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: June 21, 2019 Monitoring Year 16
Date Removal-Fill Activity Completed:
Date mitigation was completed Grading: 2002 Planting: 2004
Report submitted by: Oregon Wetlands LLC

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	Yes	
6.	Ground Cover	Yes	
7.	Non-Native Species	Yes	
8.	Wildlife Habitat	Yes	

Remedial work recommended Yes No X
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
Final Monitoring Report? Yes X No
Requesting release or partial release of bond/credits Yes X No

TABLE OF CONTENTS

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 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 12.63 credits. All of the 12.63 credits have been released.

2.0 WORK SUMMARY

The focus of 2019 work was to eliminate the few remaining non-native species, foster the increased diversity, and monitor the site for any unforeseen issues. The forbs dominated areas provided the main source of maintenance work. We utilized one of our contract backpack crews again this year to start increasing their workload as we move towards the long-term management phases of our banks and get them geared up for new projects. They were able to cover the site in less time than expected and had them work on invasives around the borders of site, and Poplar plantation to finish out the day. The forbs, sedges and rushes established well as evident on the site visits, monitoring photos, and in the monitoring data. The canopies of the willow and ash areas continued to expand, further reducing maintenance work.

The remainder of the site was walked several times to spot treat mainly non-native grasses. Several areas were flagged and patch treated with a broadleaf specific herbicide where spot spraying was not practical or advantageous. Mowing this year was limited to maintenance trails prior to the annual site visit. After seven years of hard work on the site, its well positioned for long term sustainability.

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 12, 2019 by Ray Fiori. Complete monitoring results are included as Attachment 1 and the Monitoring Point Location Map is included as Attachment 2, updated with the 2009 imagery. Fifty-five monitoring plots were examined this year, which is reduction from the previous eighty-nine plots. As discussed with the agencies, the number of plots in the wet prairie and ash habitats was excessive for the acreage. In 2016 the even numbered transects were monitored in the wet prairie, with even numbered plots in the ash forest, which will be continued for the remainder of the monitoring period. The monitoring was conducted per approved Bank protocols, with only minor differences as have been noted previously. Based on comments received from the regulatory agencies following the 2012 site visit, additional monitoring was completed in 2013, 2014, 2015, 2016, 2017, 2018 and 2019 to address several provisions within the extensive list of performance measures that had gone previously unnoticed/monitored.

Under the structural diversity component, section b) states multi-layered canopies must be present in hedgerow and northern perimeter of wetland forest (also referred to as transitional shrub). This measure has been previously monitored in the hedgerows, but neglected in northern perimeter of wetland forest. Data was collected in 2013, 2014, 2015, 2016, 2017, 2018 and 2019 to document species composition as well as average height for tree species, average width for shrub species, and aerial coverage.

Under the survivorship of trees and shrubs, section a) survivorship of trees and shrubs should result in planting densities within 5% recommended in the planting plan. The planting plan for hedgerow planting recommended 985 plants so the survivorship target is 936-985 plants. Aerial coverage is utilized in the monitoring due to extensive growth. The planting plan for the forested wetland called for planting of 1,050 Ash and no shrubs for a survivorship target of 1,000-1,050 Ash trees, or 293 stems/ac. The planting plan for the transitional shrub area (also referred to as Northern edge of wetland forest) called for 350 plants for a survivorship target of 333-350 plants. This habitat is very mature and also has a diversity component, so species composition, average height of trees, average width of shrubs, and estimate of aerial coverage was utilized in monitoring. The planting plan for the willow area called for planting 275 willows, so the survivorship target is 260-275 plants. Since this area is small, and total plant counts were used in the past that protocol was followed in 2018 with no changes observed for 2019, with continued expansion of aerial coverage.

Under the survivorship of ground cover, section c) There should be 50% ground cover within 2 years in the shrub and forest habitat. At this point the hedgerow and transitional shrub areas are closed canopy systems, with organic leaf litter being the dominant ground cover. The ash forest has 10 monitoring points to document ground cover. Two plots were established in the willow area to quantify ground cover. From the center of the area in 2012, 2 pin flags were thrown, one in each direction to establish random plots. They are illustrated on the monitoring map, and data was collected. The herbaceous layer will slowly fade away over time as the canopies close in on these habitats.

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 and has been followed since. The protocol is as follows: the species of shrubs and trees, approximate size, row width and estimate of aerial cover are noted within a 10'length of hedgerow starting at the plot marker and extending 10' to the west within the hedgerow. (Previous Report)

The hedge row tree and shrub layer accounted for approximately 99.1% of the cover. The hedgerow shrub/tree vegetation averaged 15.7 feet in width. The average high shrub/tree height was about 25.5 feet and average shrub height was 8.5 feet. The hedge row continues to thrive and function as planned.

