Mitigation Monitoring Report Cover Sheet
Oregon Department of State Lands

Block 1: Report Information

DSL Permit Number: 26208 COE Permit Number: Nationwide Permit -#2001-1031
Permittee: Ken Reynolds
County: Benton Report Date: December, 2009 Monitoring Year 6
Date Removal-Fill Activity Completed:
Date mitigation was completed Grading: 2002 Planting: 2004
Report submitted by: Frazier Creek Wetland Mitigation Bank

Block 2: Monitoring Report Purpose

This monitoring report is for monitoring a project that includes: (check all that apply):

X Compensatory **freshwater** wetland mitigation for permanent wetland impacts.
NA Compensatory **estuarine** wetland mitigation for permanent wetland impacts.
Only non-wetland compensatory mitigation.
Only mitigation for temporary impacts that has a monitoring requirement.
Voluntary wetland enhancement, creation or restoration (General authorization or individual permit) not funded with money from our wetland mitigation revolving fund.
Voluntary wetland enhancement, creation or restoration (General authorization or individual permit) funded with money from **our wetland mitigation revolving fund.**
X **Mitigation Bank** Report
Other: _____

Block 3: Results

	Success Criteria	Met? (Y/N)	Comments/Reasons for Failure*
1.	Hydrology	Yes	
2.	Community Types	Yes	
3.	Structural Diversity	Yes	
4.	Species Diversity	Yes	
5.	Tree and Shrubs	Met in all but one community type	0.2 ac willow area has not performed as anticipated
6.	Ground Cover	Met in majority of Bank	Did not meet all of the criteria in the ash forest, shrub or willow areas
7.	Non-Native Species	Yes	
8.	Wildlife Habitat	Yes	

Remedial work recommended	Yes X	No
Deed Restriction or other protection instrument attached (noted: if a filed deed restriction was a required as a permit condition, please attach a copy: previously submitted	Yes X	No
Final Monitoring Report?	Yes	No X
Requesting release or partial release of bond/credits	Yes	No X

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LIST OF ATTACHMENTS

1.0 REGULATORY BACKGROUND

The purpose of this report is to summarize the progress of the Frazier Creek Wetland Mitigation Bank (Bank). The Frazier Creek Wetland Mitigation Bank, owned by Ken Reynolds, is located in Corvallis, Oregon. The site is located in Township 11 South, Range 4 West, northwest quarter of Section 18, Tax Lot 400, Benton County, Oregon. The wetland mitigation bank is contiguous with the Jackson-Frazier Wetland. The letter of approval for the Bank was signed in 20023 and is permitted as ACOE permit #2001-1031.

The Bank is 26.01 acres, all of which was deemed cropped wetlands that generated credits at a 2:1 ratio. The Bank has a potential of 13.005 credits. Of these 13 credits, the first 45% of the credits (5.88) have been released.

2.0 WORK SUMMARY

Site preparation began in late summer of 2002 and included plowing and grading. Grading was done, including the construction of two water distribution swales. Outlet structures were constructed at the north end of the two new distribution swales. Berms in the vicinity of the outlet structures were repaired following severe storms the first winter after their installation. The repair work included correcting bank erosion, breaches in the berms and additional armoring of the sides of the outlet structures with rip-rap.

In late spring and summer of 2003, soils were prepared for planting by re-application of herbicide to eliminate ryegrass and disking. There was a re-sprouting of annual ryegrass, and another application of herbicide was made prior to plant installation. Plant installation began in October 2003. The grass seed mix consisting of tufted hairgrass (*Deschampsia cespitosa),* meadow barley (*Hordeum brachyantherum),* spike bentgrass (*Agrostis exarata),* and slough grass (*Beckmannia syzigachne*) was drilled in the wet prairie. Trees and shrubs were planted according to the approved planting plan on October 6, 2003. Willow slips and some potted material were installed in the designated 0.2 acre patch in February 2004.

