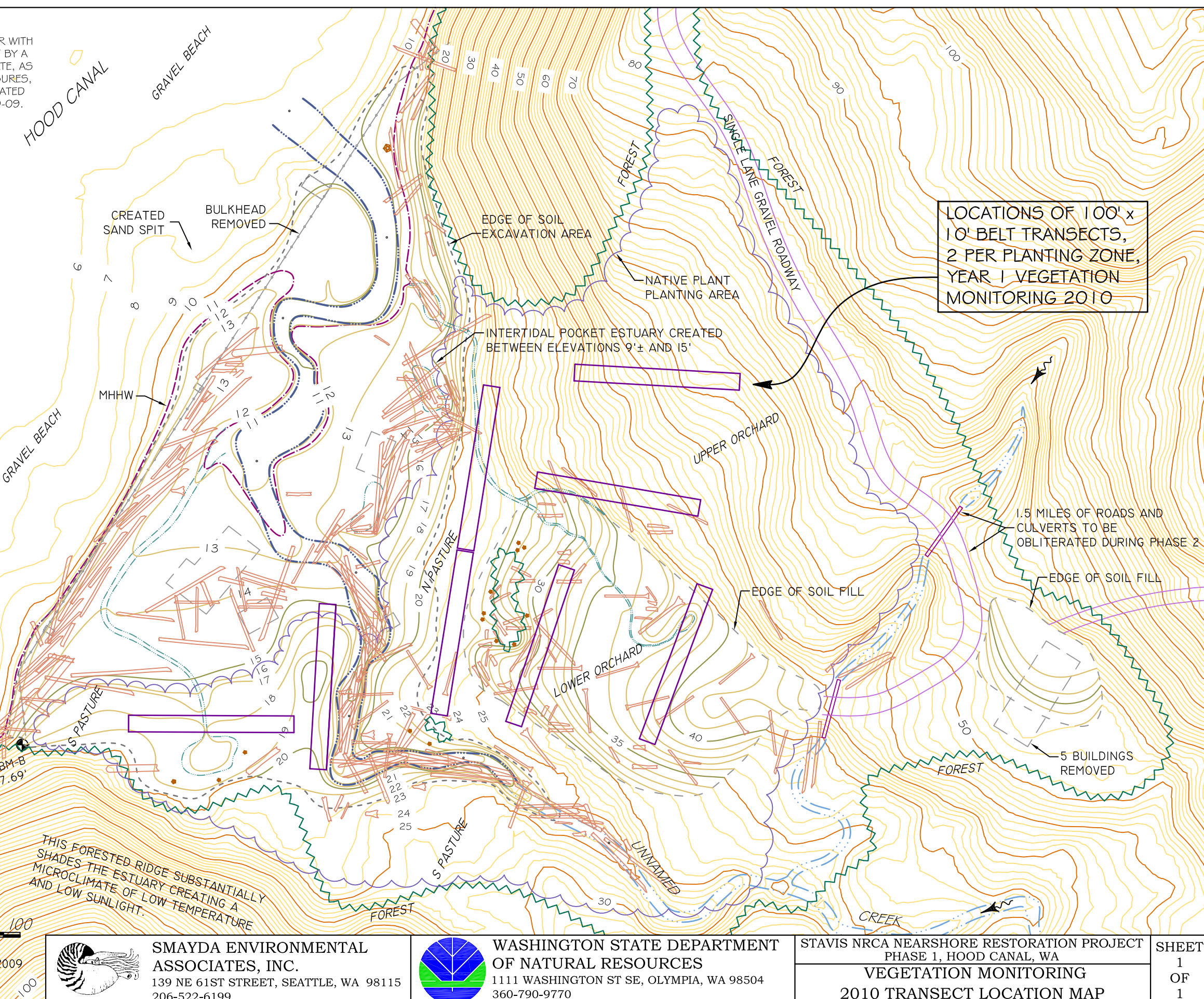
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NATIVE PLANTS INSTALLED	EACH	4,230
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INTERTIDAL ESTUARY CREATED	ACRE	1.08
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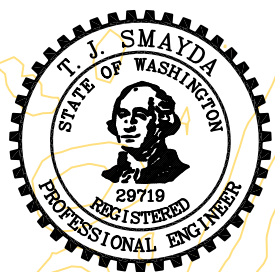
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**LEGEND**

- HABITAT LOGS
- BIRD PERCHES
- EXISTING CREEK
- CONSTRUCTED PONDS AND SWALES
- CONSTRUCTED CREEK
- MHHW (MEAN HIGHER HIGH WATER)
- EDGE OF SOIL FILL AREA
- EDGE OF SOIL EXCAVATION AREA
- EDGE OF EXISTING FOREST
- NATIVE PLANTING AREA



