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: September 22, 2010 Monitoring Year 7
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, additional planting has occurred
6.	Ground Cover	Met in all but one community type	Did not meet all of the criteria in the ash forest
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 X	No

TABLE OF CONTENTS

1.0 REGULATORY BACKGROUND 1
2.0 WORK SUMMARY 1
3.0 AS-BUILT PLANS 1
4.0 MONITORING METHODOLOGY AND GENERAL RESULTS 1
- 4.1 Northern Boundary Hedgerow 1
- 4.2 Willow Planting Southwest Portion of Bank 2
- 4.3 Ash Forest and Shrub Edge 2
- 4.4 Wet Prairie 3
- 4.5 Swale and Emergent 3

5.0 PERFORMANCE STANDARDS AND MONITORING RESULTS 3
- 5.1 Hydrology 3
- 5.2 Community Types 4
- 5.3 Structural Diversity 4
- 5.4 Species Diversity 4
- 5.5 Tree and Shrubs 4
- 5.6 Ground Cover 5
- 5.7 Non-Native Species 5
- 5.8 Wildlife Habitat 5

6.0 PHOTO POINT MONITORING 6
7.0 SUGGESTED REMEDIAL 2
8.0 CREDIT SALES SUMMARY 6
9.0 CREDIT RELEASE REQUEST 6

LIST OF ATTACHMENTS

Attachment 1 Sample Plot Monitoring Data
Attachment 2 Monitoring Point Location Map
Attachment 3 Monitoring Photos

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 2002 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. Grading was done, including the construction of two water distribution swales. Outlet structures were constructed at the north end of each distribution swale. 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 and disking. There was a re-sprouting of annual ryegrass (*Lolium multiflorum)*, and another application of herbicide was made prior to planting. Planting began in October 2003 with drilling the wet prairie grass seed mix. Trees and shrubs were planted according to the planting plan on October 6, 2003. Willow slips were installed in the designated 0.2 acre patch in February 2004.

Since its inception the Bank has undergone routine spot spraying and mowing, primarily for annual ryegrass, reed canary grass (*Phalaris arundinacea)* and Himalayan blackberry *(Rubus discolor)*. In the last year spot spraying and mowing has expanded to include bird's foot trefoil (*Lotus corniculata),* rat-tail fescue *(Vulpia myuros),* parentucellia *(Parentucellia viscose), v*elvet grass *(Holcus lanatus), and p*ennyroyal *(Mentha pulegium)*.

An additional 50 potted Pacific willows were planted in the 0.2 willow community in the southwest of the Bank in February 2010. Approximately 50 one-sided sedge (*Carex unilateralis*) and green sheathed sedge (*Carex feta*) transplants were planted in the ash forest in February as well.

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 June 25 and July 2, 2010 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-six 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 Northern Boundary Hedgerow

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.

Plots #5 and #11 have been removed from the hedge row monitoring, as these are located in areas that have been rock reinforced to protect the water distribution swale outlets and have no shrubs or trees. The vegetation on the rock berm is sprayed yearly. The hedge row shrub layer (*Rosa ssp.*) accounted for approximately 68% of the cover and the high shrub (*Salix ssp.*) and tree layer accounted for about 21% of the cover. The hedgerow shrub/tree vegetation averaged 10.5 feet in width up from 7.9 feet in width in 2009. The average high shrub/tree height was about 15.5 feet, up from 9 feet in 2009 and average shrub height was 5.5 feet up from 4.5 feet in 2009. The hedge row continues to thrive and function as planned.

Himalayan blackberry was noted in two of the sample plots as trace amounts only. These had been sprayed recently.

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. It has shown varying degrees of success. In the past, all the willows planted were cuttings. The survival rate of these cuttings has been problematic. Due to this, 50 potted Pacific willows (*Salix lucida ssp. lasiandra*) were planted in February 2010. During the 2010 monitoring, the planted willows survivorship was 100%. The newly planted willows showed new, vigorous growth. The 26 willows counted in 2009 were also all surviving and growing.

The herbaceous layer in the willow planting area is a mixture of both native and non-native species, of between 50 and 60% native. The primary native species includes dense sedge (*Carex densa*), one-sided sedge, toad rush (*Juncus bufonius*), dense flower willow herb (*Epilobium densiflorum*), Spanish clover (*Lotus purshianus*), myosotis ssp, skunkweed (*Navarettia squarrosa*), spike bentgrass (*Agrostis exarata*), slough grass (*Beckmania syzigachne*), tufted hairgrass (*Deschampsia cespitosa*), and meadow barley (*Hordeum brachyantherum*). The primary non-native species include cat's ear dandelion (*Hypochaeris radicata*), pennyroyal, parentucellia, Himalayan blackberry, curly dock (*Rumex crispus*), colonial bentgrass (*Agrostis tenuis*), velvet grass, annual ryegrass, and red brome (*Ventenata dubia*).

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. The sampling protocols developed and implemented in 2009 were followed in 2010. 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.

In 2010, there was an average of 28.9 trees per plot, up from 16.8 trees in 2009. Many of the 28.9 trees are saplings. The average number of ash trees greater than 3 feet in height is 8.2 per plot. The average height of the non-saplings increased from 7.6' to 10.2'. The ash trees continue to grow and reproduce and are meeting performance standards.