The Bank has undergone routine spot spraying, primarily for annual ryegrass (*Lolium multiflorum*), reed canary grass (*.Phalaris arundinacea, and Armenian blackberry (Rubus discolor).*

3.0 AS-BUILT PLANS

As-built monitoring was conducted March 29, 2004.

4.0 MONITORING METHODOLOGY AND GENERAL RESULTS

Vegetation monitoring was conducted on May 28, 2009 by Pat Thompson and Carla Cudmore. Complete monitoring results are included as Attachment 1 and the Monitoring Point Location Map is included as Attachment 2. Eight-nine monitoring plots were examined. The monitoring was conducted according to approved Bank protocols, with only minor differences as noted in the following sections.

4.1 <u>Northern Boundary Hedgerow</u>

As noted in the 2008 monitoring report, the protocol for monitoring the hedgerow planting was modified in 2008 due to the density of the vegetation. The 2008 sampling protocols and sample plots were used in 2009. The species of shrubs and trees, approximate size, row width and estimate of aerial cover were noted within a 10'length of hedgerow starting at the plot marker and extending 10' to the west within the hedgerow.

The low shrub layer (*Rosa ssp.*) accounted for approximately 58% of the cover and the high shrub (*Salix ssp.*) and tree layer accounted for about 12% of the cover. The shrub and tree cover percentages would have been even higher but two of the plots (5 and 11) were located in areas that had been rock reinforced to protect the water distribution swale outlets and had no shrubs or trees. The hedgerow shrub/tree vegetation averaged 7.9 feet in width. The average tree height was about 9 feet and average high shrub/tree height was 4.5 feet.

Armenian blackberry (*Rubus discolor*) was noted in six of the sample plots for a total percentage cover of only 0.77 %. This is well within allowable, limits but is an increase from 2008.

4.2 Willow Planting Southwest Portion of Bank

The willow planting area in the southwest portion of the Bank has been monitored since its initial planting in 2004 with 275 willows in the 0.2 acres area. Monitoring in 2005 and 2007 indicated an approximate 25% survivorship of the planted willows. The 2008 monitoring indicated a substantial increase in the number of willows to approximately 46% of the original planting rate. Since the area has not performed as anticipated, this year we counted all willows within the entire 0.2 acre willow area to determine the overall stem density. Twenty-six willows were counted within the 0.2 acres which is a 9% survival rate from the original 2004 planting. Suggested remedial actions are included in Section 7.0.

4.3 Ash Forest and Shrub Edge

Approximately 3.5 acres of ash forest with a shrub edge were planted in 2004. Sampling protocols have changed over the years with varying sample sizes, plot locations and reporting of results. Results of all of the previous monitoring indicated that the ash forest is meeting performance standards. In 2009, we attempted to standardize the monitoring by staking in the field and surveying via GPS the locations of each monitoring plot. Twenty plots were monitored using a 20' diameter for the overstory layer and a 3' by 3' plot for the herbaceous layer, the center of each plot being the stake. This is the first year actual herbaceous layer monitoring has been conducted.

In 2009, there was an average of 16.8 trees per plot (314 square feet). This is a dramatic increase from the 2.4 trees per same sized plot in 2004. Many of the 16.8 trees are saplings, but even the average number of ash trees greater than 2 feet in height is 8.4 per plot. The ash trees continue to grow and reproduce and are meeting performance standards.

The herbaceous layer was monitored with results indicating the years fighting the annual ryegrass has been very successful. In 2008, approximately 20 percent of the herbaceous layer was ryegrass, whereas in 2009, ryegrass was only found in trace amounts.

4.4 Wet Prairie

The same 46, 3-foot by 3-foot plots that were used and staked in 2008 were again monitored in 2009. Sample plots were located at about 100-foot intervals along east-to-west transects that were about 200 feet apart. There were about 3.3 sample plots per acre in the wet prairie.

Grass cover versus forb cover in the wet prairie was nearly identical to the 2008 monitoring with 89% grass cover in 2009 and 90% in 2008. The two most common grass species are meadow barley at 41.9% and spike bentgrass at 36.6%. As in 2008, no ryegrass was detected in any of the wet prairie sample plots.

