

# TAHOMA SALT MARSH

## YEAR 1 TO YEAR 3 MONITORING REPORT



City of Tacoma  
December 20, 2006



# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.0</b>	<b>PROJECT OBJECTIVES.....</b>	<b>1</b>
<b>3.0</b>	<b>MONITORING METHODS.....</b>	<b>2</b>
3.1	General.....	2
3.2	Habitat Assessment.....	2
3.3	Erosion and Sedimentation.....	3
<b>4.0</b>	<b>MONITORING RESULTS.....</b>	<b>3</b>
4.1	General Observations.....	3
4.1.1	Photo Points.....	3
4.1.2	Wildlife Observations.....	4
4.2	Habitat Assessment.....	4
4.2.1	Plant Cover.....	4
4.2.2	Plant Diversity.....	5
4.2.3	Invasive Species.....	5
4.3	Erosion and Sedimentation.....	6
<b>5.0</b>	<b>MAINTENANCE AND ADAPTIVE MANAGEMENT.....</b>	<b>7</b>
5.1	Completed & On-Going Activities.....	7
5.2	Recommended Adaptive Management Activities.....	7
5.2.1	Plant Cover & Diversity.....	7
5.2.2	Invasive Species.....	8
<b>6.0</b>	<b>REFERENCES.....</b>	<b>8</b>

## LIST OF TABLES

Table 1	Riparian Area Quadrat Monitoring Results
Table 2	Salt Marsh Area Quadrat Monitoring Results
Table 3	Riparian Area Species
Table 4	Salt Marsh Area Species
Table 5	Survey Transect Elevations
Table 6	Erosion Marker Elevations

## LIST OF FIGURES

Figure 1	Vicinity Map
Figure 2	Site Plan
Figure 3	Transects Cross-Sections

## LIST OF APPENDICES

Appendix A	Visual Inspections: Photos
Appendix B	Visual Inspections: Field Notes

## 1.0 INTRODUCTION

This document presents the Year 1 to Year 3 Monitoring Report for the Tahoma Salt Marsh (TSM) Natural Resource Restoration site located in Tacoma, Washington (Figure 1). The City of Tacoma (City) conducted the Year 1 through Year 3 qualitative and quantitative monitoring activities between 2004 and 2006.

The TSM is located along the Ruston Way shoreline at 1741 North Shuster Parkway. The project was constructed on land historically used for lumber production (1869 to 1920s) and for commercial boat building (1960s to 1980s). In 1987, the property was purchased by the United States Department of Defense. They performed a cleanup of the property, but never developed it. Finally, in 1996, the property was transferred to the City with the intent to use it for a restoration site.

The restoration project involved excavation of over 6,000 cubic yards of soil to create the bowl shaped salt marsh area. Approximately 1,000 cubic yards of clean excavated soil was used to create the riparian areas. Approximately 1,000 cubic yards of material had to be disposed of off-site due to unsuitable soil characteristics. Construction of the 1.95 acre salt marsh and riparian habitat was completed in March 2004.

This restoration site was constructed as part of the City's settlement of alleged natural resource damages with the Commencement Bay Natural Resource Trustees<sup>1</sup> (Trustees). This monitoring report is being provided to the Trustees as a part of that settlement.

The City has conducted four monitoring events since completion of construction:

- Year 1 - July 1, 2004 and January 10, 2005
- Year 2 - May 26, 2005
- Year 3 - August 30, 2006

The frequency of these monitoring efforts was modified compared to the plan. The methods of these monitoring events are detailed in the "Monitoring and Adaptive Management Plan: Tahoma Salt Marsh Natural Resources Restoration Project (MAMP)" (Parametrix, 2003) prepared for this site.

## 2.0 PROJECT OBJECTIVES

The restoration and cleanup objectives for the TSM, as described in the MAMP are:

1. Construct intertidal tideflat, mudflat, and emergent habitat to provide nesting, refuse, and feeding opportunities for a variety of fish and shorebird species (e.g., salmon, juvenile flatfish, plover, sandpipers, etc.).
2. Restore the shoreline via removal of surficial debris including remnants of the Ruston Formation (a concrete-like mass containing a high fraction of metal shavings and other

---

<sup>1</sup>Commencement Bay Natural Resource Trustees consist of the following entities: National Oceanic and Atmospheric Administration; U.S. Fish and Wildlife Service; Washington State Department of Ecology; Washington State Department of Fish and Wildlife; Washington State Department of Natural Resources; The Puyallup Tribe of Indians; and Muckleshoot Indian Tribe.

debris, often appearing as a rusted/fused mass where exposed directly to seawater) and other anthropogenic materials.

3. Provide a habitat linkage between the nearshore habitat in the vicinity of Ruston Way/Pt. Defiance and intertidal and riverine habitat near the mouth of the Puyallup River.
4. Provide a public education opportunity in close proximity to the Ruston Way shoreline to increase public awareness of the importance of this type of habitat in the ecosystem.

Attainment of the first and third objectives is being evaluated on the basis of the monitoring program which is the focus of this report. Attainment of the second objective was met during construction of the restoration project. The fourth objective is being attained through the City's many environmental partnerships with People for Puget Sound, Citizens for a Healthy Bay, Tacoma Public Schools, University of Washington–Tacoma, and the Pierce Conservation District Stream Team. In addition, public access to the site is expected to be provided following construction of the Chinese Reconciliation Park adjacent to the site.

Monitoring conducted to measure the success of the TSM project objectives is listed below:

- **Habitat Assessment:** In Year 1 through Year 3, qualitative habitat assessments in the riparian and salt marsh areas were conducted. Quantitative monitoring was conducted in Year 3. This monitoring included observations on:
  - Plant Cover
  - Plant Diversity
  - Invasive Species
- **Erosion and Sedimentation:** In Year 1 through Year 3, qualitative assessments of the amount of erosion and sedimentation were conducted for the riparian area, shoreline/salt marsh, and the intertidal channel/fish mix. Quantitative monitoring of these areas was conducted in Year 1 and Year 3.

## **3.0 MONITORING METHODS**

### **3.1 General**

Environmental professionals from the City's Environmental Services Science and Engineering Division conducted visual inspections and photo documentation in 2004 and 2005. David Adams and the Washington Conservation Corps crew members conducted monitoring in 2006.

Crews from the City's Public Works Department Survey Section, under the direction of the City's Licensed Professional Land Surveyor, conducted conventional topographic surveying in 2004 and 2006 of the five transects (Figure 2) identified in the MAMP. These field activities were scheduled around the low tide events.

### **3.2 Habitat Assessment**

Qualitative data was collected during all site monitoring activities for the riparian and salt marsh areas. These monitoring events included photo documentation, vegetation assessment (e.g., plant cover, invasive species), wildlife observations, and soil/sediment conditions.

Quantitative monitoring conducted during 2006 involved sampling ten 1 m<sup>2</sup> sampling plots (quadrats) randomly located along each transect (Figure 2). Eight quadrats (Table 1) were identified as being in the riparian area and twenty-two quadrats (Table 2) were identified as being in the salt marsh area based on quadrat elevations and species presence. Due to the random selection of the quadrat locations, several quadrats (e.g., T2-7, T3-2) appear to be in the transition area between the riparian and salt marsh regions.

The Daubenmire cover class (i.e., 0-5%, 5-25%, 25-50%, 50-75%, 75-95%, or 95-100%) was estimated for plants found within each quadrat. The total vegetative cover was calculated for each transect using the Daubenmire cover class midpoint values (i.e. 2.5%, 15%, 37.5%, 62.5%, 85%, or 97.5%). The quadrats were used to monitor the distribution and mean percent frequency (percent of quadrats containing each species at the site) of planted, colonizing, and invasive species<sup>2</sup>.

### **3.3 Erosion and Sedimentation**

Qualitative inspections of erosion and sediment accumulation were conducted during all monitoring events. The location of any deposition or eroded sediment, as well as possible causes and effects, were described in the monitoring notes (Appendix B).

Quantitative monitoring conducted during 2004 and 2006 involved surveying the five transects and twelve sediment monitoring stakes. Five small core samples were taken at random locations in 2006 to assess the depth of the fish mix (Figure 2).