80.95% of the herbaceous and grass species within the hedge row are native. A small amount Curly dock was present where the canopy in not completely closed. This is now a closed canopy system, so herbaceous species are only present on the borders where there is some light penetration, but mostly devoid of herbaceous cover within the original monitoring points.

4.2 Willow Planting Southwest Portion of Bank

Additional willow cuttings were installed in early spring 2012, with good survival as evident on the annual site visit. Non-native vegetation has also been eliminated from the understory, providing space for additional native woody plants to thrive. During the time of monitoring, 141 native woody plants were present, dominated by willows with a few native recruits. As indicated in the instrument, the primary objectives of this area was to provide structural diversity and wildlife cover, both of which are being accomplished.

The herbaceous layer is dominated by leaf litter among the originally planted willows, as these plants are quite large and this should be expected as succession moves forward. After extensive non-native control this year, the more open areas are mostly bare with remnant populations of dense sedge (Carex densa), tufted hairgrass (Deschampsia cespitosa), and meadow barley (Hordeum brachyantherum), which were avoided during spot spraying. Although it shouldn't be expected to prosper in the future as the woody species expand, the understory was planted with a native prairie mix to occupy space while the overstory

is establishing. Additional willow cuttings will be installed in late winter to expedite canopy closure. (Previous Report, 2012)

To quantify the herbaceous layer in the willow area, 2 monitoring plots were established, with the same monitoring protocol as the herbaceous layer in the ash forest. The herbaceous layer is dominated by native species which represent 90% of remaining vegetation, with bareground expanding with canopy closure. The total plant count for this area was 290 live plants, which provided 95% aerial coverage with 4 species present.

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 continue to be followed. Twenty plots are 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. (Previous Report)

Starting in 2016, only the even numbered plots will be sampled in the ash forest. In 2019, there were 11.4 trees per plot, which represents 326 tress/acre. There are abundant native Ash seedlings, and with survivorship standards already met, the woody component is not of concern. The herbaceous layer is 72% native vegetation cover, 13.5% non-native cover, 14% bare ground and no non-native invasives. Extensive work has gone into eliminating non-native species the last 7 years which has led to increased native cover, increased tree growth, and decreased bare ground. As the trees continue to grow and the canopy begins to close, herbaceous cover will ultimately decrease in the long-term.

4.4 Wet Prairie

Grass cover versus forb cover in the wet prairie remains high at 88.4% grass, but this was reduced from 93.4% grass cover in 2011. Meadow barley remains the most dominant species at 46.63%. The next most abundant species are tufted hairgrass at 22.22%, spike bentgrass at 13.91 % and slough grass at 3.58%. Pennyroyal, the most abundant non-native in 2011 was reduced from 1.63% cover to 0.33%. In order to increase diversity, a portion of the prairie was burned, and planted to a diversity of native forbs. (Previous Report, 2012)

Starting in 2016, only the even number transects will be monitored in the wet prairie. Twenty-two plots were monitored located along transects two and four. There are approximately 1.6 sample plots per acre in the wet prairie.

Total native cover is 88.18%, with no non-native invasives. This year true grass cover versus forbs cover in the wet prairie was 54.32% grass and 42.95% forbs/sedge/rush. Tufted hairgrass is the most dominant native grass species at 30%, followed by Spike bentgrass at 9.32%, and Slough grass at 7.27%. Of the native forbs/sedge/rush species, Nelson's checkermallow (8.86%) and One-sided sedge (6.14%) are the most dominant, followed by Dense sedge and Slender rush both represent 3.64%. Kickxia again seemed to thrive with the below average precipitation, representing 6.36% cover, which corresponded to small amounts of cover in many plots. Although not problematic, this non-native annual seems to thrive in voids left from prolonged inundation in exceptionally wet years, or warm dry years when it germinates months earlier than normal.

4.5 Swale and Emergent

The swale and emergent community remain diverse with 19 native fac or wetter species. The biggest changes from 2011 are a slight shift in species dominance, coupled with a significant reduction in pennyroyal. Creeping spike rush and pointed rush were the most dominant species in 2012, while pennyroyal was reduced to 5.5% cover. Pennyroyal was subsequently eliminated from these habitats by then end of the growing season, but conditions were not advantageous for effective control until after the monitoring period. (Previous Report)

The swale and emergent community remain diverse with 19 native fac or wetter species. Native cover is 98.5%, with only 1.5% non-native species, and 0% non-native invasives.