4.5 Swale and Emergent

The five swale monitoring points were permanently marked and located using GPS. The swale plots are three feet square. In additional to the five swale monitoring plots, five additional monitoring plots within the distribution swales, which in the past were included in the wet prairie, were grouped with the swale monitoring data. This was done to apply the performance standards more accurately for each community. These plots are identified on the Swale/Emergent Plot Data sheet in Attachment 1.

The swale and emergent community is diverse with 21 native fac or wetter species and no one species with more than 10.5% coverage.

5.0 PERFORMANCE STANDARDS AND MONITORING RESULTS

5.1 Hydrology

Performance Standards

a) Surface water should be visible in the distribution channel
b) Wetland hydrology as defined in the 1987 COE Manual must be present
c) The standard will be satisfied when the objective has been satisfied in two years with normal or below precipitation beginning in 2003

Results – *Criteria Satisified*
Hydrology monitoring performance standards were previously met, following two years of monitoring during years of normal or below normal precipitation. As such, no additional hydrology monitoring was completed.

5.2 Community Types

Performance Standards
Six community types should be present in the approximate locations identified on the planting plan. The area of each community type should be within 5 percent of the proposed area.
Results - *Criteria Satisfied*
Six community types (hedgerow scrub/shrub, forest, wet prairie, flooded emergent, shrub edge, and shrub willow) are present. They are located in the approximate location designated on the planting plan.

5.3 Structural Diversity

Performance Standards
a. Grass, shrub, and forest habitats must be present
b. Multilayered canopies must be present in the hedgerows and northern perimeter of wetland forest.
Results - *Criteria Satisfied*

a. Each of the three specified habitats is present.
b. The hedgerow and the northern perimeter of the wetland forest have a mixed canopy of both low and high growing shrubs and trees.

5.4 Species Diversity

Performance Standards
a. Three native species of trees maturing at >20 feet must be present
b. Minimum of four species of shrubs in hedgerows and transitional shrub zone
c. Twelve native species of groundcover in emergent zone including three species of Carex, two

species of Juncus, *Deschampsia cespitosa*, *Hordeum brachyantherum*, and four species of forbs.

Results - *Criteria Satisfied*

a. Five species of native trees were identified during the monitoring, including Oregon ash (*Fraxinus latifolia*), Douglas hawthorn (*Crataegus douglasii*), cascara (*Rhamnus purshiana*), cottonwood (*Populus trichocarpa*) and western crabapple (*Pyrus fusca*).

b. Four shrubs, nootka rose (*Rosa nutkana*), cluster rose (*Rosa pisocarpa*), Douglas spirea (*Spiraea douglasii*), and willow (*Salix ssp.*) are present within the hedgerows and transitional shrub zone.

c. Within the emergent zone, three species of Carex, three species of Juncus, *Deschampsia cespitosa*, *Hordeum brachyantherum*, and nine native fac or wetter species of forbs are present. Overall, 21 native species were identified in the groundcover within the emergent wetland.

5.5 Tree and Shrubs

Performance Standards

a. Planting density within 5 percent of planting plan—typically 80 to 100 percent survivorship

b. Increase aerial cover in successive years; 15 percent aerial cover of trees 3 years after planting; 40 to 60 percent aerial cover of shrubs after 3 years.

Results - *Criteria satisfied in all community types but one*

a. Tree and shrub survivorship along with natural propagation within the hedgerows and ash forest surpass the 100% survivorship standard. One area, however, has not met the criteria, the willow area in the southwest portion of the Bank. This area has struggled since its initial planting in 2004. Stem counts have been conducted each year, covering a 20' radius in the center of the community. In 2008, 15 willows were counted. This year we conducted a stem count for the entire willow area and found 26 willows ranging in height from saplings to 12' in height. This equates to approximately 130 stems per acre, which is slightly less than 50% of the original planting plan.

b. The aerial extent of the trees and shrubs has met the 15% coverage by trees and 40-60% by shrubs in all community types, except the willow area in the southwest portion of the Bank. Despite the growth of some of the willows and the slow natural propagation that is occurring, much of this area has no aerial coverage.

