

City of Portland Watershed Revegetation Program  
Open Meadows School/Metro Willamette Bluffs Revegetation Project  
Cooperative Agreement Number 1448-13420-02-J242  
July 1, 2002 – July 30, 2005

### **Project Description**

This site is 23.4 acres of oak savannah. Previously, there was 100% shrub cover by invasive weeds (Himalayan blackberry and Scot's broom), which endured two consecutive urban wildfires in the summers of 2001 and 2002. Immediately following fires, erosion control activities (not associated with this grant) were implemented over the entire site. Following these emergency erosion control measures, an opportunity existed to treat the site as an oak savannah restoration. With the financial aid of this grant and funds from the Bureau of Environmental Services, restoration opportunities were realized.

The initial goals for this project were to:

- Increase native plant cover of fire dependent plant communities of oak savannah
- Increase native plant diversity and structure
- Reduce erosion by stabilizing soils
- Reducing fuel loads
- Reducing monocultures of invasive weeds

The project met these goals by:

- Establishment and cover by 78% native grasses and 5% native shrub cover
- Planting and establishment (over 6.5 acres) of the following oak community species (persisting): Oregon oak, western serviceberry, madrone, Ponderosa pine, Oregon ash, cascara, tall Oregon grape, nootka rose, blue elderberry, red flowering currant, thimbleberry and snowberry
- Soils are stable with native grass cover, though periodic slumping from geological processes expose soils and require continual monitoring and treatment response
- Fuels load reduction by limiting invasive weed species to less than 10 % cover and dramatically reducing biomass as compared to previous years by maintaining open grassland instead of monocultures of combustible invasives (blackberry and Scot's broom)

### **Tasks**

#### **Proposed Schedule**

Permit application-Greenway/LUR (May 2002)  
Herbicide application (May/June 2002, 2003, 2004)  
Herbaceous monitoring (June 2002, 2003, 2004, 2005)  
Manual cutting (August 2002, 2003 [if needed])  
Controlled burn-Metro property (August 2002)  
Seed application (September 2002)  
Herbicide application (December 2002, 2003, 2004)  
Native plantings (February 2003)  
Irrigation/Watering (August 2003, 2004 [if needed])

Woody monitoring (October 2003, 2004, 2005)  
Native inter-planting (February [if needed])  
Maintenance monitoring (on-going-minimum 3 times per growing season)

**Work tasks implemented**

**From 7/1/02-6/30/05:**

Professional Services

Planting (3/11/03)	9,659 plants
Tubing (3/11/03)	2,258 plants
Plant staking (3/11/03)	7,400 plants
Herbicide application (6/12/03-6/13/03)	24 acres
Seeding (9/24/03)	5 acres
Cutting (10/24/03)	20 hours
Inter-planting (2/12/04)	4,821 plants
Scalping (2/12/04)	4,821 plants
Tubing (2/12/04)	2,416 plants
Plant staking (2/12/04)	2,405 plants
Mulching (3/29/04)	4,950 plants
Herbicide application (4/15/04)	23 acres
Herbicide application (6/18/04)	16 acres
Cut hourly (07/12/04)	21.5 hours
Labor manual (07/28/04)	32.0 hours
Seeding (2/01/05)	5.0 acres
Planting (2/18/05)	550 trees
Plant staking (2/18/05)	550 stakes
Spray maint spot (04/01/05)	23.4 acres
Spray maint broadcast (06/03/05)	4.0 acres

Materials

Native trees (3/11/03)	2,258 plants
Native shrubs (3/11/03)	7,817 plants
Plant materials (3/11/03)	10,075 large stakes
	2,258 small stakes
	2,258 tubes
	10 mycorrhizae units
Native seed (9/24/03)	115 lbs
Native trees (2/12/04)	2,416 plants
Native shrubs (2/12/04)	2,405 plants
Planting materials (2/12/04)	4,812 large stakes
	2,416 small stakes
	2,416 tubes
Native trees (2/18/05)	550 plants
Native seed (02/01/05)	115 lbs.
Plant materials (2/18/05)	550 large stakes

### **Staff and Partner Roles**

Andi Gresh (BES, 119 hours): project management, landowner outreach and signed participation agreements, Land Use Review and Greenway permitting, project design, budget, schedule, monitoring and reporting

Jim Schiller (BES, 156 hours): project design, developing invasive weed reduction techniques, oversight of herbicide crews, treatment prescriptions and monitoring

Damion Coe (BES, 47 hours): professional services contracting, developing invasive weed reduction techniques, oversight of herbicide crews

Ken Finney (BES, 55 hours): professional services contracting, developing invasive weed reduction techniques, oversight of cutting crews

Angie Kimpo (BES, 88 hours ): oversight of seeding crews, botanical inventories, herbaceous and woody plant monitoring

Toby Query (BES, 62 hours): materials contracting (native plants included), plant allocation and assessment of monitoring

Mark Wilson (Parks, 5 hours): planting design review

Joe Wallace (PF&R, 20 hours): controlled burn assessment and planning

Jim Morgan (Metro): landowner access

Andrew Mason (Open Meadows School): landowner access

Daniel Seffner (Open Meadows School): CRUE program teacher, monitoring of bird species, including participation by 12 students

33 Private landowners: landowner access

### **Description of area, activities and as-builts**

Activities of this project involved outreach to adjacent and project landowners, writing land use review and Greenway permit applications and designing a sustainable landscape to meet the projects many goals. Once planning activities were complete, on-the-ground restoration activities included invasive weed control over the entire 23.4-acre site, establishment of native grasses over the entire 23.4-acre site and woody plant establishment over 6.5 acres at the toe of slope.