The herbaceous layer native vegetation has increased from 2009 when it was only 0.8% to 2010, where it is 4.7. The sponsor has done a lot of herbicide applications (currently 19.75% bare ground) in this area.

Additional applications will concentrate on cat's ear dandelion, water-purslane (*Peplis portula*), colonial bentgrass (*Agrostis tenuis*), red brome (*Ventenata dubia*), velvet grass, annual ryegrass and rat-tail fescue.

Willow area - continue spot spraying for annual ryegrass, velvet grass and pennyroyal.

4.4 Wet Prairie

Forty five plots were monitored using the same 45, 3-foot by 3-foot plots that were used and staked in 2008 and 2009. Sample plots were located at about 100-foot intervals along east-to-west transects that were about 200 feet apart. There were approximately 3.3 sample plots per acre in the wet prairie.

Grass cover versus forbs cover in the wet prairie remains steady at 89.5% grass cover. By far the most common grass species is meadow barley at 51.8%. The second and third most common species are tufted hairgrass at 13.1% and slough grass at 11.4%. A very notable change was the sharp decline in spike bentgrass from 36.6% in 2009 to 8.8% this year. These changes in the grass dominance are a good example of evolution within the wetland.

4.5 Swale and Emergent

Five swale monitoring points and five monitoring points within the distribution swale were monitored, the same as in 2009. The swale and emergent community remains diverse with 21 native fac or wetter species. The two most common species are creeping spike rush (*Eleocharis palustris*) and small flowered forget-me-not (*Myosotis laxa*).

4.6 Transitional Shrub

The transitional shrub zone on the north and east sides of the ash forest is doing remarkable. It has excellent coverage and variety of shrub and trees species. The shrub coverage averages 5-7 feet in height and the tree height averages 12-25 feet in a row 20 feet wide. The species noted includes: Douglas hawthorn (*Crataegus douglasii)*, Oregon ash (*Fraxinus latifolia*), Pacific crabapple (*Pyrus fusca)*, cottonwood *(Populus balsamifera)*, cascara *(Rhamnus purshiana)*, red-osier dogwood *(Cornus stolonifera) Douglas spirea* (Spiraea douglasii), Nootka rose *(Rosa nutkana)*, clustered rose *(Rosa pisocarpa), and* willow (Salix ssp).

There is little herbaceous layer due to the full coverage by the shrub and trees. Species noted includes: spike bentgrass, meadow barley, Watson's willow herb *(Epilobium watsonii)*, slough grass, dense sedge, pennyroyal, curly dock, and tufted hairgrass.

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 five percent of the proposed area.
Results - *Criteria Satisfied*
Six community types (hedgerow scrub/shrub, forest, wet prairie, flooded emergent, transitional 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. Six species of native trees were identified during the monitoring, including Oregon ash, Douglas hawthorn, cascara, cottonwood, red-osier dogwood and western crabapple.
b. Four shrubs, Nootka rose, cluster rose, Douglas spirea, and willow 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 five percent of planting plan—typically 80 to 100% survivorship
b. Increase aerial cover in successive years; 15% aerial cover of trees 3 years after planting; 40 to 60% aerial cover of shrubs after three years.

Results - *Criteria almost satisfied*

a. Tree and shrub survivorship along with natural propagation within the hedgerows, transitional shrub, and ash forest surpass the 100% survivorship standard. The willow area in the southwest portion of the Bank has struggled since its initial planting in 2004. In February 2010, the sponsor planted 50 potted Pacific willow. Earlier plantings were all done with cuttings that had poor survival. All stems were counted in 2010 with 76 willows found,

ranging in height from saplings to 12' in height. This equates to approximately 380 stems per acre. If survival rates remain between 75% and 100%, this area will continue to meet the survivorship standards for the original planting plant.

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. The willow area in the southwest portion of the Bank is close to the 15% aerial tree coverage. If the survivorship of the newly planted material is between 75% and 100%, it should meet this standard by the 2011 monitoring.

5.6 Ground Cover

Performance Standards

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

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

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

Results - ***Criteria satisfied for performance standard a and b in emergent/swale and wet prairie. Performance standard 5 was met in the hedge row, willow and transitional shrub, but not in the ash forest.***

a & b. Within the emergent/swale community, 83.5% of the cover is native fac or wetter vegetation and within the wet prairie zone, there is 92% native vegetation.

c. The hedge row has 81.7% native herbaceous cover. The native herbaceous cover in both the willow and transitional shrub was approximated at between 50 and 60% in the willow area and between 80 and 90% in the transitional shrub. The only area not currently meeting this criterion is the ash forest, with 4.7% native herbaceous 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% of ground cover.

b. Zero tolerance for reed canary grass, 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% thereafter.

Results - Criteria satisfied.

a. Ryegrass was identified in the Bank, but only in trace amounts, except in the ash forested area where it was 3.5% of the herbaceous cover.

b. & c. The only two zero tolerance species noted in the Bank are trace amounts of reed canary grass and Himalayan blackberry.

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

Ash Forest Continue spot spaying for cat's ear dandelion, water-purslane (*Peplis portula*), colonial bentgrass (*Agrostis tenuis*), red brome (*Ventenata dubia*), velvet grass (*Holcus lanatus*), annual ryegrass (*Lolium multiflorum* and rat-tail fescue (*Vulpia myuros*).
These areas should be then be seeded with tufted hairgrass and meadow barley

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.