4.6 Transitional Shrub

The transitional shrub zone on the north and east side of the ash forest continues to do remarkable. It has excellent coverage and variety of shrub and trees species. The shrub coverage averages 7-10 feet in height and the tree height averages 12-25 feet in a row 22 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). One Himalayan blackberry was encountered, which was removed. There is little herbaceous layer due to the full coverage by the shrub and trees. Species noted includes: Slough sedge, Dense sedge, curly dock, Fringe cup, and tufted hairgrass. (Previous Report)

This area was formally monitored to quantify habitat conditions, and species diversity. There is four species of native trees and four species of native shrubs present providing multilayered canopies, excellent diversity, and 95% aerial 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 Satisfied*

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. Five species of native trees were identified during the monitoring, including Oregon ash, Douglas hawthorn, cascara, cottonwood, and western crabapple.
b. Five native shrubs, Nootka rose, cluster rose, Douglas spirea, red-osier dogwood and willow are present within the hedgerows and transitional shrub zone.
c. Within the emergent zone, four species of Carex, two species of Juncus, *Deschampsia cespitosa*, *Hordeum brachyantherum*, and six native forbs are present. Overall, 19 native species were identified in the groundcover within the emergent wetland. In addition, there is one more native rush of a different genus (Eleocharis palustris).

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 satisfied*

a. Tree and shrub survivorship along with natural propagation within the hedgerows, willow area, transitional shrub, and ash forest surpass the 100% survivorship standard.
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.

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*

a & b. Within the emergent/swale community, 98.5% of the cover is native vegetation and within the wet prairie zone, there is 88.18% native vegetation.
c. The hedge row has 95.9% native aerial cover, with 80.95% of the limited herbaceous layer native species. The 0.2-acre shrub/willow wetland is approximately 95% native aerial cover, and 95% of the herbaceous cover is native. The transitional shrub area is 95% native aerial cover; with no herbaceous layer, due to canopy closure The Ash forest has 72% native herbaceous cover, which is decreasing with canopy closure.

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. No Ryegrass present in monitoring plots
b. & c. The only two zero tolerance species noted at all within the Bank are trace amounts of Himalayan blackberry and reed canary grass, both of which were treated in this spring.

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. Photos were taken on June 12, 2019 and the location and photo direction is listed on each photo.

7.0 SUGGESTED REMEDIAL

At this point native species are well established and thriving in all habitats.

8.0 CREDIT SALES SUMMARY

As of May 2015 all 12.63 credits have been released and sold. All credit sales are documented in table 1.

Table 1: Credit Sales Summary:

DATE	*NAME*	*DSL*	*CORP*	*ADDED*	*SOLD*	*BALANCE*
04/02/2003	CORPS/DSL INITIAL RELEASE	Permit Number		3.92		3.92
04/22/2003	Cascade View Developments LLC	26456			0.03	3.89
07/08/2003	City of Corvallis	30408			0.42	3.47
07/24/2003	Norway Development	5418			0.1	3.37
01/16/2004	Timberhill Corp	24132-RF			0.26	3.11
05/26/2004	DSL Revolving Fund				0.17	2.94
06/02/2004	Timberhill Corp	30514-FP	2000-0320		1.28	1.66
08/12/2004	CREDIT RELEASE 2			1.96		3.62
08/27/2004	Jim Shaver	32347-GA	2004-0326		0.06	3.56
07/13/2004	Rodger Nyquist		2003-0053		0.03	3.53
09/06/2004	Ronald Neilson				0.02	3.51
09/20/2004	Clearwater II LLC	32861-FP			0.19	3.32
11/18/2004	Thomas Fox Properties	32863-FP			0.77	2.55
11/30/2004	Sammi Molvi	32811-FP			0.28	2.27
12/17/2004	Development by Design	33260-FP			0.14	2.13
04/11/2005	Bill Boyd	33384			1.14	0.99
06/29/2005	J. Conser & Sons	33868-RF			0.43	0.56
08/26/2005	Tuscany Estates	34542-RF			0.47	0.09
03/24/2006	ODOT Philomath Couplet	34148-GA			0.06	0.03
05/17/2012	CREDIT RELEASE 3			2.00		2.03
04/16/2013	CREDIT RELEASE 4			2.00		4.03
05/20/2013	Conser Design	FP-15070			0.91	3.12
11/08/2013	Corvallis Memory Facility	54649	NWP 2013-237		0.01	3.11
5/16/14	CREDIT RELEASE 5			2.75		5.86
5/20/2014	City of Albany	55393-RF	NWP 2014-31		0.167	5.693
7/28/2014	Casco Communications	55978	2014-127		1.28	4.413
6/1/2015	Sno-Temp	DSL # 57229-RF	NWP-2008-694-1		4.41	0

9.0 CONCLUSION

The Frazier Creek Wetland Mitigation Bank is performing well and on track to be a highly successful mitigation bank. Non-native invasive species have been virtually eliminated, allowing native species to flourish. Additional diversity was added to the prairie in 2012 and far exceeds performance standards. The greatest deficiencies in the past have been low stem counts coupled with a weedy understory in the willow area, an understory dominated by non-native species in the designated ash forest, and increasing amounts of pennyroyal throughout the site, all of which have been rectified. As evident during the annual site visits and documented in the monitoring results, the site has evolved quickly, back on a highly successful trajectory. Management efforts over the last seven years, have greatly increased diversity, decreased non-native cover, increased canopy closure and set the site up well for long term sustainability with a significant contribution to local conservation efforts on adjacent properties. All credits were sold in 2015, making this the final monitoring report.