See attached as-built plant list and work-task section.

### **Description of Methods and Effectiveness**

The site was prepped by the combination of cutting invasive weeds to reduce their biomass and then treating re-growth with herbicide. This is a very effective method for most broad-leaf weeds. (using garlon 3A)

Other weed control methods involve basal treatment of invasive trees (girdling with an herbicide spray injection). This method was effective but locust is persistent and will require future treatments.

All plants were bare-root which were a most appropriate choice of plant materials for this site. Bare-root have a better chance of adapting to new environments (more so than containerized plantings).

The occupation of the site by grasses was essential to providing competition against invasive weeds. It is really important to cover bare-ground with native before invasive plants have a chance to germinate. However, establishment of native grasses also created serious competition for resources when trying to establish native woody plants as well.

### On-Going Tasks

The project area will receive future invasive weed control treatments (cut/herbicide), native plant watering and continual monitoring. The typical schedule for future maintenance is one herbicide treatment per year and a partial acreage cut every other year. Plants have survived to date will not likely require intensive watering unless there are significant droughty periods, in which case, they will be watered. These are the minimum treatments to continue this project on its current trajectory. If more funding can be acquired, there are opportunities to do additional plantings. The site would also benefit from the removal (or girdling) of invasive mature trees such as elm and black locust, though this treatment currently requires a permit and mitigation under existing Urban Forestry regulations. This issue is currently being discussed at Portland Parks and will hopefully be resolved in the near future.

### Summary of Expenditures

Expenditure Item	Total Amount	Greenspaces Grant	Match (BES)
Materials & Supplies	\$ 9,287	\$ 6,269	\$ 3,018
Professional Services	\$ 26,234	\$16,872	\$ 9,362
Permits	\$ 3,658		\$ 3,658
Personnel (BES staff time)			
FY 02-03 (277 hours @ \$40.00/hr)	\$11,080		\$11,080
FY 03-04 (149 hours @ \$41.20/hr)	\$ 6,171		\$ 6,171
FY 04-05 (101 hours @ \$42.44/hr)	\$ 4,286		\$ 4,286
15 % Overhead	\$ 5,328		\$ 5,328
<b>PROJECT TOTAL:</b>	<b>\$66,044</b>	<b>\$ 23,141</b>	<b>\$42,903</b>

### Summary and Conclusions

The project was successful in that open savannah conditions with a modest amount of invasive weed presence has been achieved and maintained. These habitat improvements have (anecdotally) benefited bird species as evidence by greater use of the area by red-tailed hawks, commonly sighted during site visits. The difficulty with maintaining this habitat type, however, is that open grassland inherently attracts invasive weed species. Comparatively, it seems more sustainable to create forest habitat where the use of dense shade and occupation of a site by multiple native plant forms can be used to more easily exclude invasive weeds. The open growing conditions of savannah in an urban area will always require a significant amount of maintenance. Given that this is a rare and important habitat in the Willamette Valley, it seems important to carry on with improving oak savannah/woodland restoration, but communicating the reality of the long-term investment is critical. It's going to take a shift in mind-set to get to the point where there is public support of investing the resources that are going to be needed to maintain these important landscapes over the long term. For now, what project managers can contribute

towards this cause is a realistic expectation of maintenance and championing this message as part of the project.

A few technical improvements to suggest for future oak savannah restoration:

- Seed planting areas with lower growing and less aggressive grasses such as fescues. The larger *bromus* and *elymus* create too much competition for bare-root plant establishment, especially on steep dry slopes where soil moisture is limited.
- Work towards legal permission (City zoning) to treat all invasive trees. Locust remains a large problem and it will be best to follow up with the necessary permits through Urban Forestry to remove these highly invasive trees.
- Continue establishing plantings by used the shade of existing trees to protect new bare-root plantings from harsh elements (direct sun from southern exposure and droughty conditions). The strategy here is to 'build from the edges' of existing trees, using them as protection while establishing native plantings. Finding pockets of shade created by slope and sun angle can also provide this same benefit.