9.0 CREDIT RELEASE REQUEST

We are asking for a full credit release for all portions of the Bank except for the 3.5 acres of the ash forest. Although the trees are doing fine, the herbaceous area needs another year to reduce the non-native species.

Credits to be held:

3.5 ac ash forest at 2:1 credit = 1.75 credits
Hold the remaining 55% credit not already released= .963 credits

Total credits available:	13.005
Credits released to date:	5.880
Credits Remaining:	7.125
Credits to be held:	.963
Requested Credit Release	**6.162**

TABLE 1
Latitude and Longitude for Each Sample Plot

Transect # 1

Sample Plot #	LAT	LONG
1	44.61457	-123.22915
2	44.614533	-123.228444
3	44.614502	-123.228229
4	44.614475	-123.228015
5	44.614431	-123.227602
6	44.614396	-123.227188
7	44.614384	-123.226942
8	44.614349	-123.226673
9	44.614308	-123.226422
10	44.614254	-123.226131
11	44.614176	-123.225832
12	44.614066	-123.225534
13	44.613952	-123.225247

Transect # 2

1	44.613549	-123.225819
2	44.613633	-123.226045
3	44.613693	-123.226284
4	44.613745	-123.226579
5	44.61378	-123.22681
6	44.613841	-123.226988
7	44.613875	-123.227288
8	44.613958	-123.227531
9	44.613977	-123.227792
10	44.614084	-123.228083
11	44.614118	-123.228437
12	44.614177	-123.228755
13	44.614263	-123.229232

Transect # 3

1	44.614155	-123.229509
2	44.61398	-123.229437
3	44.613927	-123.229209
4	44.613845	-123.229005
5	44.613737	-123.228823
6	44.613685	-123.228604
7	44.613625	-123.228407
8	44.613549	-123.228126
9	44.613164	-123.226852
10	44.613373	-123.227679
11	44.613325	-123.227436
12	44.613218	-123.227146
13	44.61309	-123.226875

Transect # 4

1	44.613159	-123.226425
2	44.613239	-123.226554
3	44.613299	-123.226733
4	44.613325	-123.226988
5	44.613359	-123.227371
6	44.613252	-123.227734
7	44.613229	-123.227969
8	44.61318	-123.228455
9	44.613103	-123.228899
10e	44.613218	-123.229561
10w	44.613213	-123.229598
11	44.613003	-123.229618

Transect #5

1	44.614711	-123.224073

Hedge Row

1	44.614951	-123.223627
2	44.61496	-123.22402
3	44.61494	-123.224414
4	44.614932	-123.224875
5	44.614936	-123.225268
6	44.614934	-123.225684
7	44.614925	-123.226261
8	44.614929	-123.226806
9	44.614928	-123.227298
10	44.614952	-123.227791
11	44.614927	-123.228263
12	44.614916	-123.228678
13	44.614921	-123.229035

Frazier Creek Wetland Mitigatigation Bank

Swale/Emergent Plot Data

June 25, 2010

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	2.5	10			5		5			5	
Carex densa	Dense sedge	OBL	native	4.0		T		20		10				10
Carex feta	Green-sheath sedge	FACW	native	0.5						5				
Carex unilaterils	One-sided sedge	FACW	native	3.0				15						15
Cerastium arvense	Chickweed	NOL	non	0.0								T		
Eleocharis palustris	Creeping spike rush	OBL	native	17.0	30		30	15	15	50			30	
Epilobium densiflorum	Denseflower willowherb	FACW	native	2.0							15			5
Epilobium watsonii	Watson's willow herb	FACW	native	1.5							10	5		
Galium trifidum	Small bedstraw	FACW	native	0.0								T		
Juncus bolanderi	Bonader's rush	OBL	native	0.5						5				
Juncus oxymeris	Pointed rush	FACW	native	8.5	10	25				10			40	
Juncus tenuis	Slender rush	FACW	native	1.0				10						
Lemna minor	Common duckweed	OBL	native	2.0			15		5					
Lotus corniculata	Bird'sfoot trefoil	FAC	non	3.5							35			
Mentha pulegium	Pennyroyal	OBL	non	8.5	5	20	25	5		5	5		5	15
Myosotis laxa	small flowered forget me no	OBL	native	10.0	25	45	10	10						10
Oenanthe sarmentosa	Pacific water parsley	OBL	native	6.5					65					
Rorippa curvisiliqua	Western yellowcress	OBL	native	0.0								T		
Rumex crispus	Cury dock	FAC	non	1.5	5	5				5		T		
Vicia ssp.	Vetch	NOL	non	0.0								T		
Grass Species - percent cover														
Agrostis exarata	Spike bentgrass	FACW	native	0.5							5			
Alopecurus geniculatus	Water foxtail	OBL	native	0.0		T			T					
Beckmania syzigachne	Slough grass	OBL	native	5.0	T	5	10	15	5	5				10
Deschampsia cespitosa	Tufted hairgrass	FACW	native	6.5							5	50		10
Glyceria elata	Tall manna grass	FACW	native	3.0	5		10	5	10					
Hordeum brachyantherm	Meadow barley	FACW	native	9.5							25	45		25
water				3.0	10								20	
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=	83.50		80.0	75.0	75.0	95.0	100.0	90.0	60.0	100.0	75.0	85.0