## **4.0 MONITORING RESULTS**

### **4.1 General Observations**

#### **4.1.1 Photo Points**

Photo points were established as described in the MAMP and depicted in Figure 2. Year 1 to Year 3 photos are presented in Appendix A. The following general trends were noted:

- Riparian Area: Plant growth and survival was much greater in irrigated areas than in non-irrigated areas.
- Salt Marsh Area: The low salt marsh region appears to be filling in with native vegetation, especially in regions with goose exclusion devices in place (Photo Point 6B). Plant survival in the high salt marsh region is limited.

---

<sup>2</sup> Plants were categorized as “native” or “nonnative” according to Plants of the Pacific Northwest Coast (Pojar and MacKinnon, 2004).

#### 4.1.2 Wildlife Observations

Wildlife observed at the site during field visits is listed below and included on the Qualitative Field Notes in Appendix B.

Geese	Deer	Rats
Pigeon	Great Blue Herron	Jellyfish
Fish	Crows	Seagulls
Crickets	Hawks	Crabs
Eagles	Banana Slugs	Bull heads

#### 4.2 Habitat Assessment

##### 4.2.1 Plant Cover

###### ***Riparian Area***

Qualitative monitoring conducted between Year 1 and Year 3 estimated plant survival in the riparian area to be at least 80% (Appendix B). This satisfies the Year 1 to Year 3 requirements for plant survival.

Quantitative monitoring conducted during 2006 identified new growth on all planted trees and shrubs encountered in the sampling quadrats (Appendix B). Six native plants and four non-native plants were identified in the eight riparian quadrats (Table 1). Five of the six native plants were identified in only one of the quadrats (12.5% mean frequency) and one plant (*Junus effusus*) was found in two of the quadrats (25% mean frequency). This did not satisfy the performance goal for Year 3 of a mean percent frequency greater than 50 percent for the three most abundant herbaceous species.

Field observations of plant species in the riparian area in 2006 (Section 4.2.2) identified many more riparian species than were encountered in the eight riparian quadrats. This suggests that the use of 1 m<sup>2</sup> sampling quadrats does not provide a representative picture of the riparian area.

###### ***Salt Marsh Area***

Qualitative monitoring conducted between Year 1 and Year 3 estimated plant survival in the salt marsh area to be at least 80% (Appendix B). This satisfies the Year 1 to Year 3 requirements for plant survival.

Quantitative monitoring conducted during 2006 identified new growth on all herbaceous species encountered in the sampling quadrats (Appendix B). Eight native plants and four non-native plants were identified in the twenty-two salt marsh quadrats (Table 2). Six of the eight native plants were identified in three or fewer of the quadrats (less than or equal to 13.6% mean frequency), one in five of the quadrats (22.7% mean frequency), and one in seven of the quadrats (31.8% mean frequency). This did not satisfy the performance goal for Year 3 of a mean percent frequency greater than 40 percent for the three most abundant herbaceous species.

Quadrats in the salt marsh area (Figure 2) are predominately located within the low salt marsh region. Of the twenty-two salt marsh quadrats, only four appear to be located

within the high salt marsh region based on elevations and plant species (T1-1, T2-7, T3-7, and T3-10).

#### 4.2.2 Plant Diversity

##### **Riparian Area**

Plant species identified in the riparian area during field visits conducted in 2006 are listed in Table 3. The majority of the trees and shrubs are doing well at the site, with the exception of plants located on the northern side of the site, which is located outside of the irrigated area. The shore pines (*Pinus contorta* var. *contorta*) in this area do not appear to be doing well, likely due to the recent summer drought.

At least three native, noninvasive trees (*Pseudotsuga menziesii* var. *menziesii*, *Picea sitchensis*, and *Arbutus menziesii*) and three native, noninvasive shrubs (*Holodiscus discolor*, *Ribes sanguineum*, and *Philadelphus lewisii*), and three native, noninvasive herbaceous species (*Atriplex patula*, *Juncus effusus*, and grasses) appear to be surviving and doing well at the site; this satisfies the performance goal for riparian area species.

##### **Salt Marsh Area**

Plant species identified at the site in the salt marsh area during field visits conducted in 2006 are listed in Table 4. All of the plants in the low marsh area appear to be doing well at the site especially *Salicornia virginica* and *Distichlis spicata*, which satisfies the performance goal of at least two species surviving at the site. At least two high salt marsh species (*Grindelia integrifolia* and *Atriplex patula*) are surviving at the site which satisfies the performance goal.

#### 4.2.3 Invasive Species

##### **Riparian Area**

Trailing buttercup (*Ranunculus cymbalaria*), red clover (*Trifolium pretense*), thistle (*Cirsium* sp.), and Himalayan blackberry (*Rubus discolor*) were identified as non-native species present in the riparian area. Seven of the eight riparian sampling quadrats contained at least one of these non-native, invasive species (Table 1). This does satisfy the performance goal for Year 3 of invasive species found in less than 10 percent of the sampling units.

##### **Salt Marsh Area**

Trailing buttercup (*Ranunculus cymbalaria*), red clover (*Trifolium pretense*), thistle (*Cirsium* sp.), and brass buttons (*Cotula coronopifolia*) were identified as non-native species present in the salt marsh area. Although brass buttons is not native, it is not considered invasive since it has been naturalized to the region. Four of the twenty-two quadrats (18.2%) contained one of the non-native, invasive species (Table 2); this does not satisfy the performance goal for Year 3 of invasive species found in less than 5 percent of the sampling units.

### 4.3 Erosion and Sedimentation

Qualitative inspections were conducted between 2004 and 2006. Field notes are provided in Appendix B. Survey transect elevations from surveys conducted in 2004 and 2006 are presented in Table 5 and graphically in Figure 3.

#### ***Riparian Area***

Figure 3 shows only slight changes in riparian area elevations occurred between 2004 and 2006. Sedimentation of approximately 8 inches was observed near the transition to the salt marsh on transect T3 (Table 5). This sedimentation does not appear to threaten the loss of vegetation in the area.

#### ***Shoreline and Salt Marsh Areas***

No exposure of capped contaminated soils or unsuitable substrates was observed during qualitative monitoring. Although some erosion was seen during monitoring near the transitions to the riparian area, it does not appear to be threatening vegetation or affecting the stability of the stormwater outfall retaining wall or other walls.

Transect T1 shows erosion slightly exceeding 6 inches near the edge of the salt marsh (Table 5). Based on field observations, this erosion does not appear to be threatening slope stability or vegetation.

Approximately 16 inches of erosion was noted during the 2006 survey in the middle of the salt marsh area on transect T2 (Table 5). Visual observation of this area noted no significant erosion. This location is very close to erosion marker S5, which has shown no change in elevation (Table 6) between 2004 and 2006. Initial measurements of this area may have been inaccurate either due to errors in measurement or due to a temporary high elevation (e.g. rock or log) following construction.

Erosion transect E1 shows erosion ranging from 6 to 12 inches in the shoreline area between 2004 and 2006. This erosion is likely due to slight changes in riprap as the shoreline area equilibrates. Based on visual observations, this erosion does not appear to be threatening slope stability.

#### ***Intertidal Channel/Fish Mix Area***

It appears from the visual inspections and the elevation surveys that the fish mix coverage has diminished slightly from the post-construction condition. Some erosion is also evident near the stormwater culverts and between sediment stakes S10 and S11.

Five areas with fish mix material (Figure 2) were sampled to determine the depth of the fish mix material as described in the MAMP. In all five locations, the fish mix material exceeded 8 inches in depth, which satisfies the performance goal of greater than or equal to 6 inches in all locations.

The erosion marker stakes were surveyed in 2004 and 2006 (Table 6). The largest amount of erosion (3.95 cm per year) is occurring at erosion marker 11 located near the outlet of the intertidal channel. All other erosion makers show less than 2 cm of erosion per year. The performance goal of less than 4 cm of erosion per year at any monitoring stake is satisfied.

Erosion transect E2 shows erosion of slightly less than 10 inches (Table 5) in the intertidal armoring area between 2004 and 2006. This slight erosion is likely due to equilibration of the channel in this area; no exposure of capped soils or erosion that might affect the stability of the slope was witnessed during visual inspections.