Attachment 1 Sample Plot Monitoring Data

Frazier Creek Wetland Mitigatigation Bank				Transect 2												Transect 4										
Wet Prairie																										
June 12, 2019																										
Species Observed				**1**	**2**	**3**	**4**	**7**	**8**	**9**	**10**	**11**	**12**	**13**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10e**	**10w**	**11**
Botanical Name	**Common Name**	**Status**	**Origin**																							
Forbs/Sedge/Rush Species - percent cover																										
Alisma triviale	Northern water plantain	OBL	native																					5		
Bidens frondosa	Leafy beggars-tick	FACW	native																		5					
Cammasia leichtlinii	Large camss	FACW	native								5	5														
Carex densa	Dense sedge	OBL	native		10	20		10		5	15	5					15									
Carex feta	Green-sheath sedge	FACW	native																							
Carex stipata	Saw-beaked sedge	FACW	native													25						30	30			5
Carex unilaterils	One-sided sedge	FACW	native	15	10			10		10	5					50						10	20	5		
Centuarium umbellatum	Common centuray	FAC	non																						5	
Eleocharis palustris	Creeping spike rush	OBL	native	20																						
Epilobium ciliatum	Fringed willoweed	FACW	native											5				5								
Epilobium densiflorum	Denseflower willow herb	FACW	native									5														
Eriophyllum lanatum	Oregon sunshine	NOL	native																							
Galium trifidum	Small bedstraw	FACW	native									5	15													
Gnaphalium palustre	Cudweed	FAC	native																							
Hypochaeris radicata	Catsear dandelion	FACU	non																							
Kickxia elatine	Sharp-point fluellin	UPL	non		10	20	15	5	5	10	5		5					15	10	15	10				10	5
Lotus purshianus	spanish clover	NOL	native																							
Juncus acuminatus	Tapered rush	OBL	native																							
Juncus tenuis	Slender rush	FACW	native					15	15	5	5	5	20				5								10	
Mentha pulegium	Pennyroyal	OBL	non					5	5												5					5
Mimulus guttatus	Yellow Money-flower	OBL	native																							
Myosotis laxa	small flowered forget me no	OBL	native															5	5					5		
Navarettia squarosa	Skunkweed	FACU	native																						5	
Plagiobothrys figuratus	Fragrant popcorn flower	FACW	native									5														
Plagiobothrys scouleri	Scouler's popcorn flower	FACW	native								10	10														
Polygonum amphibium	Smartweed	OBL	native																							
Prunella vulgaris	Common selfheal	FACU	native						5	5	5															
Sonchus asper	Spiny sow thistle	FAC	non																							
Sidalcea nelsoniana	Nelson's checkermallow	FACW	native					25	35	25	40	50														20
Rorippa curvisiliqua	Western yellowcress	OBL	native							5				30			5							10		5
Rumex conglomeratus	Clustered dock	FACW	non																							
Rumex crispus	Curly Dock	FAC	non																							
Veronica peregrina	Purslane speedwell	OBL	native																5					5		
Grass Species - percent cover																										
Agrostis exarata	Spike bentgrass	FACW	native		10	30		10	20	15	10		10	10		5		5	35		10	20	15			
Alopecurus geniculatus	Water foxtail	OBL	native	45																						
Beckmania syzigachne	Slough grass	OBL	native	20		10								5							55	40	30			
Bromus carinatus	California brome	NOL	native																							
Bromus hordeaceus	Soft chess	FACU	non						5			5					5									
Deschampsia cespitosa	Tufted hairgrass	FACW	native		50	10	75	10	10	10			25	40		15	45	55	35	85	15			60	60	60
Deschampsia danthonioides	Annual hairgrass	FACW-	native																							
Glyceria elata	Tall manna grass	FACW	native																							
Holcus lanatus	Velvet grass	FAC	non																							
Hordeum brachyantherm	Meadow barley	FACW	native		10	10		10					15			5	25	5					5		5	
Leersia oryzoides	Rice cut-grass	OBL	native																							
Poa trivialis	Rough-stalk bluegrass	FACW	non																							
Vulpia myuros	Rat-tail fescue	NOL	non									5	10												5	
Bareground due to Organic litter		Mean=	2.73				10			10				10				10	10					10		
Total % vegetative cover		Mean=	97.27	100	100	100	90	100	100	90	100	100	100	90		100	100	90	90	100	100	100	100	90	100	100
Relative % native canopy cover		Mean=	88.18	100	90	80	75	90	85	80	95	90	85	90	0	100	95	75	80	85	85	100	100	90	80	90
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.																										
Total Sample points = 22																										