Frazier Creek Wetland Mitigation Bank

Ash Plot Data and Willow Area Count - July 1, 2010

					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
lumber of Ash Trees. - stem count within 20' Diameter					39	26	9	12	26	84	80	56	18	7	101	46	9	10	7	8	10	12	8	10
Number of non-saplings					7	8	9	8	8	13	10	8	7	6	12	8	8	8	7		10	12	8	7
Average height in feet (not including new saplings)					8	9	6	9	10	10	11	9	8	7	12	12	12	12	14	14	12	11	9	8
Average of all trees per plot =		28.9																						
Average non-saplings* per plot =		8.2																						
Average height of non-saplings per plot =		10.2		Average																				
*trees greater than 3' in height				**Cover**																				
Crataegus douglasii	Douglas Hawthorn	FAC	native			1			1		1			1										
lerbaceous Species - percent cover in 3' x 3' plot (center of 20' diameter plots)																								
Carex densa	Dense sedge	OBL	native	0.75				15																
Carex feta	Green-sheath sedge	FACW	native	1.75											15	20								
Carex unilaterils	One-sided sedge	FACW	native	7.25		T	T	15			30						50	20		30				
Carex ssp.			native	1.5				15		15				T										
Centuarium umbellatum	Common centuray	FAC	non	0		T																		
Crepis capillaris	Hawksbeard	FACU	non	0.5																				10
Eleocharis ovata	Ovoid spike rush	OBL	native	0	T																			
Epilobium watsonii	Watson's willow herb	FACW	native	0.25														T						5
Geum macrophyllum	Oregon Avens	FACW	native	2.5							50													
Geranium molle	Dovefoot geranium	NOL	non	0		T								T										
Geranium visosissimum	Crane's bill geranium	FACU	non	4											T	T				25		15	5	35
Hypochaeris radicata	catsear dandelion	FACU	non	6.75	15	50	30			10			30											
Juncus bufonius	Toad rush	FACW	native	2.75	T			5	5				35	10										
Juncus effusus	Soft rush	FACW	native	0.25											5									
Juncus oxymeris	Pointed rush	FACW	native	1.25												25								
Juncus tenuis	Slender rush	FACW	native	4		T	T	5								15	50							10
Kickxia elatine	Sharp point flevellin	NOL	non	0.5			5		T			5												
Mentha pulegium	Pennyroyal	OBL	non	3			55											5						
Myosotis ssp.				0			T																	
Peplis portula	Water- purslane	NOL	non	7.75	25			25	T					45				60						
Rorippa curvisiliqua	Western yellowcress	OBL	native	1.25								10		15										
Rubus discolor	Himalayan blackberry	FACU	non	0																			T	
Grass Species - percent cover in a 3' x 3' plot																								
Agrostis tenuis	Colonial bentgrass	FAC	non	7	15	T					T		35		80	10								
Alopecurus geniculatus	Water foxtail	OBL	native	0.5				10																
Alopecurus pratensis	Meadow foxtail	FACW	non	2.25					35		10													
Avena sp.	Wild oat	NOL	non	2.5																10		10	15	15
Beckmania syzigachne	Slough grass	OBL	native	0				T																
Bromus carinatus	California brome	NOL	native	2.5		50																		
Holcus lanatus	Velvet grass	FAC	non	5.25		T								10		25					70			
Ventenata dubia	Red brome	NOL	non	6	10		10												100					
Vulpia myuros	Rat-tail fescue	NOL	non	4.75								25								35	30			5
Lolium multiflorum	Annual reygrass	NOL	non	3.5																		50	20	
Bareground (recent spraying)				19.75	35			10	60	75	10	60		20		5		15				25	60	20
Percent native groundcover		mean=	4.7		0	50	0	65	5	15	80	10	35	25	20	60	100	20	0	30	0	0	0	15
Percent total vegetation cover:		Mean=	80.25		65	100	100	90	40	25	90	40	100	80	100	95	100	85	100	100	100	75	40	80

Shrub Willow Wetland (0.2 acres)	
)-3" height	9
3-5'	56
5-12'	11
Total Number of Willows	76

Frazier Creek Wetland Mitigation Bank

Plant Species List - 2005-2010

2009/2010 - Includes all species identified in monitoring plots and seen as walking between plots