## **5.0 MAINTENANCE AND ADAPTIVE MANAGEMENT**

### **5.1 Completed & On-Going Activities**

The City has sponsored a Washington Conservation Corps crew since Fall 2005 to provide maintenance to the City's habitat restoration sites. The crew has conducted maintenance of the site on an as needed basis throughout the year.

David Adams (site steward under City contract), frequently visited the site, removed invasive weeds as necessary, and gathered pertinent information on the condition of the site. Mr. Adams also provided advice and expertise on adaptive management options.

### **5.2 Recommended Adaptive Management Activities**

Year 1 to Year 3 monitoring results have shown varying levels of success of the TSM performance goals. Year 3 monitoring results show performance goals for plant cover and invasive species were not satisfied.

Performance goals for erosion were slightly exceeded in a few locations. These exceedances do not appear to be threatening vegetation or the stability of any slopes. No action to correct these changes is planned at this time; the points will continue to be monitored during visual inspections for conditions that threaten the stability of the slopes or the loss of vegetation.

The following adaptive management actions are proposed to satisfy the future performance goals.

#### **5.2.1 Plant Cover & Diversity**

Supplemental plantings in the salt marsh area will be conducted during Spring 2007 to help increase the mean percent frequency of selected plants. The City proposes to plant the following species:

- Salt Marsh:
  - Pickleweed (*Salicornia virginica*) – 400 plugs
  - Salt Grass (*Distichlis spicata*) – 400 plugs
  - Seacoast bulrush (*Scirpus maritimus*) – 200 plugs
  - Lyngby Sedge (*Carex lyngbyei*) – 600 plugs

Due to the size of plants in the riparian area, the 1 m<sup>2</sup> square sampling plots are insufficient to capture the variety of plants in the riparian area. A 28.3 m<sup>2</sup> (radius of 3 m) sampling quadrat, which was used at the Middle Waterway Estuarine Natural Resources restoration site, is proposed to create a more representative snapshot of the TSM riparian area.

### **5.2.2 Invasive Species**

The City plans to have the Washington Conservation Corps crew implement additional maintenance activities at TSM to reduce the presence of invasive species.

## **6.0 REFERENCES**

Parametrix (2001). Engineering Design Report.

Parametrix (2003, July 10). Monitoring and Adaptive Management Plan: Tahoma Salt Marsh Natural Resource Restoration Project.

Pojar, J. and MacKinnon, A. (2004) Revised Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia, & Alaska. Vancouver, British Columbia: Lone Pine Publishing

## **TABLES**

**Table 1 – Riparian Area Quadrat Monitoring Results**

Riparian										
	T1-5	T1-6	T1-9	T1-10	T2-6	T3-1	T3-2	T3-6	% Cover	Mean %
	Cover <sup>a</sup>		Frequency							
<b>Native Species</b>										
<i>Cornus stolonifera</i> (Red Osier Dogwood)	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	12.5%
<i>Philadelphus lewisii</i> (Mock-Orange)	0.0%	0.0%	0.0%	15.0%	0.0%	0.0%	0.0%	0.0%	1.9%	12.5%
<i>Atriplex petula</i> (Orache)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	4.7%	12.5%
<i>Juncus effusus</i> (Soft Rush)	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	5.0%	25.0%
<i>Salix lucida ssp. lasiandra</i> (Pacific Willow)	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.3%	12.5%
<i>Salix hookeriana</i> (Hookers Willow)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.0%	0.0%	1.9%	12.5%
<b>Total-&gt;</b>	<b>0.0%</b>	<b>2.5%</b>	<b>2.5%</b>	<b>15.0%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>52.5%</b>	<b>37.5%</b>		
<b>Non-Native Species</b>										
<i>Ranunculus cymbalaria</i> (Trailing Buttercup)	2.5%	15.0%	2.5%	15.0%	2.5%	15.0%	0.0%	2.5%	6.9%	87.5%
<i>Trifolium pratense</i> (Red Clover)	2.5%	15.0%	2.5%	0.0%	37.5%	15.0%	0.0%	62.5%	16.9%	75.0%
<i>Cirsium sp.</i> (Thistle sp.)	0.0%	2.5%	0.0%	2.5%	0.0%	2.5%	0.0%	0.0%	0.9%	37.5%
<i>Rubus discolor</i> (Himalayan Blackberry)	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.3%	12.5%
<b>Total-&gt;</b>	<b>5.0%</b>	<b>32.5%</b>	<b>5.0%</b>	<b>17.5%</b>	<b>42.5%</b>	<b>32.5%</b>	<b>0.0%</b>	<b>65.0%</b>		
<b>Other</b>										
Grass Sp.	97.5%	85.0%	85.0%	85.0%	62.5%	85.0%	2.5%	37.5%	67.5%	100.0%

a - Using Daubenmire midpoint value for the six cover classes: 0%-5%, 5%-25%, 25%-50%, 50%-75%, 75%-95%, 95%-100%.

**Table 2 – Salt Marsh Area Quadrat Monitoring Results**

	T1-1	T1-2	T1-3	T1-4	T1-7	T1-8	T2-1	T2-2	T2-3	T2-4	T2-
	Cover <sup>a</sup>										
<b>Native Species</b>											
<i>Distichlis spicata</i> (Salt Grass)	0.0%	2.5%	0.0%	2.5%	0.0%	0.0%	15.0%	15.0%	0.0%	0.0%	0.0%
<i>Atriplex petula</i> (Orache)	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%
Spoonleaf Gumweed	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Grindelia integrifolia</i> (Puget Sound Gumweed)	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Plantago sp.</i> (Plantain Sp.)	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Juncus effusus</i> (Soft Rush)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Salicornia virginica</i> (Pickleweed)	0.0%	0.0%	0.0%	0.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Veronica beccabunga</i> <i>ssp. americana</i> (American Brooklime)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Total-&gt;</b>	<b>117.5%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>2.5%</b>	<b>15.0%</b>	<b>0.0%</b>	<b>17.5%</b>	<b>15.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>Non-Native Species</b>											
<i>Ranunculus cymbalaria</i> (Trailing Buttercup)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Trifolium pratense</i> (Red Clover)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Cirsium sp.</i> (Thistle sp.)	2.5%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Cotula coronopifolia</i> (Brass Buttons)	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%
<b>Total-&gt;</b>	<b>2.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>5.0%</b>	<b>0.0%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>Other</b>											
Grass Sp.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Filamental Algae	0.0%	37.5%	85.0%	0.0%	0.0%	37.5%	0.0%	15.0%	85.0%	0.0%	0.0%
<b>Total-&gt;</b>	<b>0.0%</b>	<b>37.5%</b>	<b>85.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>37.5%</b>	<b>0.0%</b>	<b>15.0%</b>	<b>85.0%</b>	<b>0.0%</b>	<b>0.0%</b>

a - Based on the Daubenmire Method (Six cover classes: 0%-5%, 5%-25%, 25%-50%, 50%-75%, 75%-95%, 95%-100%)

Marsh												
T2-7 Cover <sup>a</sup>	T2-8 Cover <sup>a</sup>	T2-9 Cover <sup>a</sup>	T2-10 Cover <sup>a</sup>	T3-3 Cover <sup>a</sup>	T3-4 Cover <sup>a</sup>	T3-5 Cover <sup>a</sup>	T3-7 Cover <sup>a</sup>	T3-8 Cover <sup>a</sup>	T3-9 Cover <sup>a</sup>	T3-10 Cover <sup>a</sup>	% Cover	Mean % Frequency
0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	22.7%
0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	62.5%	2.5%	2.5%	15.0%	7.8%	31.8%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.0%	0.0%	0.0%	2.5%	1.5%	13.6%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	2.4%	9.1%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	4.5%
37.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	4.5%
15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	9.1%
2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	4.5%
<b>55.0%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>37.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>77.5%</b>	<b>2.5%</b>	<b>2.5%</b>	<b>55.0%</b>		
2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	4.5%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.1%	4.5%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	9.1%
0.0%	15.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	1.1%	22.7%
<b>2.5%</b>	<b>15.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.5%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>0.0%</b>		
62.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.0%	0.0%	0.0%	15.0%	4.2%	13.6%
0.0%	15.0%	62.5%	2.5%	0.0%	37.5%	15.0%	0.0%	37.5%	37.5%	0.0%	21.3%	54.5%
<b>62.5%</b>	<b>15.0%</b>	<b>62.5%</b>	<b>2.5%</b>	<b>0.0%</b>	<b>37.5%</b>	<b>15.0%</b>	<b>15.0%</b>	<b>37.5%</b>	<b>37.5%</b>	<b>15.0%</b>		