### Attachments

Photos

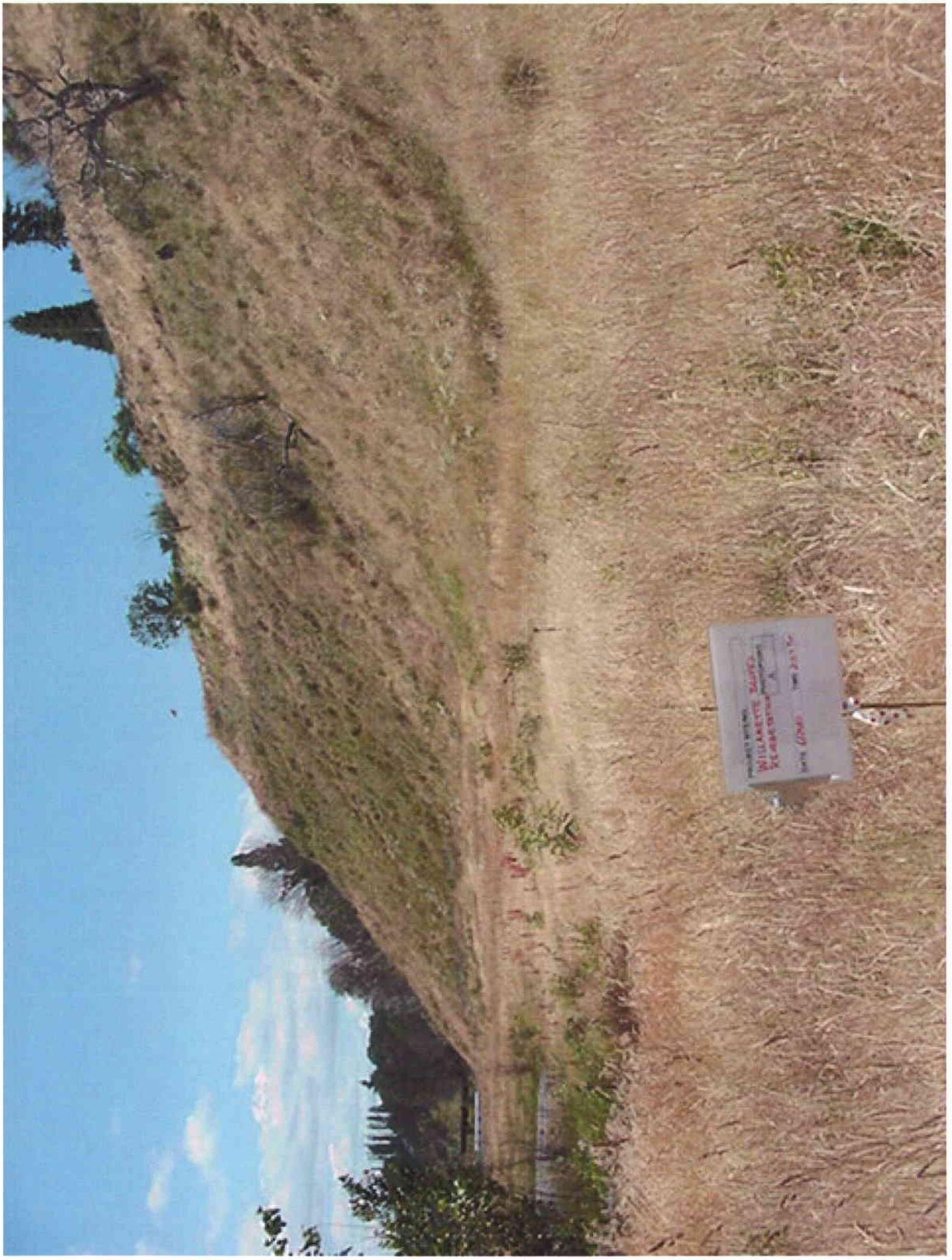
Bird list

As-built plant lists

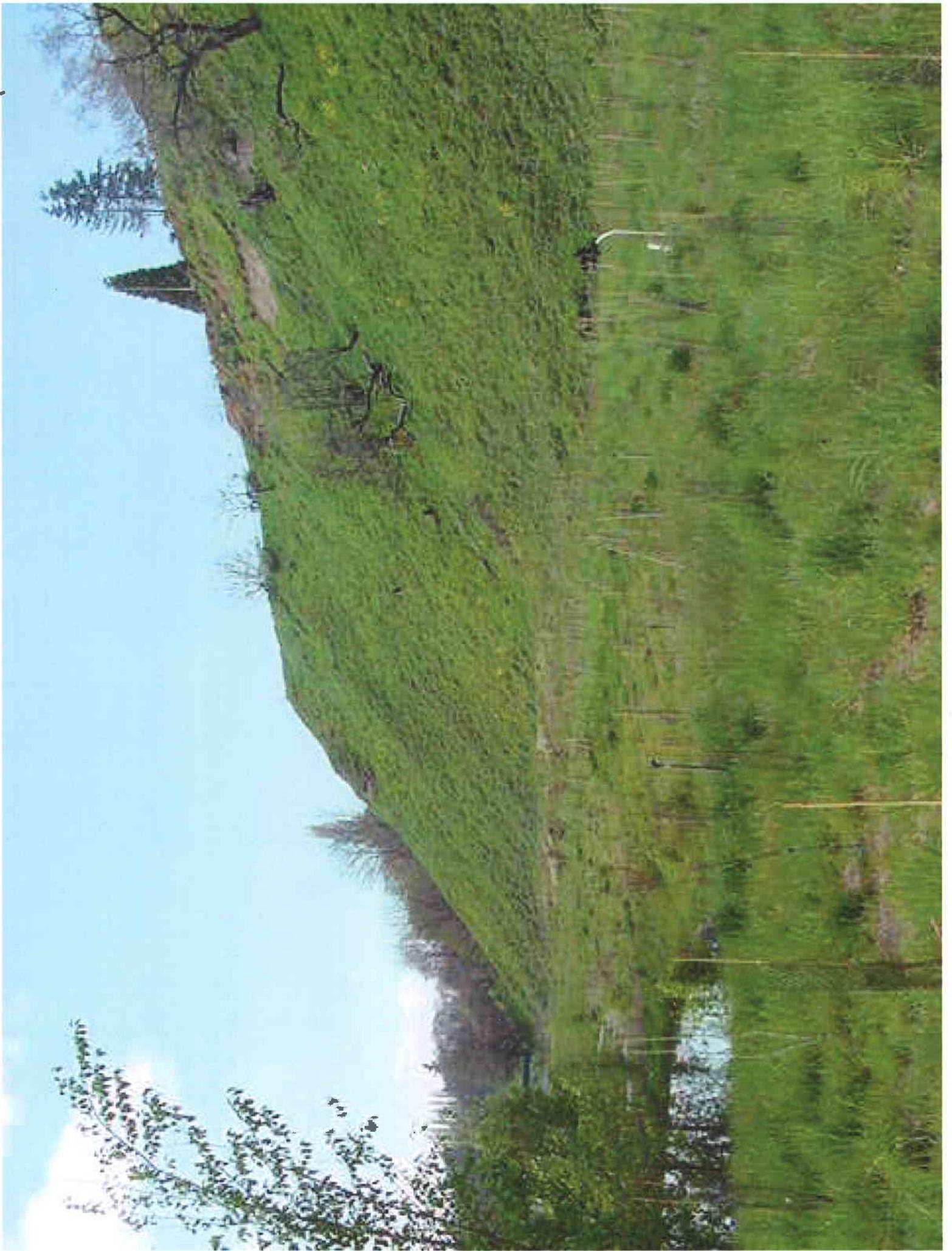
As-built project map showing planting locations

