

## Final Project Report, July 2007

### On the Cooperative Agreement between the U.S. Fish and Wildlife Service and the Friends of the Refuge

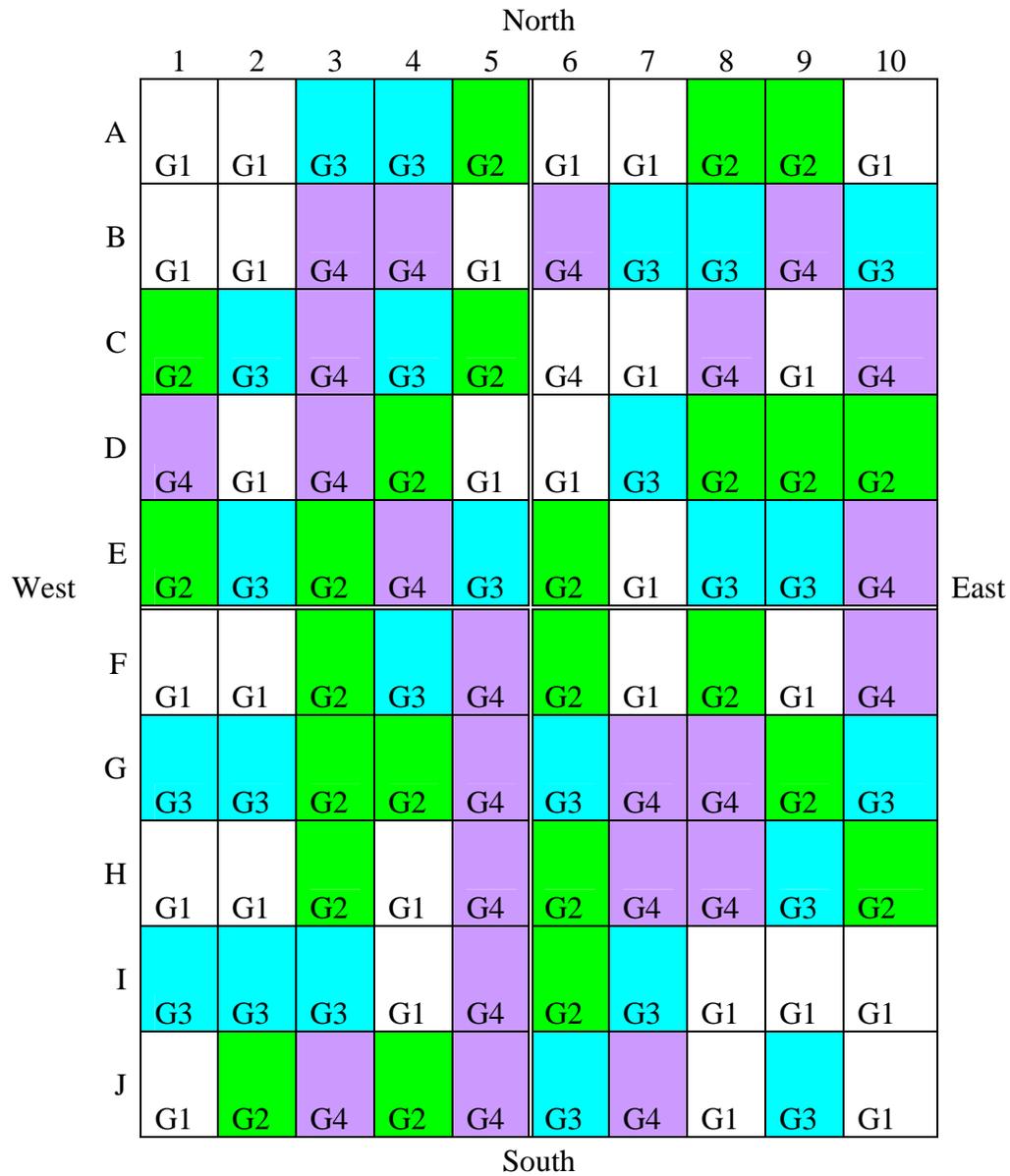
Project Title: Oak Savanna Restoration – Tualatin River NWR  
Cooperator: Friends of Tualatin River National Wildlife Refuge  
FWS Agreement No.: 13420-1122-1016

#### Project Summary:

This project is the restoration of eight acres of oak savanna habitat on the Dennis Unit of the Tualatin River National Wildlife Refuge. The site was used as pasture for many years and was covered with non-native grasses.