**Table 3 – Riparian Area Species**

Trees	Shrubs	Herbaceous Species
Red alder ( <i>Alnus rubra</i> )	Vine maple ( <i>Acer circinatum</i> )	Orache ( <i>Atriplex patula</i> )
Shore pine ( <i>Pinus contorta</i> var. <i>contorta</i> )	Twinberry ( <i>Lonicera involucrata</i> )	Soft Rush ( <i>Juncus effusus</i> )
Madrone ( <i>Arbutus menziesii</i> )	Red-Osier dogwood ( <i>Comus stolonifera</i> )	Grass species
Douglas fir ( <i>Pseudotsuga menziesii</i> ssp. <i>menziesii</i> )	Hooker willow ( <i>Salix hookeriana</i> )	Trailing buttercup ( <i>Ranunculus cymbalaria</i> )
Sitka spruce ( <i>Picea sitchensis</i> )	Snowberry ( <i>Symphoricarpos albus</i> )	Red Clover ( <i>Trifolium pratense</i> )
Black cottonwood ( <i>Populus balsamifera</i> ssp. <i>trichocarpa</i> )	Red-flowering currant ( <i>Ribes sanguineum</i> )	Thistle ( <i>Cirsium spp.</i> )
	Mock orange ( <i>Philadelphus lewisii</i> )	
	Pacific willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )	
	Oceanspray ( <i>Holodiscus discolor</i> )	
	Oregon grape ( <i>Mahonia nervosa</i> )	
	Baldhip rose ( <i>Rosa gymncarpa</i> )	
	Beaked hazelnut ( <i>Corylus comuta</i> var. <i>californica</i> )	
	Himalayan Blackberry ( <i>Rubus discolor</i> )	

Red Font - Invasive species

**Table 4 – Salt Marsh Area Species**

Low Marsh Species	High Marsh Species
Brass buttons ( <i>Cotula coronopifolia</i> )	Gumweed ( <i>Grindelia ssp.</i> )
Pickleweed ( <i>Salicornia virginica</i> )	American Brooklime ( <i>Veronica beccabunga</i> spp. <i>americana</i> )
Salt Grass ( <i>Distichlis spicata</i> )	Orache ( <i>Atriplex patula</i> )
Filamental Algae	Soft Rush ( <i>Juncus effusus</i> )
	Plantain ( <i>Plantago sp.</i> )
	Grass species
	Red Clover ( <i>Trifolium pratense</i> )
	Thistle ( <i>Cirsium spp.</i> )

Red Font – Invasive species

**Table 5 –Survey Transect Elevations**

Transect 1																
T1 (Sta 0+00 to 0+46.2)																
Station	0+00	0+03.3	0+06.6	0+09.9	0+13.2	0+16.5	0+19.8	0+23.1	0+26.4	0+29.7	0+33	0+36.3	0+39.6	0+42.9	0+46.2	0+49.5
2004 Elevation	21.85	21.8	21.96	21.94	21.99	22.08	22.05	21.96	21.86	20.99	19.48	18.15	16.75	15.68	14.62	13.3
2006 Elevation	21.44	21.46	21.59	21.67	21.78	21.71	21.78	21.69	21.62	20.77	19.21	18.09	16.7	15.64	14.55	13.3
Change (ft)	-0.41	-0.34	-0.37	-0.27	-0.21	-0.37	-0.27	-0.27	-0.24	-0.22	-0.27	-0.06	-0.05	-0.04	-0.07	-0.03

Transect 1																
T1 (Sta 1+12.7 to 1+57)																
Station	1+12.7	1+16	1+17.4	1+20.7	1+24	1+27.3	1+30.6	1+33.9	1+37.2	1+40.5	1+43.8	1+47.1	1+50.4	1+53.7	1+57	1+60.3
2004 Elevation	11.44	11.34	11.32	11.42	11.37	11.22	11.23	11.24	11.26	11.21	11.2	11.21	11.17	11.14	11.01	10.7
2006 Elevation	11.35	11.28	11.33	11.37	11.36	11.22	11.17	11.23	11.23	11.17	11.19	11.17	11.16	11.12	10.95	10.7
Change (ft)	-0.09	-0.06	0.01	-0.05	-0.01	0	-0.06	-0.01	-0.03	-0.04	-0.01	-0.04	-0.01	-0.02	-0.06	-0.03

Transect 2																
T1 (Sta 2+21.6 to 2+67.2)																
Station	2+21.6	2+24.3	2+27.6	2+30.9	2+34.2	2+37.5	2+40.8	2+44.1	2+47.4	2+50.7	2+54	2+57.3	2+60.6	2+63.9	2+67.2	2+70.5
2004 Elevation	11.2	11.16	11.26	11.27	11.27	11.46	11.64	11.75	12.01	12.45	13.17	14.49	15.17	15.97	16.6	17.3
2006 Elevation	11.14	11.12	11.22	11.23	11.29	11.43	11.5	11.71	12.14	12.32	12.62	14.59	15.13	16	16.6	17.3
Change (ft)	-0.06	-0.04	-0.04	-0.04	0.02	-0.03	-0.14	-0.04	0.13	-0.13	-0.55	NA	0.1	-0.04	0.03	0

a - Root in way of measurement

Transect 2																
T2 (Sta 0+00 to 0+46.2)																
Station	0+00	0+03.3	0+06.6	0+09.9	0+13.2	0+16.5	0+19.8	0+23.1	0+26.4	0+29.7	0+33	0+36.3	0+39.6	0+42.9	0+46.2	0+49.5
2004 Elevation	20.25	20.33	20.24	20.18	20.14	19.82	19.43	18.44	17.29	16.11	14.94	13.79	12.65	12.29	12.1	11.8
2006 Elevation	20.07	20.41	20.3	20.21	20.05	19.79	19.18	18.21	17.29	15.97	15.06	13.92	12.55	12.24	12.21	12
Change (ft)	-0.18	0.08	0.06	0.03	-0.09	-0.03	-0.25	-0.23	0	-0.14	0.12	0.13	-0.1	-0.05	0.11	-0.02

Transect 2																
T2 (Sta 1+10.3 to 1+56.5)																
Station	1+10.3	1+13.6	1+16.9	1+20.2	1+23.5	1+26.8	1+30.1	1+33.4	1+36.7	1+40	1+43.3	1+46.6	1+49.9	1+53.2	1+56.5	1+60
2004 Elevation	11.59	11.66	11.6	11.68	11.59	11.55	11.54	11.55	11.53	11.46	11.55	11.4	11.31	11.01	10.97	10.7
2006 Elevation	11.63	11.63	11.63	11.64	11.57	11.56	11.57	11.54	11.48	11.49	11.39	11.36	11.23	11.09	10.94	10.7
Change (ft)	0.04	-0.03	0.03	-0.04	-0.02	0.01	0.03	-0.01	-0.05	0.03	-0.16	-0.04	-0.08	0.08	-0.03	-0.03

Transect 2																
T2 (Sta 2+23.1 to 3+18.4)																
Station	2+23.1	2+26.4	2+29.7	2+33	2+36.3	2+39.6	2+42.9	2+46.2	2+49.5	2+52.8	2+56.1	2+59.4	2+62.7	2+66	2+69.3	2+72.6
2004 Elevation	9.58	9.54	9.49	9.4	9.32	9.2	9.23	9.19	9.01	9.08	8.98	9.07	9.06	9.09	8.83	8.8
2006 Elevation	9.52	9.56	9.47	9.41	9.29	9.22	9.23	9.21	9.06	9.06	9.06	9.05	9.01	9.05	8.91	8.8
Change (ft)	-0.06	0.02	-0.02	0.01	-0.03	0.02	0	0.02	0.05	-0.02	0.08	-0.02	-0.05	-0.04	0.08	-0.02