5.6 Ground Cover

Performance Standards

a. 30 to 50 percent native ground cover in emergent and wet prairie zones after one year

b. 60 to 80 percent ground cover of native Willamette Valley species two years after installation in emergent and wet prairie zones

c. 50 percent native ground cover within two years in shrub and forest habitat

Results - *Criteria satisfied in emergent/swale and wet prairie, but not in the ash forest, shrub or willow areas.*

a/b. Within the emergent/swale community, 76% of the cover is native fac or wetter vegetation and within the wet prairie zone, there is 90% native vegetation.

c. Less than 1% of the ground cover in the ash forest is native. Shrub areas have little ground cover due to the shade out effect of the canopy, but of the ground in the hedgerow, only 31% is native. The vast majority of the non-native groundcover is within the two plots with no shrub or tree (see Section 4.1). The herbaceous vegetation was only approximated in the willow area in the southwest portion of the Bank, but appears to be less than 50% native ground cover.

5.7 Non-Native Species

Performance Standards

a. Ryegrass should be plowed under and removed prior to active installation of native plants. Not to exceed 10 percent of ground cover.

b. Zero tolerance for reed canary grass (*Phalaris arundinacea*), Himalayan blackberry, Evergreen blackberry (*Rubus ursinus*), purple loosestrife (*Lythrum salicaria*), kudzu (Pueraria ssp.), Japanese knotweed (*Polygonum cuspidatum*), and poison hemlock (*Conlon maculatum),* the first two years after installation.

c. Aerial cover of species listed in b. should be no more than five percent two years after plant installation and <15 percent thereafter.

Results - Criteria satisfied.

a. Ryegrass was identified in the Bank, but only in trace amounts

b. & c. The only two zero tolerance species noted in the Bank are trace amounts of reed canary grass small areas of Armenian blackberry in the hedgerow community (0.77%) and in the ash forest (1.5%).

5.8 Wildlife Habitat

Performance Standards

a. Emergent, prairie, shrub, and forest habitat types must be present.

b. There should be sightings or signs of songbirds, waterfowl, shorebirds, amphibians, and mammals each year. The number of sightings should increase annually as habitats mature.

Results - Criteria satisfied.

a. All of the habitat types are present.

b. Sightings of songbirds, waterfowl, shorebirds, amphibians, and mammals were recorded.

6.0 PHOTO POINT MONITORING

Photos from the photo points are included as Attachment 3.

7.0 SUGGESTED REMEDIAL

Hedgerow

a. The Armenian blackberry in the hedgerow needs to be treated. To prevent damage to the surrounding vegetation the canes should be cut near the root, and base spot sprayed or painted with herbicide, or protected with visqueen during spraying.

b. The rocked water distribution swale outlets located in plots 5 and 11, should be sprayed and replanted with native vegetation including: California brome (*Bromus carinatus*), California oatgrass (*Danthonia californica*), and western serviceberry (*Amelanchier alnifolia*).

Willow area

In order for the willow area to be successful, additional hydrology is needed. The area without willows can be graded to remove 6 to 12" of soil to the approximate elevation of the adjacent swale area. Additional willows along with acceptable herbaceous cover can be replanted. A second possibility is that the willow area can be planted to wet prairie species, while leaving the existing willows in place. The performance standard for this area could then convert to the wet prairie standards. Suggested planting mix includes slough grass (*Beckmannia syzigachne*), tufted hairgrass (*Deschampsia cespitosa*), dense sedge (*Carex densa),* one-sided sedge (*Carex unilateralis*), slender rush (*Juncus tenuis*) and common camas (*Camassia quamash*).