An integrated approach of using mechanical and herbicide treatments to suppress non-native plant growth began in the fall of 2004. Initial pretreatment for the 8 acres began on 10/1/04. An herbicide treatment was conducted using a tractor mounted boom sprayer to apply glyphosate herbicide at a rate of 40 oz. /acre. An 80% control rate was achieved. A reapplication of glyphosate herbicide at a rate of 40 oz. /acre was applied in the spring of 2005 on 5/17/05. A 95% control rate was achieved. Mechanical treatments were completed in July, 2005 and included mowing of decadent grasses followed by a shallow disking. All pretreatment activities were conducted by staff of the Tualatin River National Wildlife Refuge. All herbicide applications followed USFWS application guidelines. Seeding with native grass was completed in fall, 2005. Species planted were blue wildrye (*Elymus glaucus*), California oatgrass (*Danthonia californica*), California brome (*Bromus carinatus*), and Roemer's fescue (*Festuca idahoensis*). Tree species planted was Garry oak (*Quercus garryana*).

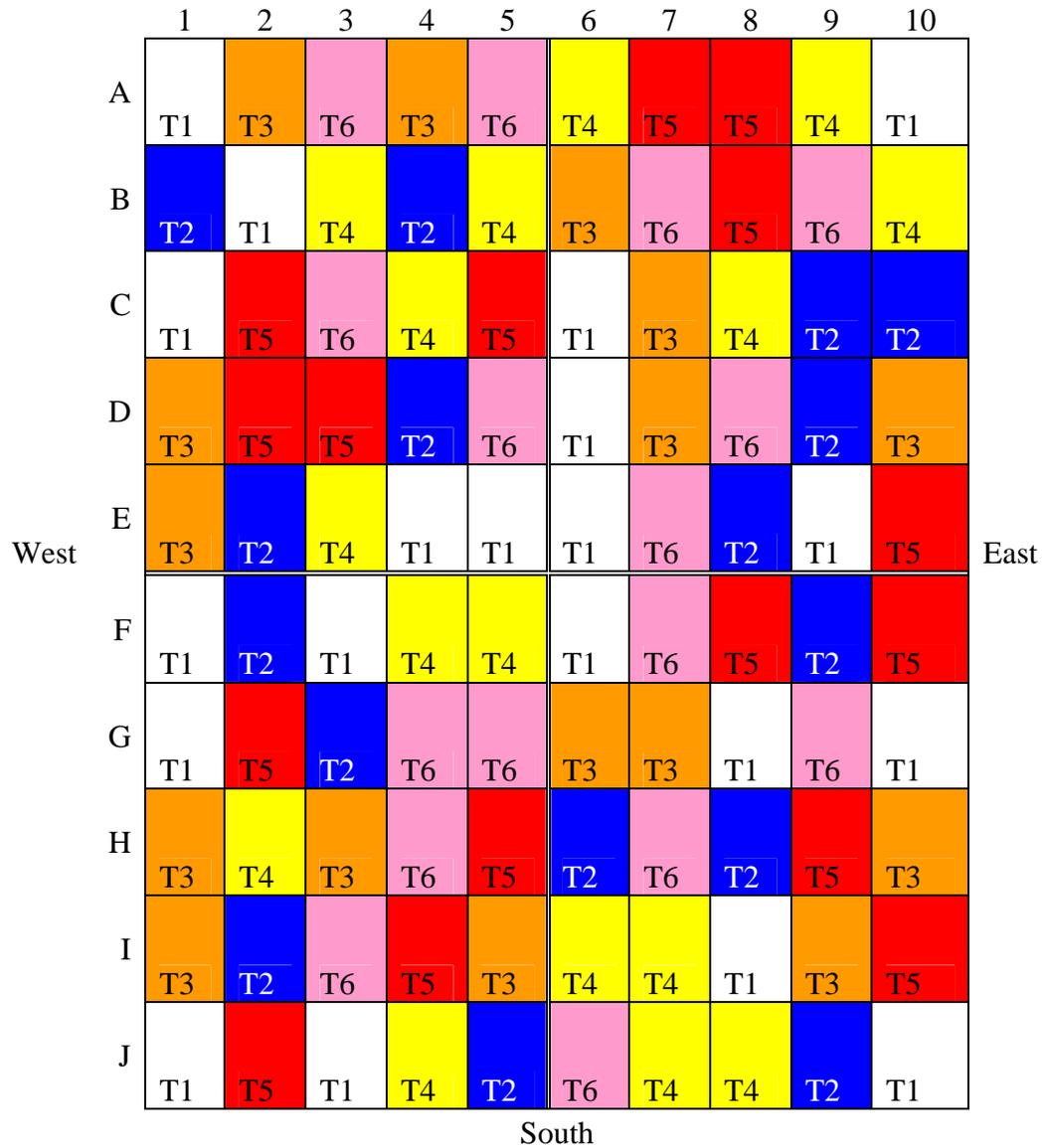
In order to learn more about the effectiveness of various treatments a study was set up in the central portion of this site. The first variable is disking before grass seed planting vs. not disking. The plot was divided into four parts, two were disked and two were not. Native grass was seeded in the entire plot in October 2005. The entire plot was then sprayed with Roundup before the grass seedlings emerged. In the spring the entire plot was marked out in a 10 x 10 matrix resulting in 100 squares of approx 15 meters on a side. Four different treatments for native grasses are planned for these squares: control (no treatment), broadleaf herbicide, burning, and mowing (Figure 1). In addition, 6 treatments are planned for trees: control (no treatment), tree tubes, weed mats, mowing around the tree, herbicide around the base of the tree, and mulch (Figure 2). The growth/survival of trees and native grasses in each plot are being recorded.