Transect 3																
T3 (Sta 0+00 to 0+45.2)																
Station	0+00	0+03.3	0+06.6	0+09.9	0+13.2	0+16.5	0+19.8	0+23.1	0+26.4	0+29.7	0+33	0+36.3	0+39.6	0+42.9	0+45.2	0+48.5
2004 Elevation	21.5	21.6	21.77	21.8	21.84	21.84	21.85	21.84	22.06	21.85	21.42	20.69	19.46	18.44	17.14	15.8
2006 Elevation	21.43	21.55	21.56	21.69	21.53	21.5	21.73	21.68	21.85	21.69	21.21	20.42	19.42	18.29	17.44	16.1
Change (ft)	-0.07	-0.05	-0.21	-0.11	-0.31	-0.34	-0.12	-0.16	-0.21	-0.16	-0.21	-0.27	-0.04	-0.15	0.3	0

Transect 3																
T3 (Sta 1+12.2 to 1+82.2)																
Station	1+12.2	1+15.5	1+18.8	1+22.1	1+25.4	1+28.7	1+32	1+35.7	1+39	1+42.3	1+45.6	1+48.9	1+52.2	1+55.5	1+58.8	1+62.1
2004 Elevation	11.61	11.56	11.55	11.59	11.38	11.36	11.21	11.32	11.28	11.33	11.18	11.15	11.17	11.17	11.14	11.1
2006 Elevation	11.61	11.57	11.52	11.47	11.37	11.35	11.32	11.33	11.29	11.26	11.18	11.14	11.15	11.12	11.04	11
Change (ft)	0	0.01	-0.03	-0.12	-0.01	-0.01	0.11	0.01	0.01	-0.07	0	-0.01	-0.02	-0.05	-0.1	-0.03

Transect 4																
E1 (Sta 0+00 to 0+46.2)																
Station	0+00	0+03.3	0+06.6	0+09.9	0+13.2	0+16.5	0+19.8	0+23.1	0+26.4	0+29.7	0+33	0+36.3	0+39.6	0+42.9	0+46.2	0+49.5
2004 Elevation	20.94	21.45	21.62	21.74	21.64	21.65	21.06	20.5	19.6	18.78	17.81	16.84	15.84	15.27	14.31	13.3
2006 Elevation	20.89	21.43	21.73	21.64	21.65	21.49	20.99	20.53	19.7	18.7	17.79	16.82	15.81	15.02	14.2	13.3
Change (ft)	-0.05	-0.02	0.11	-0.1	0.01	-0.16	-0.07	0.03	0.1	-0.08	-0.02	-0.02	-0.03	-0.25	-0.11	-0.03

Transect 4																
E1 (Sta 1+12.2 to 1+43.8)																
Station	1+12.2	1+15.5	1+18.8	1+22.1	1+25.4	1+28.7	1+32	1+35.3	1+38.6	1+41.9	1+43.8					
2004 Elevation	15.57	15.65	16.63	16.74	17.98	17.76	17.64	17.67	17.61	18.02	17.12					
2006 Elevation	14.55	15	16.1	16.23	17.38	17.16	17.05	17.1	16.9	17.42	16.66					
Change (ft)	-1.02	-0.65	-0.53	-0.51	-0.6	-0.6	-0.59	-0.57	-0.71	-0.6	-0.46					

Transect 4																
E2 (Sta 0+00 to 0+46.2)																
Station	0+00	0+03.3	0+06.6	0+09.9	0+13.2	0+16.5	0+19.8	0+23.1	0+26.4	0+29.7	0+33	0+36.3	0+39.6	0+42.9	0+46.2	0+49.5
2004 Elevation	16.87	16.14	15.18	14.59	13.95	12.98	12.27	11.66	11.35	10.99	10.87	10.85	11.38	9.77	9.42	9
2006 Elevation	16.91	16.03	15.23	14.65	13.8	12.55	12.06	11.66	11.31	11.03	10.86	10.82	11.25	9.78	9.42	9
Change (ft)	0.04	-0.11	0.05	0.06	-0.15	-0.43	-0.21	0	-0.04	0.04	-0.01	-0.03	-0.13	0.01	0	-0.03

Blue highlight - Change in elevation greater than 0.5 ft

ct T1

to 1+09.4)																		
0+52.8	0+56.1	0+59.4	0+62.7	0+66	0+69.3	0+73	0+76.4	0+79.7	0+83	0+86.3	0+89.6	0+92.9	0+96.2	0+99.5	1+02.8	1+06.1	1+09.4	
13.18	12.61	12.2	12.19	11.97	11.92	11.89	11.89	12.04	12.09	11.88	11.75	11.76	11.84	11.76	11.67	11.59	11.48	11.47
13.07	12.54	12.03	12.05	11.9	11.85	11.87	11.95	11.96	11.79	11.75	11.7	11.77	11.79	11.62	11.52	11.41	11.38	
-0.11	-0.07	-0.17	-0.14	-0.07	-0.07	-0.02	-0.09	-0.13	-0.09	0	-0.06	-0.07	0.03	-0.05	-0.07	-0.07	-0.09	

to 2+18.3)																	
1+63.6	1+66.9	1+70.2	1+72.1	1+75.4	1+78.7	1+82	1+85.3	1+88.6	1+91.9	1+95.2	1+98.5	2+01.8	2+05.1	2+08.4	2+11.7	2+15	2+18.3
10.81	10.76	10.79	10.71	10.76	11.29	11.21	11.06	10.94	11.17	11.25	11.48	11.65	11.67	11.53	11.61	11.45	11.31
10.82	10.75	10.71	10.68	10.67	11.18	11.19	11.04	10.96	11.13	11.23	11.43	11.61	11.61	11.63	11.59	11.37	11.22
0.01	-0.01	-0.08	-0.03	-0.09	-0.11	-0.02	-0.02	0.02	-0.04	-0.02	-0.05	-0.04	-0.06	0.1	-0.02	-0.08	-0.09

to 3+27.6)																	
2+73.8	2+77.1	2+80.4	2+83.7	2+87	2+90.3	2+93.6	2+96.9	2+99.2	3+02.5	3+05.8	3+08.1	3+11.4	3+14.7	3+18	3+21.3	3+24.6	3+27.6
17.73	18.73	19.66	20.43	21.56	22.49	23.34	24.11	24.91	25.64	26.1	26	25.96	25.97	26.04	25.93	25.58	25.31
17.81	18.69	19.58	20.43	21.61	22.41	23.18	24	24.62	25.34	25.98	26	25.95	25.95	25.96	25.9	25.83	25.15
0.08	-0.04	-0.08	0	0.05	-0.08	-0.16	-0.11	-0.29	-0.3	-0.12	0	-0.01	-0.02	-0.08	-0.03	0.25	-0.16

ct T2

to 1+07)																	
0+52.8	0+56.1	0+59.4	0+62.7	0+66	0+69.3	0+72.5	0+74.1	0+77.4	0+80.7	0+84	0+87.3	0+90.6	0+93.9	0+97.1	1+00.4	1+03.7	1+07
12.15	12.17	12.15	12.12	11.98	11.98	12	12.04	12.01	12.03	11.95	11.83	11.8	11.76	11.81	11.82	11.84	11.59
12.15	12.12	12.08	12.07	12.01	11.98	12.04	12	11.93	11.99	11.88	11.81	11.78	11.74	11.77	11.78	11.77	11.65
0	-0.05	-0.07	-0.05	0.03	0	0.04	-0.04	-0.08	-0.04	-0.07	-0.02	-0.02	-0.02	-0.04	-0.04	-0.07	0.06

to 2+19.8)																	
1+64	1+67.3	1+70.6	1+73.9	1+77.2	1+80.5	1+83.8	1+87.1	1+90.4	1+93.7	1+97	2+00	2+03.3	2+06.6	2+09.9	2+13.2	2+16.5	2+19.8
10.7	10.64	11.68	11.42	10.55	10.47	10.35	10.39	10.19	10.04	10.05	9.82	9.72	9.69	9.71	9.61	9.47	9.5
10.61	10.54	10.31	10.93	10.36	10.34	10.33	10.31	10.16	10.05	9.98	9.83	9.71	9.65	9.71	9.59	9.48	9.43
-0.09	-0.1	-1.37	-0.49	-0.19	-0.13	-0.02	-0.08	-0.03	0.01	-0.07	0.01	-0.01	-0.04	0	-0.02	0.01	-0.07