Frazier Creek Wetland Mitigation Bank														
Ash Plot Data and Willow Area - June 12, 2019														
					2	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**
Number of Ash Trees - stem count within 20' radius.					13	8	18	18	7	9	9	8	12	12
Number of non-saplings		6.71			12	8	9	12	6	8	9	8	12	10
Average height in feet (not including new saplings)					9	13	12	10	8	13	15	16	12	9
Average of all trees per plot =		11.4												
Average non-saplings* per plot =		9.4												
Average height of non-saplings per plot =		11.7												
*trees greater than 3' in height														
Number of non-sapling trees/ac		326.0												
Herbaceous Species - percent cover in 3' x 3' plot (center of 20' radius plots)														
Bidens frondosa	Leafy beggars-tick	FACW	native	0.00										
Carex densa	Dense sedge	OBL	native	6.50		15		30	20					
Carex feta	Green-sheath sedge	FACW	native	6.00			20	30			10			
Carex obnupta	Slough sedge	OBL	native	0.00										
Carex unilaterils	One-sided sedge	FACW	native	9.50		25	20	20			30			
Centuarium umbellatum	Common centuray	FAC	non	0.50					5					
Epilobium watsonii	Watson's willow herb	FACW	native	0.50	5									
Geum macrophyllum	Oregon Avens	FACW	native	0.00										
Geranium visosissimum	Crane's bill geranium	FACU	non	8.00	5				10		5	25	10	25
Hypochaeris radicata	catsear dandelion	FACU	non	0.00										
Juncus bufonius	Toad rush	FACW	native	0.00										
Juncus tenuis	Slender rush	FACW	native	0.00										
Kickxia elatine	Sharp-point fluellin	UPL	non	0.00										
Lythrum portula	Spatulaleaf loosestrife	NOL	non	0.00										
Mentha pulegium	Pennyroyal	OBL	non	0.00										
Myosotis laxa	small flowered forget m	OBL	native	0.00										
Navarettia squarosa	Skunkweed	FACU	native	0.00										
Peplis portula	Water- purslane	NOL	non	0.00										
Plagiobothrys figuratus	Fragrant popcorn flowe	FACW	native	0.00										
Polygonum amphibium	Smartweed	OBL	native	0.00										
Rorippa curvisiliqua	Western yellowcress	OBL	native	0.00										
Rubus discolor	Himalayan blackberry	FACU	non	0.00										
Sidalcea nelsoniana	Nelson's checkermallov	FACW	native	9.00			20		20		25	25		
Vicia hirsuta	Tiny vetch	NOL	Non	2.50	20									5
Grass Species - percent cover in a 3' x 3' plot														
Agrostis exarata	Spike bentgrass	FACW	native	0.00										
Alopecurus geniculatus	Water foxtail	OBL	native	0.00										
Alopecurus pratensis	Meadow foxtail	FACW	non	0.00										
Avena sp.	Wild oat	NOL	non	0.00										
Beckmania syzigachne	Slough grass	OBL	native	0.00										
Bromus carinatus	California brome	NOL	native	0.00										
Deschampsia cespitosa	Tufted hairgrass	FACW	native	0.00										
Deschampsia danthonioides	Annual hairgrass	FACW-	native	0.00										
Deschampsia elongata	Slender hairgrass	FACW	native	0.00										
Glyceria occidentalis	Western mannagrass	OBL	native	0.00										
Holcus lanatus	Velvet grass	FAC	non	1.00						10				
Hordeum brachyantherm	Meadow barley	FACW	native	40.50	50	60	30		10	45	25	25	90	70
Lolium multiflorum	Annual reygrass	NOL	non	0.00										
Panicum capillare	Common witchgrass	FACU	native	0.00										
Poa trivialis	Rough-stalk bluegrass	FACW	non	2.00						15	5			
Ventenata dubia	Red brome	NOL	non	0.00										
Vulpia myuros	Rat-tail fescue	NOL	non	0.00										
Bareground due to: Canopy closure:		mean=	14		20		10	20	35	30		25		
Percent native groundcover		mean=	72.0		55	100	90	80	50	45	90	50	90	70
Percent total vegetation cover:		Mean=	86.00		80	100	90	80	65	70	100	75	100	100