Scientific Name	Common Name	Status	Origin	On Plan	2005	2007	2008	2009
Overstory Species								
Cornus stolonifera	Red-osier dogwood	FACW	native					X
Crataegus douglasii	Douglas Hawthorn	FAC	native	X	X	X	X	X
Fraxinus latifolia	Oregon ash	FACW	native	X	X	X	X	X
Pyrus fusca	Pacific Crabapple	FAC	native	X	X	X	X	X
Populus balsamifera	Cotton wood	FAC	native					X
Rhamnus purshiana	Cascara	FAC	native	X	X	X	X	X
Scrub/Shrub Species								
Spiraea douglasii	Douglas spirea	FAC	native	X	X	X	X	X
Rosa nutkana	Nootka rose	FAC	native	X				X
Rosa pisocarpa	Clustered rose	FAC	native	X	X	X	X	X
Salix ssp	Willow	FAC/FACW	native	X	X	X	X	X
Sedges and Rushes								
Carex densa	Dense sedge	OBL	native	X	X	X	X	X
Carex feta	Green-sheath sedge	FACW	native					X
Carex unilateralis	One-sided sedge	FACW	native	X	X	X	X	X
Eleocharis ovata	Ovoid spike rush	OBL	native	X	X	X	X	X
Eleocharis palustris	Creeping spike rush	OBL	native	X	X	X	X	X
Juncus acuminatus	Tapered rush	OBL	native	X	X			X
Juncus bolanderi	Bolander's rush	OBL	native					X
Juncus bufonius	Toad rush	FACW	native		X			
Juncus effusus	Soft rush	FACW	native		X	X	X	
Juncus ensifolius	Swordleaf rush	FACW	native	X	X	X		X
Juncus oxymeris	Pointed rush	FACW	native				X	X
Juncus tenuis	Slender rush	FACW	native	X	X	X	X	X
Herbaceous Species								
Alisma gramineum	Narrow leaf water plantain	OBL	native					X
Alisma plantago aquatica	Water plantain	OBL	native	X	X	X	X	
Antemis cotula	Mayweed chamomile	FACU	non			X	X	X
Bidens frondosa	Leafy beggars-tick	FACW	native		X	X	X	X
Centuarium umbellatum	Common centuray	FAC	non			X	X	X
Centuarium erythrea		NOL					X	
Cerastium arvense	Chickweed	FACU	non		X			X
Cirsium arvense	Canada thistle	FACU	non		X		X	X
Cirsium vulgare	Bull thistle	FACU	non		X			X
Crepis capillaris	Hawksbeard	FACU	non					
Daucus carota	Queen Anne's lace	NOL	non				X	X
Downingia elegans	Showy downingia	OBL	native		X	X	X	
Epilobium densiflorum	Denseflower willowherb	FACW	native			X	X	X
Epilobium watsonii	Watson's willow herb	FACW	native		X	X	X	X
Eryngium petiolatum	Coyote thistle	OBL	native		X	X	X	
Galium aparine	Catchweed	FACU	non					X
Galium trifidum	Small bedstraw	FACW	native					
Geum macrophyllum	Oregon Avens	FACW	native					X
Geranium molle	Dovefoot geranium	NOL	non		X			
Geranium visosissimum	Crane's bill geranium	FACU	non					X
Gnaphalium palustre	Cudweed	FAC	native		X	X	X	
Hypericum formosum	Scouler's St.John's-wort	FAC	native					X
Hypochaeris radicata	Catsear dandelion	FACU	non		X	X	X	X

Lactuca serriola	Prickly lettuce	FACU	non		X	X	X	X
Lemna minor	Common duckweed	OBL	native					X
Lotus corniculata	Bird'sfoot trefoil	FAC	non		X		X	X
Lotus purshianus	Spanish clover	NOL	native					
Lythrum hyssopifolium	Hyssop loosestrife	OBL	non		X		X	X
Lythrum portula	Spatulaleaf loosestrife	NOL	non		X			X
Madia sativa	Coast tarweed	NOL	native				X	X
Melilotus alba	White sweetclover	FACU	non				X	
Mentha arvensis	Field mint	FACW	native		X			
Mentha pulegium	Pennyroyal	OBL	non		X	X	X	X
Mimulus guttatus	Yellow Money-flower	OBL	native					
Myosotis laxa	Small-flowered forget me not	OBL	native					X
Myosotis ssp.					X	X	X	
Navarettia squarosa	Skunkweed	NOL	native				X	X
Oenanthe sarmentosa	Pacific water parsley	OBL	native	X	X			X
Parentucellia viscosa	Yellow parentucellia	FAC	non		X	X	X	X
Peplis portula	Water- purslane	NOL	non					
Plagiobothrys figuratus	Fragrant popcorn flower	FACW	native	X	X			
Plagiobothrys scouleri	Scouler's popcorn flower	FACW	native					X
Polygnum sp.					X	X	X	X
Rorippa curvisiliqua	Western yellowcress	OBL	native			X		X
Rubus discolor	Himalayan blackberry	FACU	non		X	X	X	X
Rumex acetosella	Sheep sorrel	FACU	non				X	
Rumex conglomeratus	Clustered dock	FACW	non				X	X
Rumex crispus	Curly Dock	FAC	non		X	X	X	X
Senecio vulgaris	Common grounsel	FACU	non				X	X
Sonchus asper	Spiny sow thistle	FAC	non					X
Taraxacum officinale	Dandelion	FACU	non		X		X	X
Trifolium pratense	Red clover	FACU	non		X			
Trifolium repens	White clover	FAC	non				X	X
Typha latifolia	Cat tail	OBL	native		X	X		X
Veronica americana	American speedwell	OBL	native					X
Veronica peregrina	Purslane speedwell	OBL	native		X	X		X
Veronica persicaria		NOL				X	X	
Veronica scutella	Skullcap speedwell	OBL	native					
Vicia ssp.	Vetch	NOL	non				X	X
Grass Species								
Agrostis exarata	Spike bentgrass	FACW	native	X	X	X	X	X
Agrostis tenuis	Colonial bentgrass	FAC	non					
Alopecurus geniculatus	Water foxtail	OBL	native		X	X		X
Alopecurus pratensis	Meadow foxtail	FACW	non					X
Avena sp.	Wild oat	NOL	non		X	X	X	X
Beckmania syzigachne	Slough grass	OBL	native	X	X	X	X	X
Bromus sp.	Brome	NOL			X	X		X
Bromus carinatus	California brome	NOL	native					
Deschampsia cespitosa	Tufted hairgrass	FACW	native	X	X	X	X	X
Echinochloa crusgalli	Large barnyard-grass	FACW	non		X	X		X
Glyceria elata	Tall manna grass	FACW	native					X
Glyceria sp.					X			
Holcus lanatus	Velvet grass	FAC	non		X	X		X
Hordeum brachyantherm	Meadow barley	FACW	native	X	X	X	X	X
Lolium multiflorum	Annual ryegrass	NOL	non					X
Lolium sp.	Ryegrass	NOL	non		X	X	X	X
Phalaris arundinacea	Reed canary grass	FACW	non		X	X	X	X
Poa sp.					X			X
Poa trivialis	Rough-stalk bluegrass	FACW	non					X
Ventenata dubia	Red brome	NOL	non					
Vulpia myuros	Rat-tail fescue	NOL	non					