2+75.9	2+79.2	2+82.5	2+85.8	2+89.1	2+92.4	2+95.7	2+99	3+02.3	3+05.6	3+08.9	3+12.2	3+18.4
8.74	8.36	15	15.88	16.42	16.78	17.38	17.54	17.55	17.61	17.65	17.65	17.75
8.68	8.47	14.91	15.79	16.36	16.85	17.5	17.61	17.58	17.74	17.71	17.72	17.68
-0.06	0.11	-0.09	-0.09	-0.06	0.07	0.12	0.07	0.03	0.13	0.06	0.07	-0.07

ct T3

to 1+08.9)																	
0+51.8	0+55.1	0+58.4	0+61.7	0+65	0+68.3	0+71.6	0+74.9	0+78.2	0+81.5	0+84.8	0+89.1	0+92.4	0+95.7	0+99	1+02.3	1+05.6	1+08.9
14.77	13.45	12.64	12.4	12.25	12.24	12.25	12.18	12.15	12.07	12.04	12.04	11.9	12	11.92	11.85	11.72	11.75
15.14	14.09	12.77	12.37	12.25	12.18	12.19	12.31	12.14	12.03	11.99	12	11.85	11.94	11.88	11.81	11.65	11.64
0.37	0.64	0.13	-0.03	0	-0.06	-0.06	0.13	-0.01	-0.04	-0.05	-0.04	-0.05	-0.06	-0.04	-0.04	-0.07	-0.11

1+65.4	1+68.7	1+72	1+75.3	1+78.6	1+82.2
11.33	11.58	11.91	12.36	13.24	13.9
11.27	11.56	11.9	12.26	13.19	13.96
-0.06	-0.02	-0.01	-0.1	-0.05	0.06

ct E1

to 1+08.9)																	
0+52.8	0+56.1	0+59.4	0+62.7	0+66	0+69.3	0+72.6	0+75.9	0+79.2	0+82.5	0+85.8	0+89.1	0+92.4	0+95.7	0+99	1+02.3	1+05.6	1+08.9
12.89	12.7	12.24	12.22	12.1	12.03	11.97	11.89	12.02	12.06	12.12	12.5	12.36	12.58	13.19	13.38	13.57	13.98
12.9	12.63	12.29	12.18	12.05	11.95	11.91	11.9	11.97	12.03	12.03	12.4	12.33	12.61	13.16	13.42	13.5	13.89
0.01	-0.07	0.05	-0.04	-0.05	-0.08	-0.06	0.01	-0.05	-0.03	-0.09	-0.1	-0.03	0.03	-0.03	0.04	-0.07	-0.09

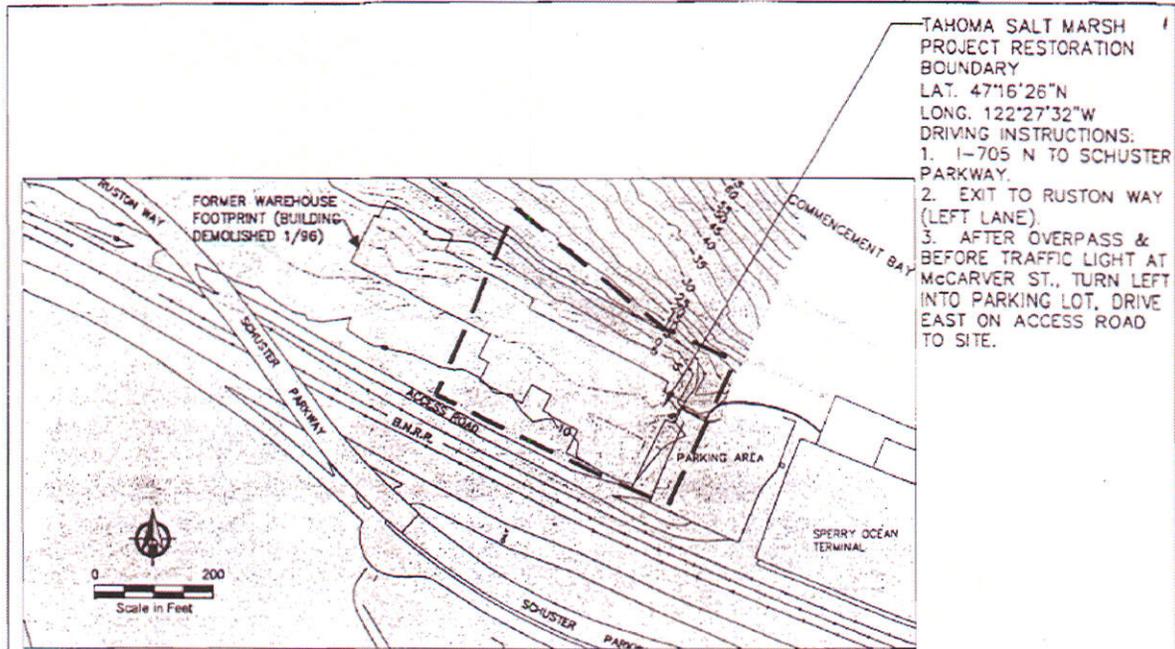
ct E2

to 1+08.9)																	
0+52.8	0+56.1	0+59.4	0+62.7	0+66	0+69.3	0+72.6	0+75.9	0+79.2	0+82.5	0+85.8	0+89.1	0+92.4	0+95.7	0+99	1+02.3	1+05.6	1+08.9
9.08	8.85	9.25	9.39	9.64	9.72	10.08	10.91	12.57	14.05	15.15	16.32	17.54	18.25	19.92	19.96	19.94	19.86
9.04	8.93	9.04	9.47	9.6	9.75	10	10.12	11.73	14	15.75	16.5	17.48	17.87	19.83	19.66	19.64	19.6
-0.04	0.08	-0.21	0.08	-0.04	0.03	-0.08	-0.79	-0.84	-0.05	0.6	0.18	-0.06	-0.38	-0.09	-0.3	-0.3	-0.26

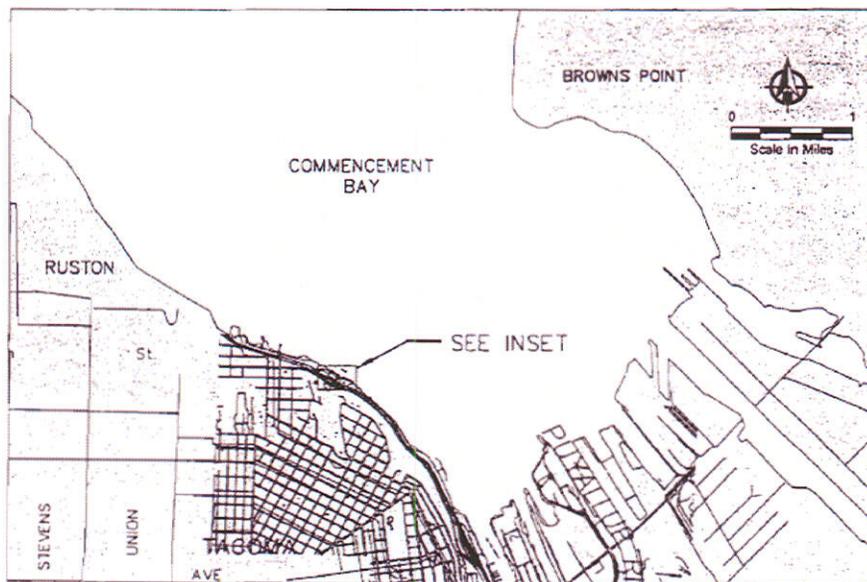
**Table 6 – Erosion Marker Elevations**

Stake	Year 1 - 2004 Height (cm)	Year 3 - 2006 Height (cm)	Total Change (cm)	Average Change (cm/yr)	Exceed 4 cm/yr
S1	15.54	14.90	-0.64	-0.32	No
S2	11.90	13.10	1.20	0.60	No
S3	19.50	18.90	-0.60	-0.30	No
S4	24.30	20.40	-3.90	-1.95	No
S5	19.20	19.20	0.00	0.00	No
S6	13.40	11.30	-2.10	-1.05	No
S7	15.50	14.90	-0.60	-0.30	No
S8	18.00	17.40	-0.60	-0.30	No
S9	16.50	17.40	0.90	0.45	No
S10	18.60	18.30	-0.30	-0.15	No
S11	19.50	11.60	-7.90	-3.95	No