Frazier Creek Wetland Mitigatigation Bank

Swale/Emergent Plot Data

June 12, 2019

Species Observed				Ave.										
				Cover	1	2	3	4	5	T1-10	T2-5	T2-6	T3-9	T4-9
Botanical Name	**Common Name**	**Status**	**Origin**	**ea. Species**										
Overstory Species														
Fraxinus latifolia	Oregon ash	FACW	native											
Herbaceous Species - percent cover														
Alisma gramineum	Narrow leaf water plaintain	OBL	native	7.0	20	10	10	5	25					
Bidens frondosa	Leafy beggars-tick	FACW	native	0.0										
Carex densa	Dense sedge	OBL	native	1.0								10		
Carex feta	Green-sheath sedge	FACW	native	7.5							20			55
Carex obnupta	Slough sedge	OBL	native	1.5							15			
Carex unilaterils	One-sided sedge	FACW	native	4.5						20	20	5		
Cammasia leichtlinii	Large camss	FACW	native	0.0										
Centuarium umbellatum	Common centuray	FAC	non	0.0										
Eleocharis palustris	Creeping spike rush	OBL	native	19.5	40	15	35	30	45				30	
Epilobium densiflorum	Denseflower willowherb	FACW	native	0.0										
Epilobium watsonii	Watson's willow herb	FACW	native	0.0										
Eriophyllum lanatum	Oregon sunshine	NOL	native	0.0										
Juncus acuminatus	Tapered rush	OBL	native	9.5		15	10	25		25			20	
Juncus effusus	Soft rush	FACW	native	0.0										
Juncus oxymeris	Pointed rush	FACW	native	11.0		15	30	25		25				15
Juncus tenuis	Slender rush	FACW	native	0.0										
Lemna minor	Common duckweed	OBL	native	1.0									10	
Lythrum portula	Spatulaleaf loosestrife	NOL	non	0.0										
Mentha pulegium	Pennyroyal	OBL	non	0.5					5					
Mimulus guttatus	Yellow Money-flower	OBL	native	0.5								5		
Myosotis laxa	small flowered forget me n	OBL	native	4.5		20	5	5		10				5
Oenanthe sarmentosa	Pacific water parsley	OBL	native	0.0										
Parentucellia viscosa	Yellow parentucellia	FAC	non	0.0										
Plagiobothrys figuratus	Fragrant popcorn flower	FACW	native	0.0										
Plagiobothrys scouleri	Scouler's popcorn flower	FACW	native	0.0										
Potenilla gracilis	Slender cinquefoil	FAC	native	0.0										
Prunella vulgaris	Common selfheal	FACU	native	0.0										
Rorippa curvisiliqua	Western yellowcress	OBL	native	1.0						5		5		
Rumex conglomeratus	Clustered dock	FACW	non	0.0										
Rumex crispus	Curly Dock	FAC	non	0.0										
Sidalcea nelsoniana	Nelson's checkermallow	FACW	native	5.5								55		
Typha latifolia	Cat tail	OBL	native	3.0		15				15				
Veronica scutella	Skullcap speedwell	OBL	native	0										
Grass Species - percent cover														
Agrostis exarata	Spike bentgrass	FACW	native	1.0										10
Alopecurus geniculatus	Water foxtail	OBL	native	0.0										
Beckmania syzigachne	Slough grass	OBL	native	8.0	30	10	10	10	10				10	
Deschampsia cespitosa	Tufted hairgrass	FACW	native	6.0							35	15		10
Glyceria elata	Tall manna grass	FACW	native	4.5	10				20				15	
Hordeum brachyantherm	Meadow barley	FACW	native	2.0							10	5		5
Poa trivialis	Rough-stalk bluegrass	FACW	non	0.0										
Phalaris arundinacea	Reed canary grass	FACW	Invasive	0.0										
Vulpia myuros	Rat-tail fescue	NOL	non	0.0										
Bareground:		Mean=	0.0											
Open Water:		Mean=	1.5										15	
Relative % listed species invasive canopy cover :		Mean=	0.0		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.														
Number of native species = 19														
Species of Sedge = 4														
Species of Rush = 3														
Species of Native Forbs = 6														
% native canopy cover (Excludes bare substrate):		Mean=	98.50		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.0	100.0