Ash Forest

Planting the ground cover in the forested wetland has not yet been completed. Up until now, the focus has been on controlling ryegrass, which is now complete. The native ground cover should be established next fall after spraying out the weeds that took over this spring. The planting plan includes planting slough sedge (*Carex obnupta*), California false hellebore (*Veratrum californicum*), skunk cabbage and water parsley were also on the list, but it is my personal opinion that these species will not survive at this location. I would substitute cow parsnip (*Heracleum lanatum*) and large leaf avens (*Geum macrophyllum*).

8.0 CREDIT SALES SUMMARY

Two credit releases have occurred. The first release (30%) for 3.92 credits in April 2003 and a second (15%) release for 1.96 credits in August 2004, totally 5.88 credits. Of these 5.88 credits, 5.78 have been sold and were previously reported on. No credits have been sold in the past year. To date 0.04 credits remained unsold.

Frazier Creek Wetland Mitigatigation Bank

Swale/Emergent Plot Data

May 28, 2008

Common Name	Botanical Name	Status	Origin	Ave. Cover ea. Species	1	2	3	4	5	T1-10	T2-5	T2-6	T3-9	T4-9
Herbaceous Species - percent cover														
Alisma gramineum	Narrow leaf water plaintain	OBL	native	5.5	10		10		5	15			15	
Carex densa	Dense sedge	OBL	native	6.5		15		30		10				10
Carex feta	Green-sheath sedge	FACW	native	0.5						5				
Carex unilaterils	One-sided sedge	FACW	native	2.0				10						10
Cerastium arvense	Chickweed	NOL	non	1.0								10		
Eleocharis ovata	Ovoid spike rush	OBL	native	3.5						35				
Eleocharis palustris	Creeping spike rush	OBL	native	10.5	30		30		5				40	
Epilobium densiflorum	Denseflower willowherb	FACW	native	2.5							20			5
Epilobium watsonii	Watson's willow herb	FACW	native	3.5							20	10		5
Juncus acuminatus	Tapered rush	OBL	native	1.0				10						
Juncus bolanderi	Bonader's rush	OBL	native	0.5						5				
Juncus oxymeris	Pointed rush	FACW	native	7.5	10	25							40	
Lemna minor	Common duckweed	OBL	native	4.5			30		15					
Lotus corniculata	Bird'sfoot trefoil	FAC	non	1.5							15			
Mentha pulegium	Pennyroyal	OBL	non	9.0	15	25				10			5	35
Myosotis laxa	small flowered forget me not	OBL	native	8.5	25	30		30						
Oenanthe sarmentosa	Pacific water parsley	OBL	native	6.5					65					
Rumex crispus	Cury dock	FAC	non	2.0	5	5				10				
Veronica americana	American speedwell	OBL	native	1.0			10							
Grass Species - percent cover														
Agrostis exarata	Spike bentgrass	FACW	native	5.0							15	20		15
Alopecurus geniculatus	Water foxtail	OBL	native	0.5					5					
Beckmania syzigachne	Slough grass	OBL	native	5.5	5		10	20		10				10
Deschampsia cespitosa	Tufted hairgrass	FACW	native	0.5								5		
Glyceria elata	Tall manna grass	FACW	native	1.5			10		5					
Hordeum brachyantherm	Meadow barley	FACW	native	6.0							30	20		10
Bareground				3.5								35		
Relative % listed species invasive canopy cover : 0														
Listed species includes reed canary grass, Himalayan Blackberry, evergreen blackberry, purple loosestrife, kudzu, Japanese knotweed and poison hemlock.														
Number of native species = 21														
Species of Carex = 3														
Species of Juncus = 3														
Species of Native Fobes = 15														
% native canopy cover (includes bareland):		Mean=	**76.00**	76.0	80.0	70.0	70.0	100.0	85.0	80.0	65.0	55.0	95.0	60.0