Monitoring report

Summer 2005



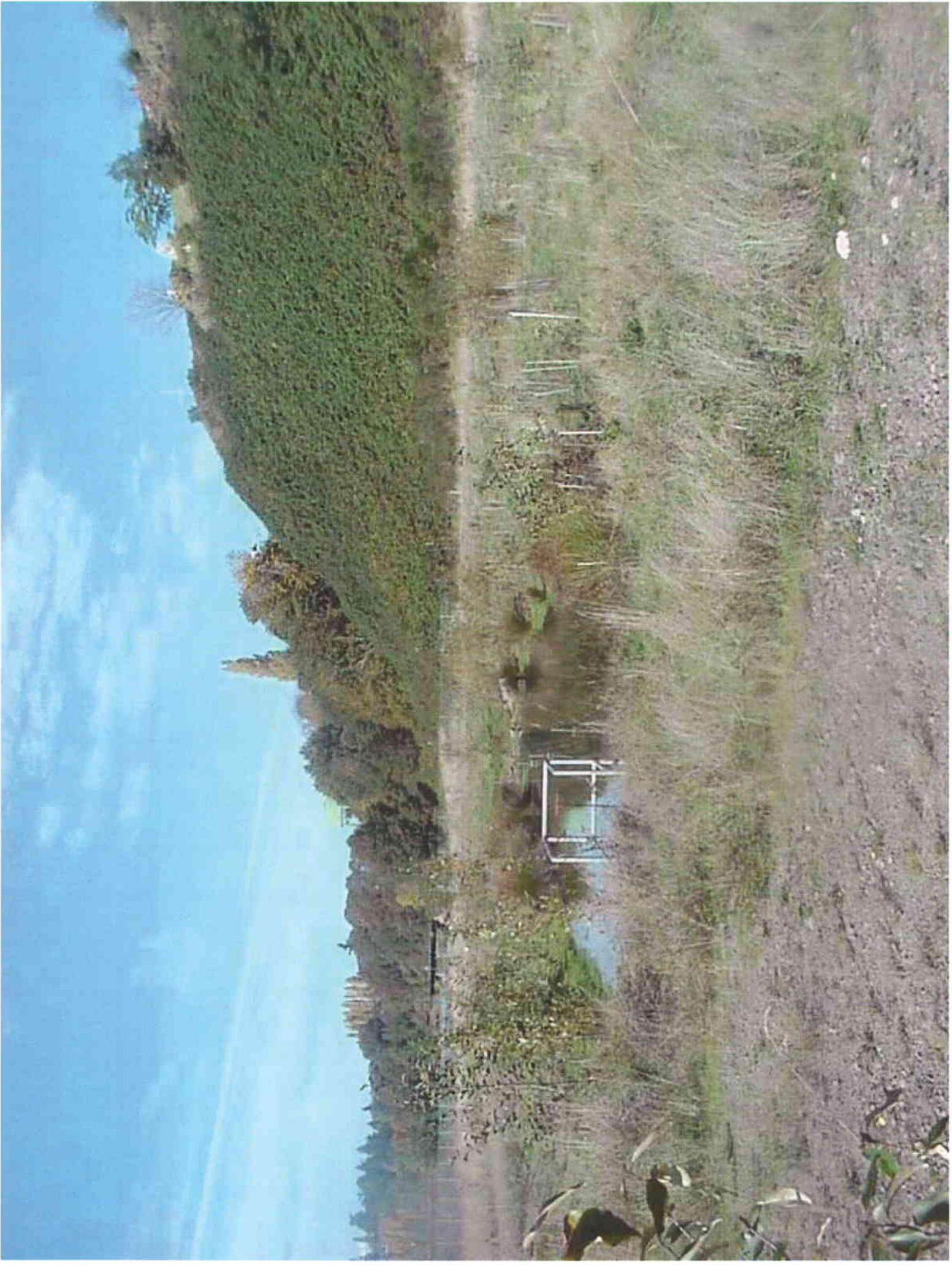
Spring 2003



fall 2001



Summer 2000



Willamette Bluffs Bird Identification by Darlene Philpott

Bird	Genus/species	Migratory Status	Federal Listing	State Listing	Riparian	WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
American crow	<i>Corvus brachyrhynchos</i>	R			X		X	X	X	X	X	XX	XX
American goldfinch	<i>Carduelis tristis</i>	S			X		X	X	X	X	X	X	X
American kestrel	<i>Falco sparverius</i>	S			X		X	X	X	X	X	X	X
American robin	<i>Turdus migratorius</i>	S			X		X	X	X	X	X	X	X
Anna's hummingbird	<i>Calypte anna</i>	R			X		X	X	XX	X			X
Bald eagle	<i>Haliaeetus leucocephalus</i>	S	Threatened	Threatened	XX	XX	X	X	X	X	X	X	X
Barn owl	<i>Tyto alba</i>	R/S			X		X	X		X	X	XX	X
Belted kingfisher	<i>Ceryle alcyon</i>	S			XX	XX		XX					
Bewick's wren	<i>Thryomanes bewickii</i>	R			X		X	X	X	X		X	X
Black-capped chickadee	<i>Poecetes atricapilla</i>	R			X		X	X	X	X	X	X	X
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	N			X		X	X	X	X		X	X
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	S			X		X	X	X	X	X	XX	X
Brown creeper	<i>Certhia americana</i>	R			X		X	X	X	X	X	X	X
Brown-headed cowbird	<i>Molothrus ater</i>	S/N			X		X	X	X	X	X	XX	X
Bushhit	<i>Psittiriparus minimus</i>	R			X			X	X	X	X	X	X
California gull	<i>Larus californicus</i>	S			XX	XX	X					X	X
Canada goose	<i>Branta canadensis</i>	Variable			XX	XX	XX	X				XX	X
Cassin's vireo	<i>Vireo cassinii</i>	N							X	XX			X
Cedar waxwing	<i>Bombus cedrorum</i>	S			X		X	X	X	X		X	X
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	N			XX	XX	X	XX	X	X	X	X	X
Common nighthawk	<i>Chordeiles minor</i>	N		Critical	X	X	X	X	X	X	X	X	X
Coopers hawk	<i>Accipiter cooperii</i>	S			X		X	X	X	X	X	X	X
Dark-eyed junco	<i>Junco hyemalis</i>	S			X		X	X	X	X	X	X	X
Double-crested cormorant	<i>Phalacrocorax auritus</i>	R/S			XX	XX	X	X					X
Downy woodpecker	<i>Picoides pubescens</i>	R			XX			XX	X	X		X	X
European starling	<i>Sturnus vulgaris</i>	R/S			XX		X	XX	X	X	X	X	XX
Fox sparrow	<i>Passerella iliaca</i>	W/M			X			X	X	X		X	X
Glaucous-winged gull	<i>Larus hyperboreus</i>	W/M			XX	XX	X						X
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	R			X		X	X	X	X	X	X	X
Great blue heron	<i>Ardea herodias</i>	R			XX	XX	XX	XX	X	X	X	XX	X
Great Egret	<i>Ardea alba</i>	W/M			XX	XX	XX	XX	X	X	X	X	X
House finch	<i>Carpodacus mexicanus</i>	R			X		X	X	X	X	X	XX	XX