LOCATIONS OF 100' x 10' BELT TRANSECTS, 2 PER PLANTING ZONE, YEAR 1 VEGETATION MONITORING 2010



JANUARY 2011

SCALE (FEET)  
CONSTRUCTED SUMMER 2009

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206-522-6199

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1111 WASHINGTON ST SE, OLYMPIA, WA 98504  
360-790-9770

STAVIS NRCA NEARSHORE RESTORATION PROJECT  
PHASE 1, HOOD CANAL, WA  
**VEGETATION MONITORING**  
2010 TRANSECT LOCATION MAP

SHEET  
1  
OF  
1



Stavis NRCA Revegetation Monitoring Data: Year 1						9/27/2010
UPLAND FOREST PLANTING ZONES						
LOWER ORCHARD						
Transect 1					1000 sq ft	
Species	Live	Dead				
Installed plants						
GASH	11	4				
MANE	7	5				
PICO	7	0				
PSME	7	17				
SYAL	24	5				
VAOV	0	1			Percent survival of installed plants:	64%
Total	56	32			Stem density of installed plants:	56 per 1000 sq ft
						2439 per acre
Volunteer plants						
ALRU	84	0				
Total w/volunteers	140	32			Stem density of installed & volunteers:	140 per 1000 sq ft
						6098 per acre
Transect 2					1000 sq ft	
Species	Live	Dead				
Installed plants						
GASH	4	0				
MANE	8	1				
PICO	5	0				
PSME	4	1				
SYAL	26	0				
VAOV	1	0			Percent survival of installed plants:	96%
Total	48	2			Stem density of installed plants:	48 per 1000 sq ft
						2091 per acre
Volunteer plants						
ALRU	129	0				
Total w/volunteers	177	2			Stem density of installed & volunteers:	177 per 1000 sq ft
						7710 per acre
Lower Orchard						
averaged results			average			
Total Installed	104		52		Avg stem density of installed plants:	52 per 1000 sq ft
Total w/volunteers	317		158.5			2265 per acre
					Avg stem density installed & volunteers:	158.5 per 1000 sq ft
						6904 per acre

UPPER ORCHARD							
Transect 1				1000 sq ft			
Species	Live	Dead					
Installed plants							
PSME	8	0					
SYAL	6	0					
THPL	0	0			Percent survival of installed plants:	100%	
Total	14	0			Stem density of installed plants:	14 per 1000 sq ft	
						610 per acre	
Existing and Volunteer plants							
ALRU	23						
CRDO	2						
POMU	14						
PSME	3						
SYAL	0						
THPL	2						
VAOV	4						
Total exist & vol.	48						
Total w/existing and volunteers	62	0			Stem density exist/installed/volunteers:	62 per 1000 sq ft	
						2701 per acre	
MALUS	6	1	<i>(non-native, not included in total)</i>				
Weeds: Upper Orchard T1: CIAR (numerous), RUDI2 (7), RULA (3), ILAQ (1)							
Transect 2				1000 sq ft			
Species	Live	Dead					
Installed plants							
PSME	1	1					
SYAL	0	0					
THPL	0	0			Percent survival of installed plants:	50%	
Total	1	1			Stem density of installed plants:	1 per 1000 sq ft	
						44 per acre	
Existing and Volunteer plants							
ALRU	8						
CRDO	4						
POMU	13						
PSME	0						
SYAL	0						
THPL	1						
VAOV	1						
Total exist & vol.	27						
Total w/existing and volunteers	28	0			Stem density exist/installed/volunteers:	28 per 1000 sq ft	
						1220 per acre	
MALUS	9	0	<i>(non-native, not included in total)</i>				
Weeds: Upper Orchard T2: RUDI2 (8), RULA (4), ILAQ (1)							
Upper Orchard averaged results							
Total Installed	15		average	7.5	Avg stem density of installed plants:	7.5 per 1000 sq ft	
Total w/volunteers	90			45		327 per acre	
					Avg stem density installed & volunteers:	45 per 1000 sq ft	
						1960 per acre	