Ash Monitoring

DATECOLL	TIMECOLL	PLOT_	GPS_DAT	GPS_TIME	FEAT_NAME	DATAFILE
6/2/2009	09:09:24am	1	6/2/2009	08:09:31am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:11:43am	2	6/2/2009	08:11:46am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:13:13am	3	6/2/2009	08:13:16am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:14:42am	4	6/2/2009	08:14:46am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:16:02am	5	6/2/2009	08:16:06am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:18:23am	6	6/2/2009	08:18:26am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:21:19am	7	6/2/2009	08:23:31am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:25:07am	8	6/2/2009	08:25:11am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:26:28am	9	6/2/2009	08:26:36am	Monitori	FRAZIER CK ASH.cor
10/1/2004	09:27:42am	10	6/2/2009	08:27:46am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:30:38am	11	6/2/2009	08:30:41am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:31:47am	12	6/2/2009	08:31:51am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:33:15am	13	6/2/2009	08:33:21am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:34:52am	14	6/2/2009	08:34:56am	Monitori	FRAZIER CK ASH.cor
6/2/2009	09:36:08am	15	6/2/2009	08:36:11am	Monitori	FRAZIER CK ASH.cor

Swale Monitoring

DateColl	TimeColl	Plot__	GPS_Date	GPS_Time	Feat_Name	Datafile
6/2/2009	08:58:15am	1	6/2/2009	07:58:21am	Monitori	FRAZIER CK SWALE 09.
6/2/2009	09:01:13am	2	6/2/2009	08:01:16am	Monitori	FRAZIER CK SWALE 09.
6/2/2009	09:02:47am	3	6/2/2009	08:02:51am	Monitori	FRAZIER CK SWALE 09.
6/2/2009	09:04:22am	4	6/2/2009	08:04:26am	Monitori	FRAZIER CK SWALE 09.
6/2/2009	09:06:04am	5	6/2/2009	08:06:06am	Monitori	FRAZIER CK SWALE 09.