Frazier Creek Wetland Mitigation Bank

Shrub Willow Wetland (0.2 acres) - June 12, 2019

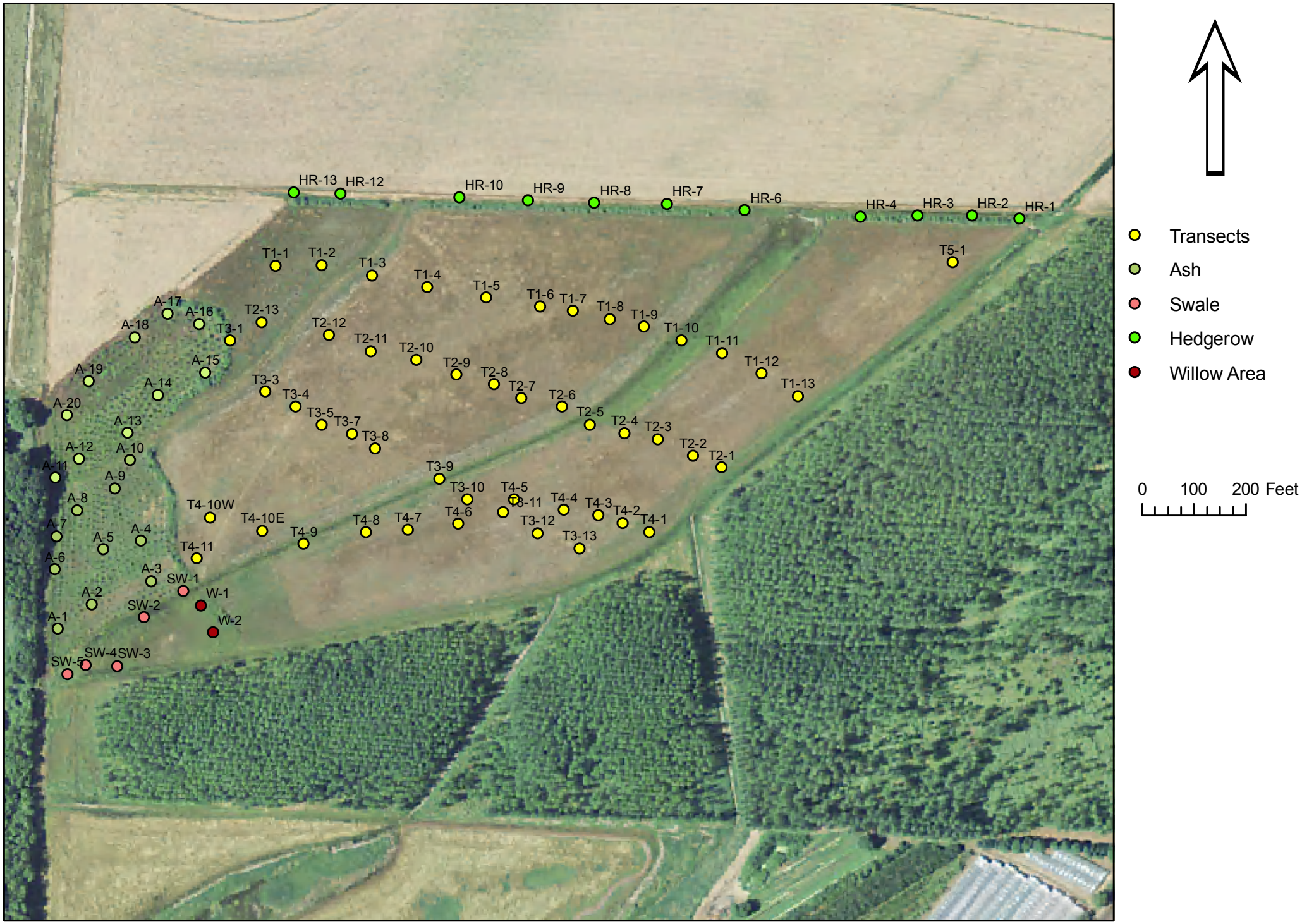
0-5' height	12					
5-12'	271					
13'+	13					
Total Willows found	**296**					
Cottonwood	2					
Hawthorn	2					
Ash	2					
Total Trees/Shrubs	**302**					
Aeriel Coverage	**95%**					
Herbaceous/Grass Species - percent cover in 3' x 3' plot				**AVG**	**1**	**2**
Agrostis exarata	Spike bentgrass	FACW	native	0.0		
Alopecurus geniculatus	Water foxtail	OBL	native	0.0		
Beckmania syzigachne	Slough grass	OBL	native	0.0		
Bromus hordeaceus	Soft chess	FACU	non	0.0		
Carex obnupta	Slough sedge	OBL	native	10.0		20
Centuarium umbellatum	Common centuray	FAC	non	0.0		
Epilobium ciliatum	Fringed willoweed	FACW	native	0.0		
Geranium visosissimum	Crane's bill geranium	FACU	non	2.5	5	
Juncus bufonius	Toad rush	FACW	native	0.0		
Kickxia elatine	Sharp-point fluellin	UPL	non	0.0		
Navarettia squarosa	Skunkweed	FACU	native	0.0		
Parentucellia viscosa	Yellow parentucellia	FAC	non	0.0		
Plagiobothrys figuratus	Fragrant popcorn flowe	FACW	native	0.0		
Plagiobothrys scouleri	Scouler's popcorn flowe	FACW	native	0.0		
Poa trivialis	Rough-stalk bluegrass	FACW	non	0.0		
Sidalcea nelsoniana	Nelson's checkermallov	FACW	native	35.0	40	30
Vulpia myuros	Rat-tail fescue	NOL	non	0.0		
Vicia hirsuta	Tiny vetch	NOL	Non	2.5	5	
Bareground Due To: Canopy closure					50	50
Percent native groundcover		Mean=	45.0		40	50
Percent total vegetation cover:		Mean=	50.0		50	50
Northern Perimeter of Forested wetland						
Overstory species present		**Average Height(ft)**				
Crataegus douglasii	Douglas Hawthorn	10				
Fraxinus latifolia	Oregon ash	17				
Populus trichocarpa	Black cottonwood	11				
Salix lasiandra	Pacific willow	22				
	Mean:	15				
Aeriel Coverage	**40%**					
Shrub species present		**Average Width (ft)**				
Cornus sericea	Red osier dogwood	6				
Douglas spirea	Spiraea douglasii	10				
Rosa nutkana	Nootka rose	30				
Rosa pisocarpa	Clustered rose	30				
	Mean:	19				
Aeriel Coverage	**55%**					