House wren	<i>Troglodytes aedon</i>	N			X		X	X	X	X	X	X	X
Killdeer	<i>Charadrius vociferus</i>	N			X		X	X	X	X	X	XX	X
Lincoln's sparrow	<i>Melospiza lincolni</i>	S/N			XX		XX	XX	X			X	X
Mallard	<i>Anas platyrhynchos</i>	R			XX	X	XX	XX				X	X
Merlin	<i>Falco columbarius</i>	W/M			X	X	X	X	X	X	X	X	X
Mourning dove	<i>Zenaidura macroura</i>	S			XX		XX	X	X	X	X	XX	X
Northern flicker	<i>Colaptes auratus</i>	R			X		X	X	X	X	X	X	X
Ospreys	<i>Pandion haliaetus</i>	N			XX	XX		X	X	X	X	X	X
Peregrine falcon	<i>Falco peregrinus anatum</i>	N	Endangered		X	X	X	X	X	X	X	X	X
Purple finch	<i>Carpodacus purpureus</i>	S			XX			XX	X	XX		X	X
Red-breasted sapsucker	<i>Sphyrapicus ruber</i>	S			X			X	X	X	X	X	X
Red-tailed hawk	<i>Buteo jamaicensis</i>	N			X			X	X	X	X	X	X
Redwinged blackbird	<i>Agelaius phoeniceus</i>	S			XX		XX	X			X	X	X
Ring-billed gull	<i>Larus delawarensis</i>	W/M			XX	XX	X					X	X
Rock dove	<i>Columba livia</i>	S									X	XX	XX
Ruby-crowned kinglet	<i>Regulus calendula</i>	W/M			X		X	X	X	X	X	X	X
Rufous hummingbird	<i>Selasphorus rufus</i>	N			X		X	X	X	X	X	X	X
Sandhill crane	<i>Grus canadensis</i>	W/M			XX		XX					XX	X
Savannah sparrow	<i>Passerculus sandwichensis</i>	S/N			X		X	X			XX	XX	X
Say's phoebe	<i>Sayornis saya</i>	N									X	X	X
Sharp-shinned hawk	<i>Accipiter striatus</i>	N			X		X		X	X	X	X	X
Song sparrow	<i>Melospiza melodia</i>	R			X		X	X	X	X	X	X	X
Spotted sandpiper	<i>Actitis macularia</i>	N			XX	X	X	XX				X	X
Spotted towhee	<i>Pipilo maculatus</i>	R			X		X	X	X	XX		X	X
Stellar's jay	<i>Cyanocitta stelleri</i>	R			X		X	X	X	X		X	X
Turkey vulture	<i>Cathartes aura</i>	N			X		X	X	X	X	X	X	X
Varied thrush	<i>Icterus naevius</i>	W/M							XX	X		X	X
Vaux's swift	<i>Chaetura vauxi</i>	N			XX	XX	X	X	X	X	X	X	X
Violet green swallow	<i>Tachycineta thalassina</i>	N			X	X	X	X	X	X	X	X	X
Western scrub jay	<i>Aphelocoma californica</i>	R			X			X	X	XX	X	X	X
Western tanager	<i>Piranga ludoviciana</i>	N			X			X	XX	XX		X	X
Western wood peewee	<i>Contopus sordidulus</i>	N			X			X	X	X		X	X
White throated sparrow	<i>Zonotrichia albicollis</i>	W/M										X	X
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	S			X		X	X	X	X	X	X	X
Willow flycatcher	<i>Empidonax traillii brewsteri</i>	N		Vulnerable	XX			XX	X	X		X	X
Wilson's warbler	<i>Wilsonia pusilla</i>	N			XX			XX	XX	X		X	X
Yellow-rumped warbler	<i>Dendroica coronata</i>	S			X		X	X	X	X		X	X