# FIGURES



INSET



PURPOSE: SOIL CLEANUP & HABITAT RESTORATION

Reference # 200300203

DATUM: MLLW

VICINITY MAP



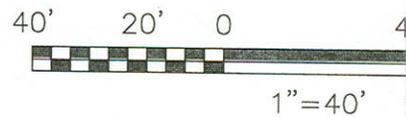
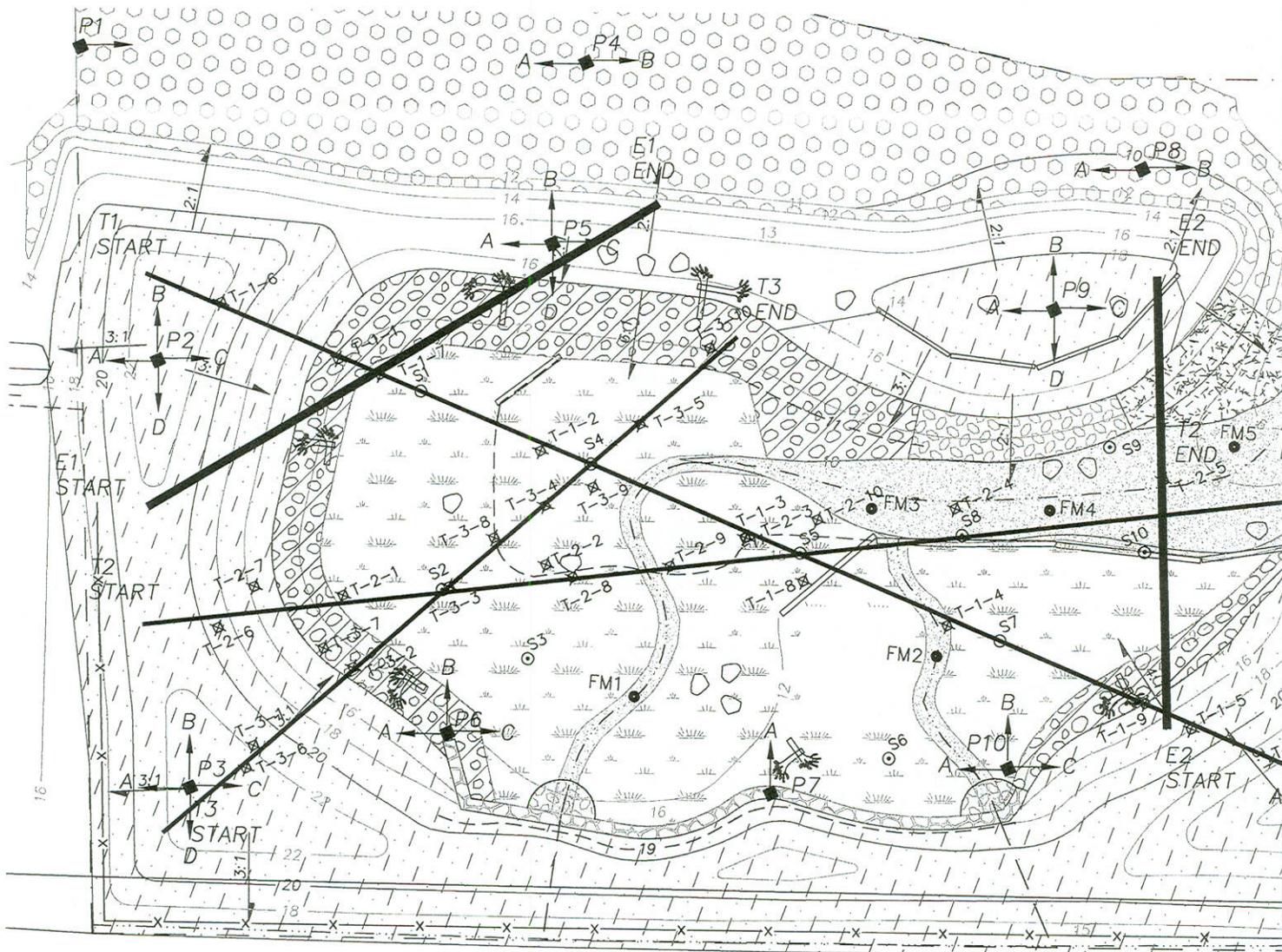
SCALE: AS NOTED

TAHOMA SALT MARSH RESTORATION

IN: SECTION 29, TOWNSHIP 21N, RANGE 3E  
 COUNTY OF: PIERCE STATE OF: WA  
 APPLICATION BY: CITY OF TACOMA  
 SHEET 1 OF 12 FEBRUARY 2003