Frazier Creek Wetland Mitigation Bank
Hedge Row Plot Data - June 12, 2019

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	2.27					15	10					
Rhamnus purshiana	Cascara	FAC	native	0.45											5
Salix ssp.	Willow ssp.	FACW	native	30.45	5	55	40	50		30	15	5	20	50	65
Scrub/Shrub Species -% aerial coverage within 10' length of hedgerow															
Rosa nutkana	Nootka rose	FAC	native	34.55	50	20	35	30	40	30	40	50	40	25	20
Rosa pisocarpa	Clustered rose	FAC	native	31.36	45	20	25	20	40	30	45	45	40	25	10
Total Cover by Trees and Shurbs					100	95	100	100	95	100	100	100	100	100	100
Average % Cover Trees and shru	mean=	99.1													
Average row width (feet)	mean =	15.7			14	20	16	16	12	15	14	1 6	22	22	22
Average shrub height (feet)	mean=	8.5			7	8	8	8	8	10	8	7	9	10	10
Average tree height (feet)	mean=	25.5			18	20	16	20	8	20	14	15	18	30	25
* 2 plots were removed from monitoring. They are on the rock berms and are sprayed yearly.															
Herbaceous Species - percent cover															
Alisma gramineum	Narrow leaf water plantain	OBL	native	0.91				10							
Bidens frondosa	Leafy beggars-tick	FACW	native	0.00											
Carex densa	Dense sedge	OBL	native	3.18					10	5		10	10		
Carex obnupta	Slough sedge	OBL	native	0.45						5					
Carex unilateralis	One-sided sedge	FACW	native	1.82					10	5			5		
Cirsium arvense	Canada thistle	FACU	non	0.00											
Eleocharis palustris	Creeping spike rush	OBL	native	0.91		10									
Epilobium ciliatum	Fringed willoweed	FACW-	native	0.00											
Epilobium watsonii	Watson's willow herb	FACW	native	0.00											
Juncus effusus	Soft rush	FACW	native	0.91						5			5		
Lactuca serriola	Prickly lettuce	FACU	non	0.00											
Mentha pulegium	Pennyroyal	OBL	non	0.00											
Myosotis laxa	Small-flowered forget me	OBL	native	0.00											
Parentucellia viscosa	Yellow parentucellia	FAC	non	0.00											
Rubis discolor	Himalayan blackberry	FACU	non	0.00											
Rumex crispus	Cury dock	FAC	non	0.45				5							
Sonchus asper	Spiny sow thistle	FAC	non	0.00											
Grass Species - percent cover															
Agrostis exarata	Spike bentgrass	FACW	native	0.00											
Alopecurus pratensis	Meadow foxtail	FACW	non	0.00											
Beckmania syzigachne	Slough grass	OBL	native	0.00											
Deschampsia cespitosa	Tufted hairgrass	FACW	native	0.00											
Hordeum brachyantherm	Meadow barley	FACW	native	1.36					15						
Lolium multiflorum	Annual reygrass	NOL	non	0.00											
Poa ssp.	Bluegrass	FAC	non	0.00											
Bareground due to Canopy Closure		Mean=		90.0	100	90	100	85	65	80	100	90	80	100	100
Total Cover by herbaceous and grass species:		Mean=		10.0	0	10	0	15	35	20	0	10	20	0	0
Percentage of the herbaceous and grass species that is nat		Mean =		80.95	0	100	0	67	100	100	0	100	100	0	0
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.															

Attachment 2: Monitoring Map

Frazier Creek Mitigation Bank Monitoring Points



Frazier Creek Mitigation Bank 2019 Photo Monitoring

Photo 1 T5-1 West

Photo 2 T2-7 Northwest

Photo 3 T2-1 West

Photo 4 T2-1 Southeast

Photo 5 T4-9 North

Photo 6 T2-10 Northeast

Photo 7 SW across swale

Photo 8 Willow area West

Photo 9 Willow area Southwest

Photo 10 A-2 Northwest

Photo 11 Ash area SW corner

Photo 12 A-5 Northwest

Photos Taken June 12, 2019

Photo 13 T2-12 Northwest

Photo 14 T3-8 East

Photo 15 T4-9 Northeast

Photo 16 T2-9 East

Photo 17 T1-1 East

Photo 18 T2-12 East

Photo 19 T2-7