**Migratory Status**

W= Winters in the region

M = Migrates through area without stopping for long time periods

N = Neotropical migratory species (birds; majority of individuals breeding in the Metro region migrate south of U.S./Mexico border for winter)

R = Permanent resident (lives in the area year-round)

S = Short-distance migrant (from elevational to regional migration, e.g., across several states)

**Habitat Types based on Johnson and O'Neil (2001).**

WLCH = Westside Lowlands Conifer-Hardwood Forest

WODF = Westside Oak and Dry Douglas-fir Forest and Woodlands

WEGR = Westside Grasslands

AGPA = Agriculture, Pasture and Mixed Environs

URBN = Urban and Mixed Environs

WATR = Open Water - Lakes, Rivers, Streams

HWET = Herbaceous Wetlands

RWET = Westside Riparian-Wetlands

Single "X" in any habitat type (upland or water-associated) indicates general association; "XX" indicates close association, as per Johnson and O'Neil 2001.

Site Costing

Site #: 1590 Site Name: **Willamette Bluffs Revegetation**

Acres: 23.4 Sale?: No Year: 2005 Month: February

Planting Plan:

<i>Tree Species</i>	<i>Nursery</i>	<i>Seed Zone</i>	<i>Elev</i>	<i>Stock Type</i>	<i>Total #</i>	<i>Unit\$</i>	<i>Cost \$</i>
<b>Quercus garryana</b>	<b>Mineral Springs Orna</b>	<b>261</b>	<b>0.00</b>		<b>550</b>	<b>\$0.45</b>	<b>\$247.50</b>
<i>Totals:</i>					<b>550</b>		<b>\$247.50</b>

<i>Materials</i>	<i>Total #</i>	<i>Unit \$</i>	<i>Cost \$</i>
<b>Large Stakes</b>	<b>550</b>	<b>\$0.06</b>	<b>\$31.35</b>
<i>Totals:</i>		<b>550</b>	<b>\$31.35</b>

<b>Willamette Bluffs Revegetation Planting Grand Total:</b>	<b>\$278.85</b>
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Site Costing

Site #: 1590 Site Name: **Willamette Bluffs Revegetation**

Acres: 23.4 Sale?: No Year: 2004 Month: February

Planting Plan:

<i>Tree Species</i>	<i>Nursery</i>	<i>Seed Zone</i>	<i>Elev</i>	<i>Stock Type</i>	<i>Total #</i>	<i>Unit\$</i>	<i>Cost \$</i>
Amelanchier alnifolia	Brooks Tree Farm	042	0.50	1-0	200	\$0.60	\$120.00
Arbutus menziesii	Hort Services	042	0.50	Plug	196	\$0.75	\$147.00
Crataegus suksdorfii	Brooks Tree Farm	042	0.50	1-0	300	\$0.25	\$75.00
Fraxinus latifolia	Brooks Tree Farm	042	0.50	1-0	800	\$0.25	\$200.00
Pinus ponderosa	Brooks Tree Farm	261	0.50	2-0	20	\$0.27	\$5.40
Quercus garryana	Mineral Springs Orna	251	0.50	1-0	700	\$0.47	\$329.00
Rhamnus purshiana	Brooks Tree Farm	042	0.50	1-0	200	\$0.50	\$100.00
<i>Totals:</i>					<b>2416</b>		<b>\$976.40</b>

<i>Shrub Species</i>	<i>Nursery</i>	<i>Seed Zone</i>	<i>Elev</i>	<i>Stock Type</i>	<i>Total #</i>	<i>Unit\$</i>	<i>Cost \$</i>
Mahonia aquifolium	Brooks Tree Farm	042	0.50	1-0	1600	\$0.25	\$400.00
Rosa pisocarpa	Sevenoaks Native Nurs	262	0.50	1-0	200	\$0.50	\$100.20
Sambucus cerulea	Brooks Tree Farm	042	0.50	1-0	105	\$0.60	\$63.00
Sambucus racemosa	Brooks Tree Farm	042	0.50	1-0	100	\$0.60	\$60.00
Symphoricarpos albus	Balance Restoration N	252	0.50	1-0	400	\$0.52	\$208.00
<i>Totals:</i>					<b>2405</b>		<b>\$831.20</b>