Treatments:	
Grass	1 Control
	2 Mowing
	3 Herbicide
	4 Burning

Figure 1. Treatment matrix for native grass.

North



Treatments:	
Trees	1 Control
	2 Tube
	3 Mulch
	4 Herbicide
	5 Mow
	6 Weed mat

Figure 2. Treatment matrix for native oak trees.

Native oaks in one and two gallon pots, and bare-root trees were planted by volunteers on November 4, 2006 and January 20, 2007. As part of the research design the trees in some

of the 10 x 10 plots were either tubed, had weed mats put in place, were mulched, were treated with herbicide around the tree, or mowed around the tree. In summer 2007 an assessment of the native grass survival was performed and showed that native grasses were more abundant in areas that had been disced before seeding (41% native grass in disced areas vs 26% in non-disced areas), and were more abundant in areas treated with broad-leaf specific herbicide than in control plots or mowed plots (Table 1). No plots were burned. An examination of tree survival showed only 53% survival during the first spring/summer. Trees that had tubes showed a survival rate of 98% (Table 2). Most dead trees and many counted as living were girdled by voles (63%). A few trees were mowed in the mowed plots because they were difficult to find in the tall grass. Tree tubes provided an excellent deterrent to voles and are easier to find in the grass for monitoring.

Native grass and tree survival will be monitored for the next few years. The last of the remaining grant funds of approximately \$1835 was used to purchase tree watering bags to be used in the project area.

Table 1. Native grass abundance estimates from July 2007.

Treatment	Percent Native Grass
Control	35%
Mow	15%
Herbicide	46%
Overall Average	33%

Table 2. Tree survival estimates from August 2007.

Treatment	Average # Alive	Average Height (cm)
Control	28	63
Mulch	39	53
Mow	47	58
Weed Mat	48	69
Herbicide	57	73
Tube	98	72
Total Average # Alive	53	
Total Average Height		64

Friends of the Refuge

Summary of In Kind Contributions for Greenspaces Oak Savanna Grant at TRNWR

FOT cost of crew leader training \$70/person or \$3150 We used 5% of FOT crew leader effort or	\$157
3 units of mulch from Grimm's Fuel	\$354
Nov 4, 2006 Planting, 45 volunteers, 280 hr @ \$11/hr	\$3080
Jan 20, 2007 Planting, 58 volunteers, 170 hr @\$11/hr	\$1914
Jan 24, 2007, tubing and matting newly planted trees, 8 volunteers, 4 hr @\$11/hr	\$ 352
Donation for purchase of planting and maintenance tools and equipment. Total \$1000, 1/3 allocated to this project	\$ 330
Volunteer coordinator: recruiting volunteers and maintaining Volunteer data base; 50 % of (1 hr/wk x 52 weeks @ \$25/hr)	\$650
Grant administration, purchasing, reporting 2 hr/mo x 36 months @ \$20/hr	\$720
Use of Friends of Trees tree planting tools and equipment, Nov 4 and Jan 20	\$500
Use of Tualatin Riverkeepers planting tools and equipment, Jan 20	\$ 200
Web site development contract, recruiting and communicating with volunteers 25% of \$4000	\$1000
Volunteer time from webmaster for web site installation 20% of 60 hr x \$30/hr	\$360
Water trailer purchase, 25% of \$4000	\$1000
Total	\$10,492

Friends of the Refuge  
Oak Savannah Restoration on Dennis Unit of TRNWR Greenspaces Grant

Record of Funds Used

Oct 6, 2006	Oak trees, Sevenoaks Native Nursery	\$ 3427.50
Oct 17, 2006	Grass Seed from Pacific NW Natives	\$2339.20
May 11, 2007	Professional Services from FOT	\$2500
July 2007	115, 14 gal. Tree Watering Bags from Berry Hill Irrigation	\$1813
	Total	\$10,079.70



Looking south. Disced on the right, not disced on the left. Summer 2006.



Disced with herbicide. Summer 2006



Not disced, no herbicide. Summer 2006.



Not disced, with herbicide. Summer 2006.



Measuring trees in herbicide treated grass plot with tree tubes. August 2007.



Measuring trees in control plot. August 2007.



Measuring trees in mowed plot. August 2007.