Frazier Creek Wetland Mitigatigation Bank					Transect 1													Transect 2			
Wet Prairie										NOTE: T1-10, T2-5, T2-6, T3-9, T4-9 have been moved to the swale/emergent pl											
June 25, 2010																					
				Ave. Cover	1	2	3	4	5	6	7	8	9	11	12	13		1	2	3	4
Botanical Name	**Common Name**	**Status**	**Origin**	**ea. Species**																	
lerbaceous Species - percent cover																					
lisma gramineum	Narrow leaf water plantain	OBL	native	0.76														10			
Carex densa	Dense sedge	OBL	native	0.11																	
idens frondosa	Leafy beggars-tick	FACW	native	0.11														5			
Carex unilaterils	One-sided sedge	FACW	native	0.43								5									
pilobium densiflorum	Denseflower willow herb	NOL	native	1.63															T	T	
pilobium watsonii	Watson's willow herb	FACW	native	0.11																	
alium trifidum	Small bedstraw	FACW	native	0.11															5		T
actuca serriola	Prickly lettuce	FACU	non	0.00																	
otus corniculata	Bird'sfoot trefoil	FAC	non	0.33																	10
otus purshianus	spanish clover	NOL	native	1.09																	
uncus tenuis	Slender rush	FACW	native	1.30					5	10	5	10									
lentha pulegium	Pennyroyal	OBL	non	1.52									5			5					
lyosotis laxa	small flowered forget me no	OBL	native	0.43														10	T		
arentucellia viscosa	Yellow parentucellia	FAC	non	0.00																	
lagiobothrys scouleri	Scouler's popcorn flower	FACW	native	0.11																	
umex crispus	Curly Dock	FAC	non	0.00							T										
icia ssp.	Vetch	NOL	non	0.00																	
rass Species - percent cover				0.00																	
grostis exarata	Spike bentgrass	FACW	native	8.70	T	T	40	10	10	5	15	5	10	15					10	T	5
grostis tenuis	Colonial bentgrass	FAC	non	0.11																	
eckmania syzigachne	Slough grass	OBL	native	11.30			5		5	30	40	15	15	30	5	40			T	15	5
rome ssp.	Brome	NOL		3.15															85		
eschampsia cespitosa	Tufted hairgrass	FACW	native	13.04	90	90	30	30	5	25			15		25	5					5
lyceria elata	Tall manna grass	FACW	native	0.54														25			
olcus lanatus	Velvet grass	FAC	non	0.00																	
ordeum brachyantherm	Meadow barley	FACW	native	52.39	10	10	20	45	70	30	40	65	55	55	70	50				80	65
oa trivialis	Rough-stalk bluegrass	FACW	non	0.54			5	15	5												
areground				1.33														10		5	10
pen water				0.89														40			
otal % vegetative cover				97.83						100	100	100	100	100	100	100		50	100	95	90
Relative % native canopy cover, includes bareland:		Mean=	92		100	100	95	85	95	100	100	100	95	100	100	95		50	15	95	80
Relative % listed species invasive canopy cover :		Mean=	0.00																		
Listed species includes reed canary grass, Himalayan Blackberry, evergreen blackberry, purple loosestrife, kudzu, Japanese knotweed and poison hemlock.																					
otal Sample points = 46																					

ɔt data results. T3-6 and T5-1 were removed.

7	8	9	10	11	12	13		1	2	3	4	5	7	8	10	11	12	13		1	2	3	4	5	6	7	8	10e	10w	11
								Transect 3												Transect 4										
																				25										
								5																						
																				T										
			5					5						5																
10					T			T							10		5	5			5	5							25	10
								5																						
																	5													
											50				T															
T										T		15	5		5														5	
Y																				10						10	10	20		10
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	5	10	5	5	50	5		T	10	10		10	40	10	10	5	5	10			5	10	20	5	T	5	10	5	10	10
												5																		
20	5	40	5			5								5	25			10		T		10	10	5	50	45	35	25		15
																		10			50	T								
						70		40	45	T			5	10	5	5				25	5	20		5			15	5	5	10
																	T													
70	90	50	85	95	50	20		35	45	90	50	70	50	70	45	90	85	65		20	30	55	70	85	40	40	30	45	55	40
								10												15					10					
100	100	100	100	100	100	100		90	100	100	100	100	100	100	100	100	100	100		85	100	100	100	100	90	100	100	100	100	100
100	100	100	100	100	100	100		90	100	100	100	95	100	100	100	100	95	90		75	50	100	100	100	90	90	90	80	100	90