<i>Materials</i>	<i>Total #</i>	<i>Unit \$</i>	<i>Cost \$</i>
Large Stakes	4816	\$0.07	\$349.16
Small Stakes	2416	\$0.04	\$94.22
Tubes	2416	\$0.17	\$409.51
<i>Totals:</i>		<b>9648</b>	<b>\$852.90</b>

<b>Willamette Bluffs Revegetation Planting Grand Total:</b>	<b>\$2,660.50</b>
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Site Costing

Site #: 1590 Site Name: **Willamette Bluffs Revegetation**

Acres: 23.4 Sale?: No Year: 2003 Month: February

Planting Plan:

Tree Species	Nursery	Seed Zone	Elev	Stock Type	Total #	Unit\$	Cost \$
Acer macrophyllum	Brooks Tree Farm	042	0.50	1-0	100	\$0.35	\$35.00
Amelanchier alnifolia	Brooks Tree Farm	042	0.50	1-0	350	\$0.45	\$157.50
Arbutus menziesii	Hort. Services	042	0.50	Plug	250	\$0.75	\$187.50
Cornus nutallii	Sevenoaks Native Nurs	042	0.50	1-0	50	\$0.44	\$22.00
Crataegus suksdorfii	Brooks Tree Farm	042	0.50	1-0	150	\$0.22	\$33.00
Pinus ponderosa	D. L. Phipps Nursery	261	0.50	2-0	250	\$0.36	\$90.50
Quercus garryana	Brooks Tree Farm	261	0.50	1-0	425	\$0.45	\$191.25
Quercus garryana	Mineral Springs Orna	251	0.50	1-0	683	\$0.50	\$338.46
					<b>Totals:</b>	<b>2258</b>	<b>\$1,055.21</b>

Shrub Species	Nursery	Seed Zone	Elev	Stock Type	Total #	Unit\$	Cost \$
Acer circinatum	Brooks Tree Farm	042	0.50	1-0	800	\$0.35	\$280.00
Mahonia aquifolium	Brooks Tree Farm	042	0.50	1-0	990	\$0.22	\$217.80
Philadelphus lewisii	Balance Restoration N	262	1.00	1-0	350	\$0.64	\$224.00
Ribes sanguineum	Brooks Tree Farm	042	0.50	1-0	1550	\$0.45	\$697.50
Rosa nutkana var. nut	Brooks Tree Farm	042	0.50	1-0	600	\$0.45	\$270.00
Rubus parviflorus	Brooks Tree Farm	042	0.50	1-0	926	\$0.45	\$416.70
Sambucus cerulea	Brooks Tree Farm	261	0.50	1-0	860	\$0.60	\$516.00
Sambucus racemosa	Brooks Tree Farm	042	0.50	1-0	1300	\$0.60	\$780.00
Symphoricarpos albus	Balance Restoration N	262	1.00	1-0	450	\$0.64	\$288.00
					<b>Totals:</b>	<b>7826</b>	<b>\$3,690.00</b>

Materials	Total #	Unit \$	Cost \$
Large Stakes	9659	\$0.07	\$700.28
Mycorrhizae	10	\$25.00	\$250.00
Small Stakes	9659	\$0.04	\$376.70
Tubes	2258	\$0.17	\$382.73
		<b>Totals:</b>	<b>21586</b>
			<b>\$1,709.71</b>

<b>Willamette Bluffs Revegetation Planting Grand Total:</b>	<b>\$6,454.92</b>
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**Watershed Revegetation Program**