7/17/03 FILENAME: 5158-03P0109F-00 MET'S

Figure 1 – Vicinity Map



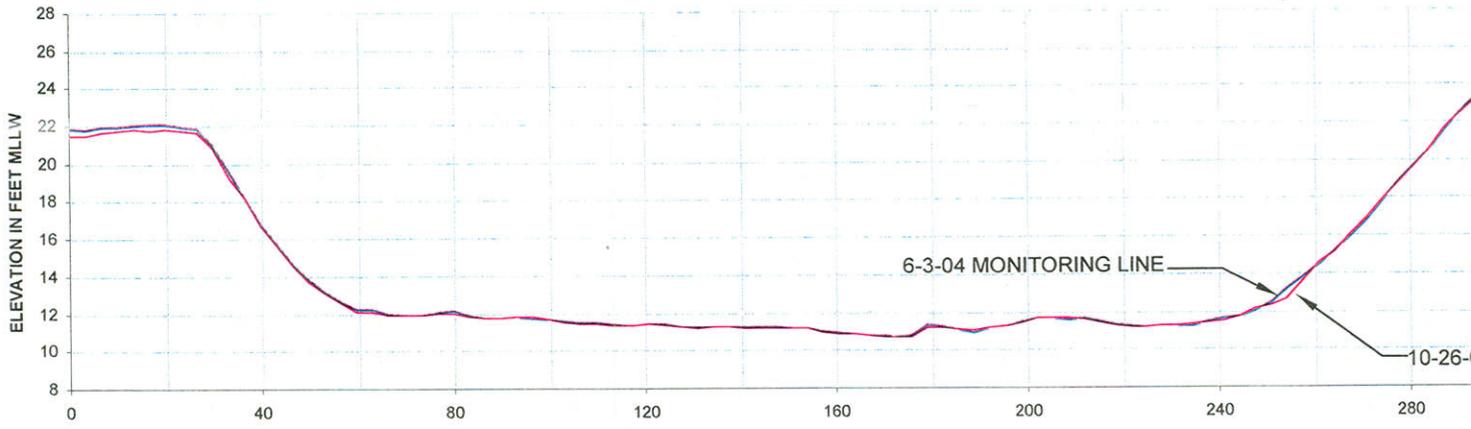


# LEGEND

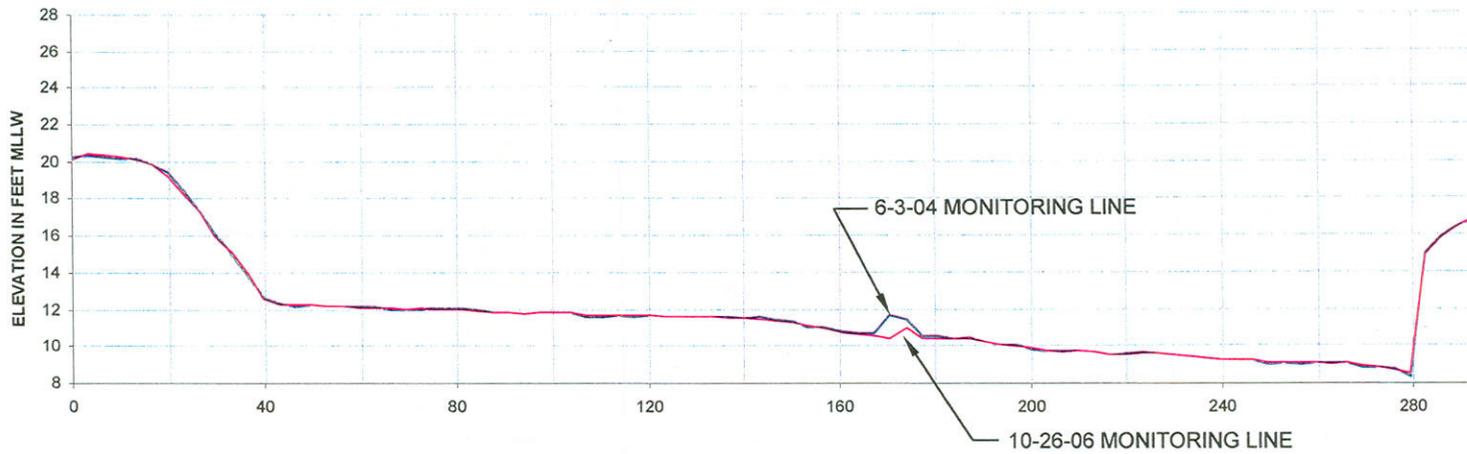
-  RIPARIAN (W/EROSION CONTROL BLANKET & HYDROSEED)
-  SHORELINE ARMORING (RIPRAP W/FISH MIX)
-  SHORELINE ARMORING (RIPRAP)
-  INTERTIDAL CHANNEL ARMORING
-  SALTMARSH (AMENDED SOIL)
-  TIDAL CHANNEL (FISH MIX)
-  SALTMARSH TRANSITION AREA (W/EROSION CONTROL BLANKET)
-  ROUNDED NATURAL BOULDER (1 CY MIN.)
-  LOG BERM
-  EROSION MARKER
-  PHOTO POINT
-  VEGETATION MONITORING TRANSECT
-  EROSION & SEDIMENT TRANSECT
-  FM3 FISH MIX SAMPLE LOCATION
-  QUADRAT LOCATIONS

	DATE 5-26-04	SCALE 1" = 40'	CITY OF TACOMA DEPARTMENT OF PUBLIC WORKS	SHEET NO.
	DESIGNED DSP	CHECKED DSP		
	DRAWN REG	PROJECT NAME TSM	SHEET 1 OF 1	
	DRAWING NAME 5-24-04-BASE			

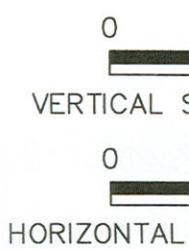
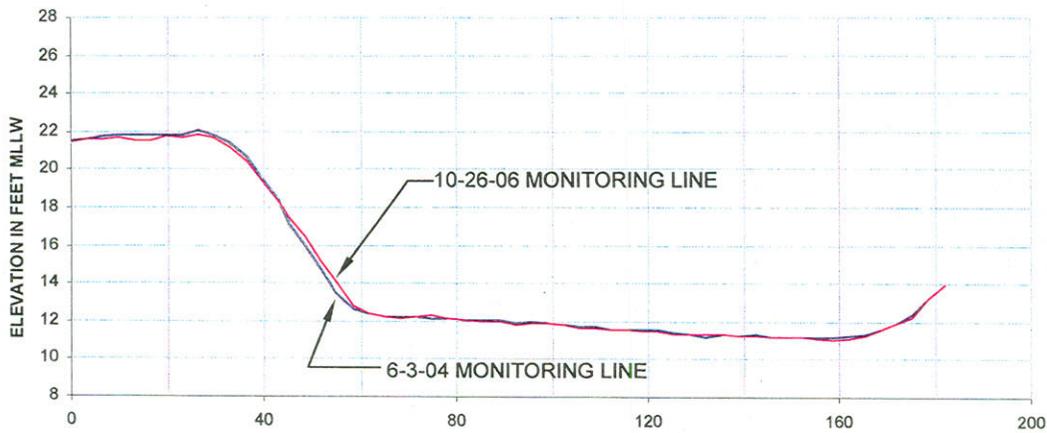
TRANSECT T1

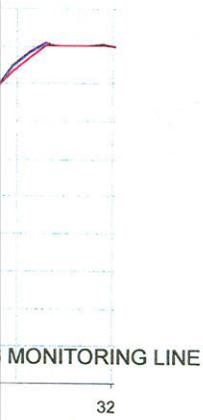


TRANSECT T2

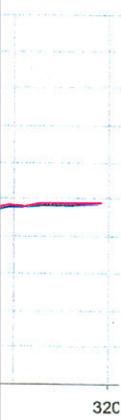
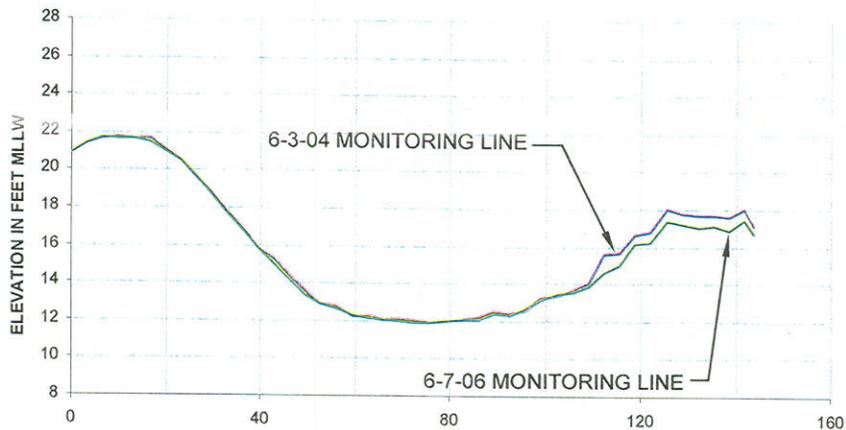


TRANSECT T3

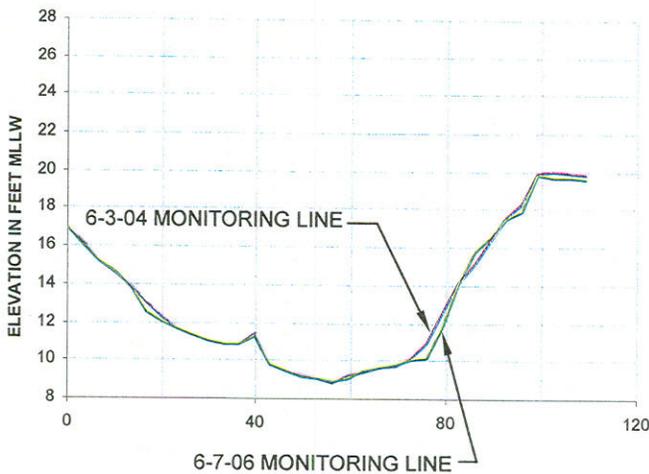




TRANSECT E1



TRANSECT E2



**GENERAL NOTES FOR FIGURE 3:**

1. SEE FIGURE 2 FOR PLAN VIEW OF TRANSECT LOCATIONS.
2. ELEVATION ALONG THE MONITORING TRANSECT LINES ARE INTERPOLATED BETWEEN THE DISCRETE MONITORING POINTS WHICH ARE LOCATED APPROXIMATELY 1 METER APART.

MONITORING LINE  
MONITORING LINE  
MONITORING LINE

10'  
SCALE 1"=10'  
40'  
SCALE 1"=40'

	DATE	SCALE
	11-28-06	AS NOTED
	DESIGNED	CHECKED
	KB	KB
DRAWN	PROJECT NAME	
REG	TSM	
DRAWING NAME		
5-24-04-BASE		

<b>CITY OF TACOMA</b> <b>DEPARTMENT OF PUBLIC WORKS</b>		
<b>TAHOMA SALT MARSH</b> <b>TRANSECTS CROSS-SECTIONS</b> <b>FIGURE 3</b>		
		SHEET NO.
		SHEET 1 OF 1