Frazier Creek Wetland Mitigation Bank
Hedge Row Plot Data - June 25, 2010

Common Name	Botanical Name	Status	Origin	Cover	1	2	3	4	6	7	8	9	10	12	13
Tree Species - % aerial coverage within 10' length of hedgerow unless noted															
Fraxinus latifolia	Oregon ash	FACW	native	0.91					1 tree	5					5
Rhamnus purshiana	Cascara	FAC	native	0.45											5
Salix ssp.	Willow ssp.	FACW	native	20.00		40	30	15		20	5	5	15	35	55
Scrub/Shrub Species -% aerial coverage within 10' length of hedgerow															
Rosa nutkana	Nootka rose	FAC	native	34.09	50	25	35	35	20	30	45	45	45	25	20
Rosa pisocarpa	Clustered rose	FAC	native	34.09	50	30	35	40	20	35	40	35	40	40	10
Total Cover by Trees and Shurbs					100	95	100	90	40	90	90	85	100	100	95
Average % Cover Trees and shrubs:		89.5													
Average row width (feet)	mean	10.5			10	15	8	10	8	12	7	9	12	15	10
Average shrub height (feet)	mean	5.6			5	5.5	6	5	5	5.5	5	5	6	8	6
Average tree height (feet)	mean	15.5				20	12	10	6	10	7	5	9	25	20
* 2 plots have been removed from monitoring. They are on the rock berms and are sprayed yearly.															
Herbaceous Species - percent cover															
Beckmania syzigachne	Slough grass	OBL	native	0.00	T										
Carex densa	Dense sedge	OBL	native	3.64				5	20	5	5	5			
Carex unilateralis	One-sided sedge	FACW	native	0.45				T		5		T			
Eleocharis palustris	Creeping spike rush	OBL	native	0.00	T	T									
Epilobium watsonii	Watson's willow herb	FACW	native	0.00	T										
Myosotis laxa	Small-flowered forget me	OBL	native	0.91				5	5						
Rubis discolor	Himalayan blackberry	FACU	non	0.00			T								T
Rumex crispus	Cury dock	FAC	non	0.00	T				T						
Veronica scutella	Skullcap speedwell	OBL	native	0.00			T								
Vicia ssp.	Vetch	NOL	non	0.45		T						5		T	
Grass Species - percent cover															
	Colonial bentgrass														
Beckmania syzigachne	Slough grass	OBL	native	0.00	T	T	T	T							
Bromus sp.	brome	NOL		0.00	T										
Deschampsia cespitosa	Tufted hairgrass	FACW	native	0.45		5	T						T		
Hordeum brachyantherm	Meadow barley	FACW	native	4.55		T			35	T	5	5	T	T	5
Lolium multiflorum	Annual reygrass	NOL	non	0.00											T
Poa ssp.	Bluegrass	FAC	non	0.00	T										
Total Cover by herbaceous and grass species:		Mean=	10.5		0	5	0	10	60	10	10	15	0	0	5
Percentage of the herbaceous and grass species that is native			Mean =	81.7%	57%	100%	75%	100%	100%	50%	100%	67%	100%	50%	100%
Relative % listed species invasive canopy cover :		Mean=	**0.00**		0	0	0	0	0	0	0	0	0	0	0
Listed species includes reed canary grass, Himalayan Blackberry, evergreen blackberry, purple loosestrife, kudzu, Japanese knotweed and poison hemlock.															