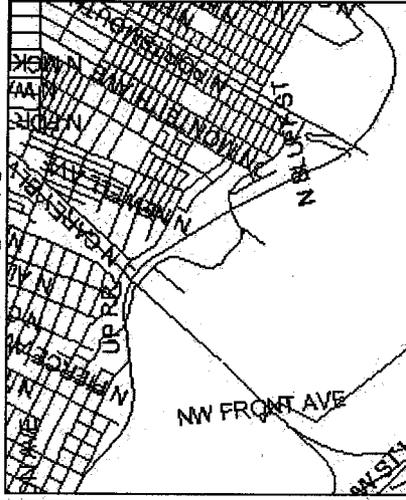


City of Portland  
Environmental Services

**Willamette Bluffs  
Revegetation Project**

Project Area: 23.4 acres  
Length of Bank: 0 feet

**Vicinity Map**

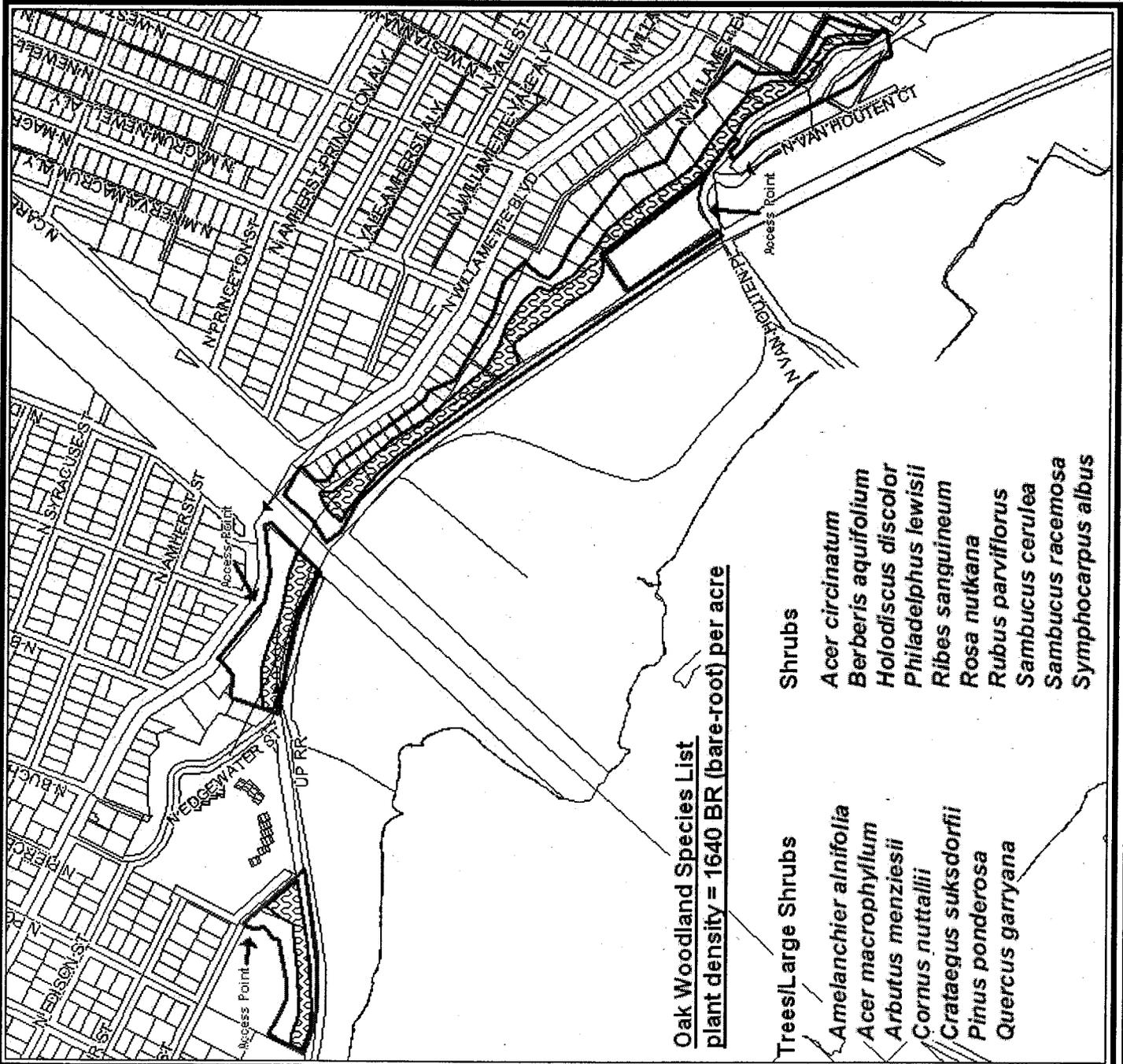


**Legend**

Project Boundary and  
Grassland



Oak Woodland Plantings  
(6.0 acres lower slope)



**Oak Woodland Species List**  
plant density = 1640 BR (bare-root) per acre

**Trees/Large Shrubs**

- Amelanchier alnifolia*
- Acer macrophyllum*
- Arbutus menziesii*
- Cornus nuttallii*
- Crataegus suksdorfii*
- Pinus ponderosa*
- Quercus garryana*

**Shrubs**

- Acer circinatum*
- Berberis aquifolium*
- Holodiscus discolor*
- Philadelphus lewisii*
- Ribes sanguineum*
- Rosa nutkana*
- Rubus parviflorus*
- Sambucus cerulea*
- Sambucus racemosa*
- Symphocarpus albus*

## *Observations*

Native grasses occupy 78% of the site, 8% is bare-ground 5% native shrub cover and the remaining 9% is invasive weed cover. Slump or surface slides are common along the bluff and therefore the site needs to be constantly monitored for surface soil erosion. Overall the site is stable, but there are 1-2' deep slab slides in spots, not more than 20 feet in length or width. These areas have been re-seeded. The seeded grasses are definitely preventing soil erosion where grasses have been successfully established, over the majority of the site. Both Oregon white oak and poison oak have re-sprouted from their base since the disturbance by wildfire from 2000 and 2001. Other native species that returned were Oregon grape and nootka rose, showing a definite tolerance to wildfire. However, butterfly bush and black locust are both very invasive and seem to have also been stimulated by fire. There is an eruption of locust saplings in distinct patches (under mature locust trees) throughout the site. These patches have been effectively treated using herbicides, however, this weed continues to re-sprout regularly. Ideally, there will be a treatment of mature black locust trees in the future and a real effort made to eradicate them from the site. Planted oaks died back, but then resprouted from the base in early fall. Many plants will recover if they are watered next year. Establishing plant materials on this site has been most difficult due to the well drained sandy soils, steep topography and droughty conditions in previous summers. Plants are surviving and the 'stocking' rate for quite good in planted areas, an average of 572 trees per acre and 505 shrubs per acre. It is expected that there will be even more mortality in future years as oak restoration in these conditions is particularly challenging, though it will still be a successful restoration with a lower density and the initial planting density was quite high in order to account for this mortality. The following species survived from planting: snowberry, oregon grape, elderberry, ash, cascara, oaks, hawthornes, and ponderosa pine.

## *Recommendations*

Target black locust, scot's broom, blackberry and butterfly bush during cut/herbicide treatments. Watch for slab slides and the need for erosion control. Closely monitor plantings and water during dry spells.

## *Plants Per Acre*

Trees= 572      Shrubs = 505      Total= 1077      # of Plots= 43