NORTH PASTURE							
Transect 1					1000 sq ft		
Species	Live	Dead					
<b>Installed plants</b>							
ACMA	0	9					
CRDO	7	1					
MANE	1	1					
MAFU	0	0					
PSME	0	2					
RONU	5	1					
SYAL	9	3					
THPL	4	3			Percent survival of installed plants:	57%	
<i>Total</i>	<i>26</i>	<i>20</i>			Stem density of installed plants:	26 per 1000 sq ft	
						<b>1133</b>	<b>per acre</b>
<b>Volunteer plants</b>							
ALRU	35	0					
<i>Total w/volunteers</i>	<i>61</i>	<i>20</i>			Stem density of installed & volunteers:	61 per 1000 sq ft	
						<b>2657</b>	<b>per acre</b>
<b>Weeds: North Pasture T1: CYSC (2, both pulled)</b>							
Transect 2					1000 sq ft		
Species	Live	Dead					
<b>Installed plants</b>							
ACMA	0	4					
CRDO	15	5					
MANE	5	3					
MAFU	0	0					
PSME	0	0					
RONU	14	1					
SYAL	4	4					
THPL	10	2			Percent survival of installed plants:	72%	
<i>Total</i>	<i>48</i>	<i>19</i>			Stem density of installed plants:	48 per 1000 sq ft	
						<b>2091</b>	<b>per acre</b>
<b>Volunteer plants</b>							
ALRU	53	0					
RUSP	1	0					
Total volunteers	<i>54</i>	<i>0</i>					
<i>Total w/volunteers</i>	<i>102</i>	<i>19</i>			Stem density of installed & volunteers:	102 per 1000 sq ft	
						<b>4443</b>	<b>per acre</b>
<b>Weeds: North Pasture T2: RUDI2 (2)</b>							
<b>North Pasture averaged results</b>			<b>average</b>				
Total Installed	74		37		Avg stem density of installed plants:	37 per 1000 sq ft	
Total w/volunteers	163		81.5			<b>1612</b>	<b>per acre</b>
					Avg stem density installed & volunteers:	81.5 per 1000 sq ft	
						<b>3550</b>	<b>per acre</b>

SOUTH PASTURE							
<b>Transect 1</b>							
<b>Species</b>	<b>Live</b>	<b>Dead</b>					
<b>Installed plants</b>							
ACMA	0	3					
CEVU	1	0					
CRDO	1	0					
MANE	0	1					
MAFU	3	0					
OECE	0	0					
PISI	5	0					
RUSP	7	0					
SASI	3	0					
THPL	4	0			Percent survival of installed plants:	86%	
<i>Total</i>	<i>24</i>	<i>4</i>			Stem density of installed plants:	<i>24</i> per 1000 sq ft	
						<b>1045</b>	<b>per acre</b>
<b>Volunteer plants</b>							
ALRU	125	0					
Conifer seedlings	13	0					
Total volunteers	<i>138</i>	<i>0</i>					
<i>Total w/volunteers</i>	<i>162</i>	<i>4</i>			Stem density of installed & volunteers:	<i>162</i> per 1000 sq ft	
						<b>7057</b>	<b>per acre</b>
<b>Transect 2</b>							
<b>Species</b>	<b>Live</b>	<b>Dead</b>			1000 sq ft		
<b>Installed plants</b>							
ACMA	0	4					
CRDO	2	1					
MAFU	1	0					
PISI	2	0					
RUSP	9	2					
THPL	2	0					
TSHE	1	3			Percent survival of installed plants:	63%	
<i>Total</i>	<i>17</i>	<i>10</i>			Stem density of installed plants:	<i>17</i> per 1000 sq ft	
						<b>741</b>	<b>per acre</b>
<b>Volunteer plants</b>							
ALRU	270	0					
ACMA seedlings	5	0					
conifer seedlings	5	0					
Total volunteers	<i>280</i>	<i>0</i>					
<i>Total w/volunteers</i>	<i>297</i>	<i>10</i>			Stem density of installed & volunteers:	<i>297</i> per 1000 sq ft	
						<b>12937</b>	<b>per acre</b>
<b>Weeds: South Pasture T2: LAGA: one patch 1sq ft, at east end of T2; pulled; monitored and retreat if nec.</b>							
<b>South Pasture averaged results</b>							
				<b>average</b>			
Total Installed	41			20.5	Avg stem density of installed plants:	20.5	per 1000 sq ft
Total w/volunteers	459			229.5		<b>893</b>	<b>per acre</b>
					Avg stem density installed & volunteers:	229.5	per 1000 sq ft
						<b>9997</b>	<b>per acre</b>

SANDSPIT		Installed	Count 9/27/10		% survival installed		
	ELMO	47	24		66%		
	RONU	11	8		58%		
	AMCH	seed	8				
	ATPA	seed	36				
	GRIN	seed	72				
	ACMI	seed	16				
	Total	58	164				
	Target no. plants year 1		43		equivalent to 80% survival of installed plants		
	Actual no. installed plants surviving		32				
	Total no. rooted plants incl seedlings		164		<i>(3.81 x target value)</i>		
LIVESTAKES		live	dead				
		8	2				
		9	1				
		9	1				
	Total:	26	4				
	Target survival	50%					
	Actual survival	87%					
ESTUARY AND FRESHWATER WETLANDS							
	Visual inspection only						