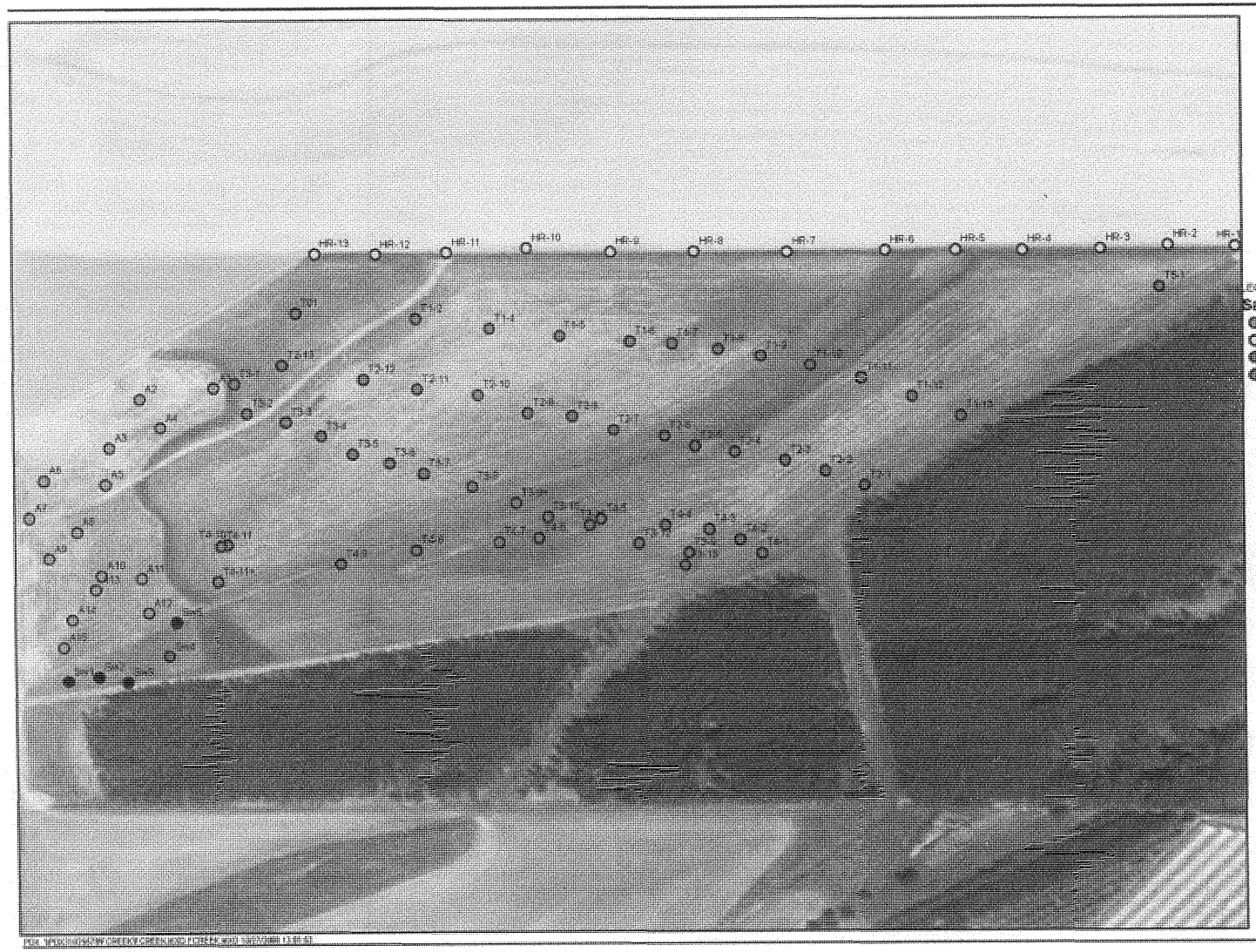

Figure 1
Frazier Creek Wetland Monitoring

LEGEND
Sample Points
- ASH
- HEDGEROW
- SWALE
- TRANSECTS

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

N

0 100 200 400
Feet

CH2MHILL

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 southwest 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

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

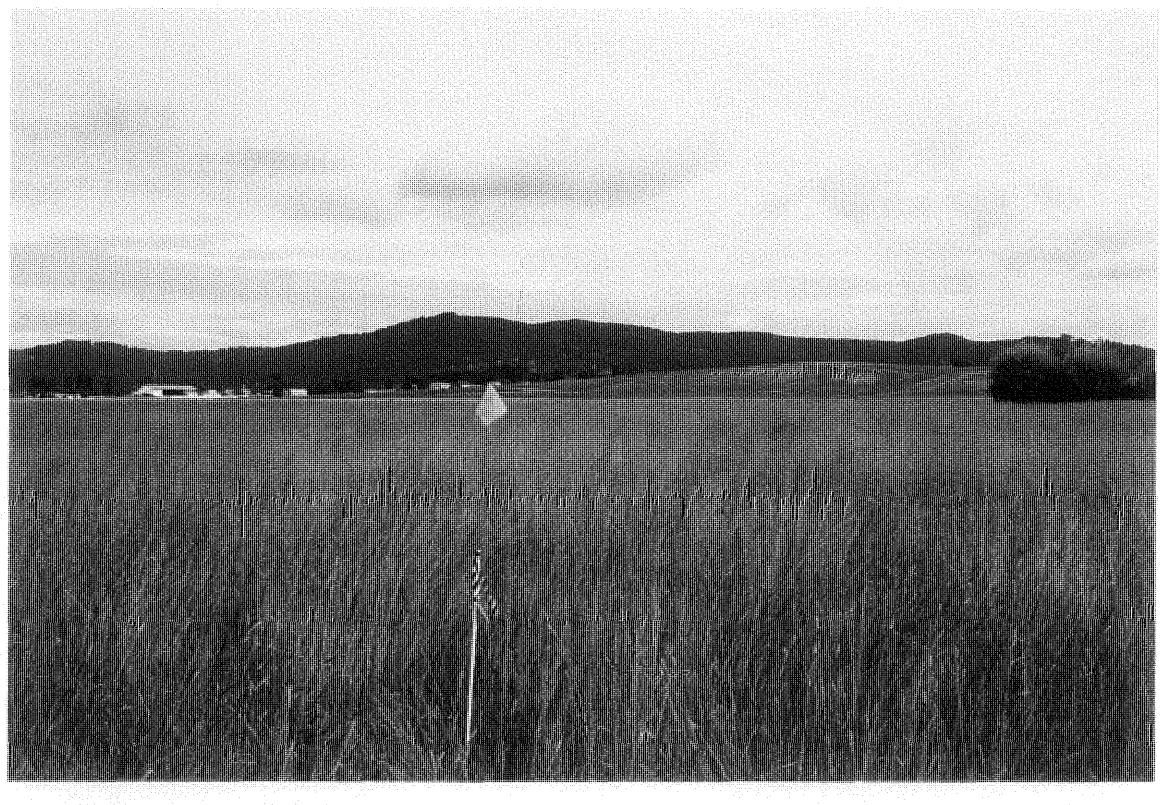

Photo 14 looking east from T3 8

Photo 15 looking northwest 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