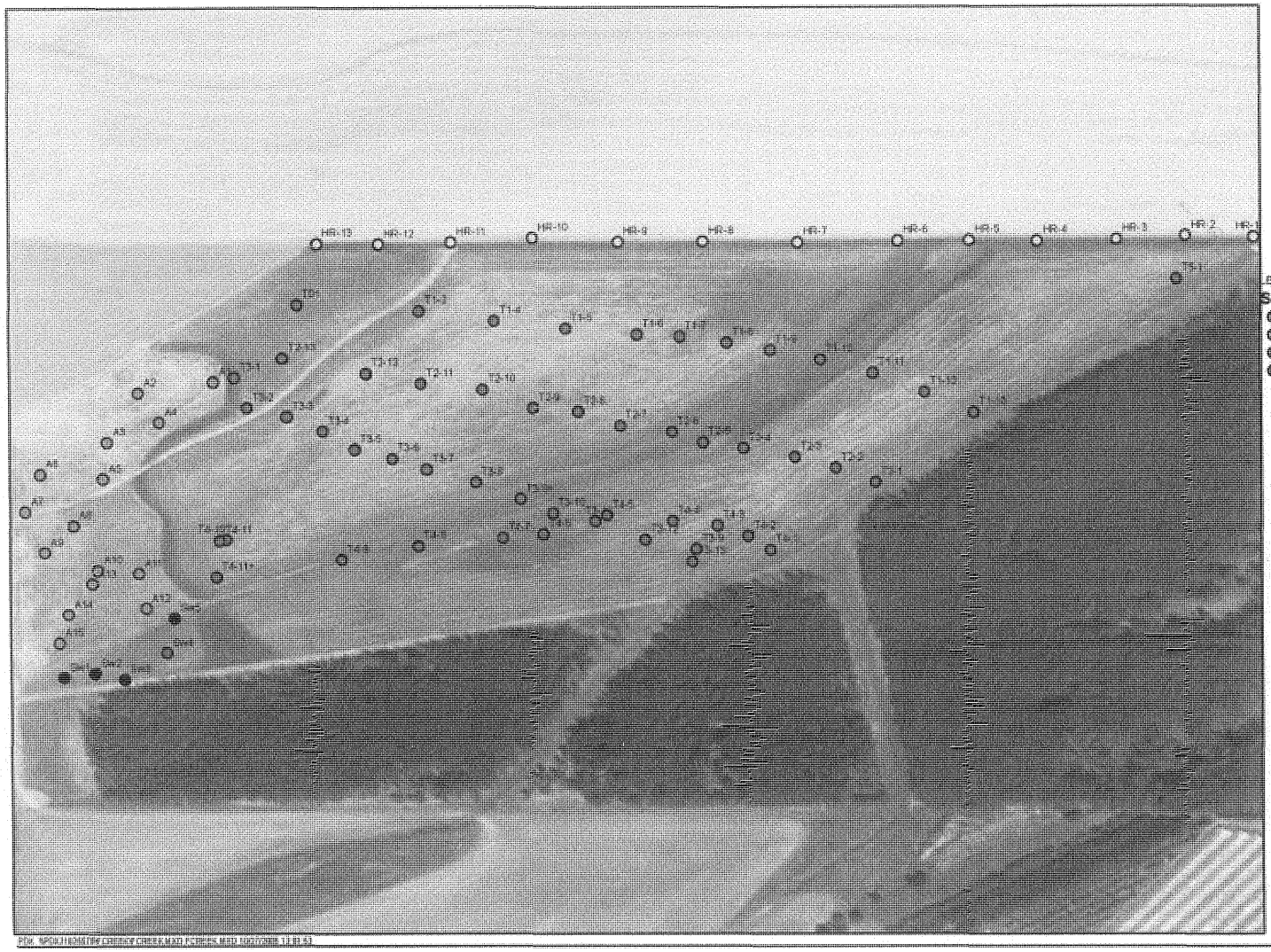
UNFILT_PO	GPS_HEIGHT	LATITUDE
14	148.706	44.612605329
10	146.618	44.612729114
10	145.195	44.612861207
11	145.877	44.613075187
11	145.289	44.613025468
10	143.818	44.612909884
10	151.572	44.613082368
10	153.123	44.613217457
10	152.477	44.613340094
10	150.397	44.613477754
10	151.702	44.613404922
10	145.086	44.613508837
10	140.788	44.613658946
10	141.195	44.613838716
10	141.709	44.613987056

Unfilt_Pos	GPS_Height	Latitude
21	145.040	44.612821427
11	144.172	44.612669569
11	145.415	44.612396716
14	148.417	44.612448072
10	147.127	44.612346966

LONGITUDE
-123.230659042
-123.230423915
-123.229988180
-123.230070055
-123.230355479
-123.230705365
-123.230688782
-123.230559233
-123.230276896
-123.230151106
-123.230721240
-123.230548286
-123.230205464
-123.229993706
-123.229647872

Longitude
-123.229730298
-123.230044607
-123.230191754
-123.230451556
-123.230576688

Figure 1
Frazier Creek Wetland Monitoring



Source:
1. GPS Data Collected with Garmin GPS
2. Photo from Oregon Streaming Imagery

Fazier Creek Monitoring Points

Ash Monitoring

Swale Monitoring

0 50 100 200 Feet

Photo 1 looking west from T5-1

Photo 2 looking northwest from T2-7

Photo 3 looking west from T2-1

Photo 4 looking southeast from T2-1

Photo 5 looking north from T4-9

Photo 6 looking northeast from T2-10

Photo 7 willow area looking southwest across swale area with ash area in background

Photo 8 willow area looking west across swale towards ash area

Photo 9 willow area in southwest corner

Photo 10 ash area looking northwest across from ash 2

Photo 11 ash area in southwest corner

Photo 12 ash area looking northwest across from ash 5

Photo 13 looking northwest from T2-12

Photo 14 looking east from T3-8

Photo 15 looking northeast from T4-9

Photo 16 looking east from T2-9

Photo 17 looking east from T0-1

Photo 18 looking east from T2-12

Photo 19 looking southwest from T2-7