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L-325 Sagebrush Habitat Mitigation Project: FY2008 Compensation Area Monitoring Report

Robin E. Durham
Michael R. Sackschewsky

September 2008

Pacific Northwest
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1.0 Introduction

This document provides a review and status of activities conducted in support of the Fluor Daniel Hanford Company (Fluor) Mitigation Action Plan (MAP) for Project L-325, Electrical Utility Upgrades (2007). It includes time-zero monitoring results for planting activities conducted in January 2008, annual survival monitoring for all planting years (2007 and 2008), and recommendations for the successful completion of DOE habitat mitigation commitments for this project.

2.0 Background

Installation of the new 13.8 kV electrical distribution line between the 251-W substation and the 100K area resulted in the loss of approximately 1.5 ha (3.7 acres) of mature sagebrush steppe. Hanford site biological resource management guidelines stipulate compensatory mitigation via habitat replacement for this level and type of disturbance (DOE 2001, 2003). A MAP was prepared to outline the measures necessary to mitigate these ecological resource losses (Fluor 2007).

Commitments outlined in the MAP provided for planting 5,000 Wyoming big sagebrush (*Artemisia tridentata* ssp *wyomingensis*) seedlings over a 4.5 hectare (11 acre) site. A planting of this nature would result in a plant density of 1,111 seedlings per hectare (450/acre) which is consistent with management guidelines (DOE 2001, 2003). The project mitigation site is located north of the B/C cutoff road, which is just west of the L-325 site of disturbance (Figure 1).

During the previous reporting period, 4-in^3 locally-derived sagebrush pluglings were purchased and planted in late February 2007. At the time of delivery, some seedlings fell below minimum quality specifications and were rejected. This shortfall resulted in the planting of less than 4,000 seedlings over an area of about 3.5 hectares (8.6 acres). First-year monitoring showed low survival across the site, most likely due to the late season planting which left insufficient time for seedling establishment prior to spring warm up and the onset of resource competition. Irrigation was not used.

An additional planting was planned and seedling procurement was initiated early in FY08. The decision to purchase 10-in^3 vs. 4-in^3 seedlings was made because across the Hanford Site, in similar planting conditions, the smaller plants were not showing satisfactory survival. Another difference in FY08 was the substrate in which the seedlings were grown; being quite sandy, this substrate more resembles mitigation-site soils when compared to the vermiculite-rich potting mix used in previous years.

Planting in FY08 began on January 8 with the delivery of 2,665 seedlings, and was completed on January 10. Planting conditions were considered excellent, with adequate moisture and snowy conditions during the planting event. Compensatory plantings are monitored annually for 5 years to confirm a customary performance criterion of 60% survival. As part of that effort, time-zero monitoring was conducted on February 15. This activity put in place permanent monitoring transects to follow seedling survival and establishment, and to verify that accurate planting densities were achieved. Subsequent first-year (time-one) and second-year (time-two) monitoring of the FY08 and FY07 plantings (respectively) was conducted in August 2008.

3.0 Methods

3.1 Time-zero Mapping

Two, 50-m by 20-m transects (1,000 m^2) were established to monitor this planting. Because survival in the previous planting year was so low, the new lines (P2-08 and P3-08) were placed directly on top of the lines established in FY07 (P2-07 and P3-07). Prior to monitoring, all seedlings planted in FY07 were flagged based on the coordinates established for that planting. Each newly planted seedling was then

mapped within 10-m of either side of the belt by assigning coordinates (based on the distance along, and distance from the belt). Those seedlings mapped on the right side of the belt (relative to the B/C cutoff road) were assigned positive distance values along the line. Those seedlings on the left side were given negative distance values. Other baseline measurements included seedling height, and two perpendicular widths.

Following the methodology used in FY07, each plant was evaluated for planting quality and grouped into one of eight categories: 1) planted correctly; 2) planted too deep; 3) planted too shallow; 4) plant left with obvious air gaps about the roots and crown; 5) multiple plants in hole; 6) planted too deep with air gaps; 7) planted too deep with multiple plants; and 8) planted too shallow with air gaps.

3.2 Annual Monitoring

All mapped seedlings were revisited during August 2008. As before, measures of seedling height and two widths were recorded. Each plant was then rated according to appearance as healthy (1), marginal (-1), or dead (0). A seedling was considered healthy (1) if its leaves were turgid. Marginal plants were identified as exhibiting 75 percent or more chlorotic foliage, or it was thought the seedling would not survive until the next monitoring year. Plants were considered dead when no live leaves were present on any stem, or when previously mapped seedlings could not be relocated.

4.0 Results

4.1 Time-zero Mapping

A time-zero monitoring summary of planting density and quality is presented in Table 1.

4.1.1 Planting Density

Two (2) monitoring transects were mapped. Planting density across the FY08 planting area was calculated to be 1000 plants per hectare.

4.1.2 Planting Quality

Ninety-one percent of all seedlings monitored (n=200) were categorized as planted correctly. A small percentage of seedlings were observed as being planted either too shallow (6%); left with air gaps about the roots and crown (1%); with multiple plants in the hole (2%); or planted too shallow with air gaps about the roots and crown (1%).

4.2 Annual Monitoring

Time-one monitoring of the FY08 planting is summarized in Table 1. Time-two monitoring results for the FY07 planting are presented in Figure 2.

4.2.1 Time-One FY08 Planting

Overall survival was 73 percent across both transects (P2-08 and P3-08). Of those plants still living (n=145), 93 percent were judged to be in healthy condition.

4.2.2 Time-Two FY07 Planting

Overall survival was 12 percent across three (3) transects (P1-07, P2-07, and P3-07) which was down from 24 percent survival in FY07. Of those plants still living (n=17), 94 percent were judged to be in healthy condition. The greatest drops in survival were seen on lines P1-07 (down 12% from FY07) and P3-07 (down 17% from FY07).

5.0 Discussion

Planting density across the FY08 planting area was calculated to be 1000 plants per hectare, which is consistent with MAP commitments (Fluor 2007).

Planting quality and the percentage of seedlings documented in less than optimal categories (such as seedlings planted too shallow, or with air gaps about the roots and crown) showed improvement over the previous planting year (Durham and Sackschewsky 2007). The number of seedlings found in these less than optimal categories is reasonable in light of the snow-covered ground into which they were planted.

While survival in the 70-percent range is not the best we could have hoped for, it was a marked improvement over survival seen in the previous planting year. The purchase of 10-in^3 seedlings and an early planting window most likely contributed to the increased survival. Conditions were favorable before, during, and after the planting which also contributed to successful seedling establishment. It is hard to say if the sandy substrate used in seedling production contributed to the success of this planting but it did not appear to hurt.

According to the project MAP, 5000 sagebrush seedlings were to be planted, with a goal of 60% survival after 5 years (Fluor 2007). Therefore, 3000 surviving plants will be needed at the end of the monitoring period. There are currently an estimated 2400 surviving plants, based on 12% survival of about 4000 plants from the first planting, and 73% survival of 2665 plants in the second planting. Some additional mortality is to be expected. Therefore a minimum of 600 additional plants (probably more) will be needed to meet the MAP commitments.

Activities in FY09, in addition to annual monitoring and reporting of the FY07 and FY08 plantings, will include the collection of seed, making arrangements for the production of seedlings, and making arrangements to plant the additional seedlings at the mitigation site in FY10 to complete the planting commitments of this project.

6.0 References

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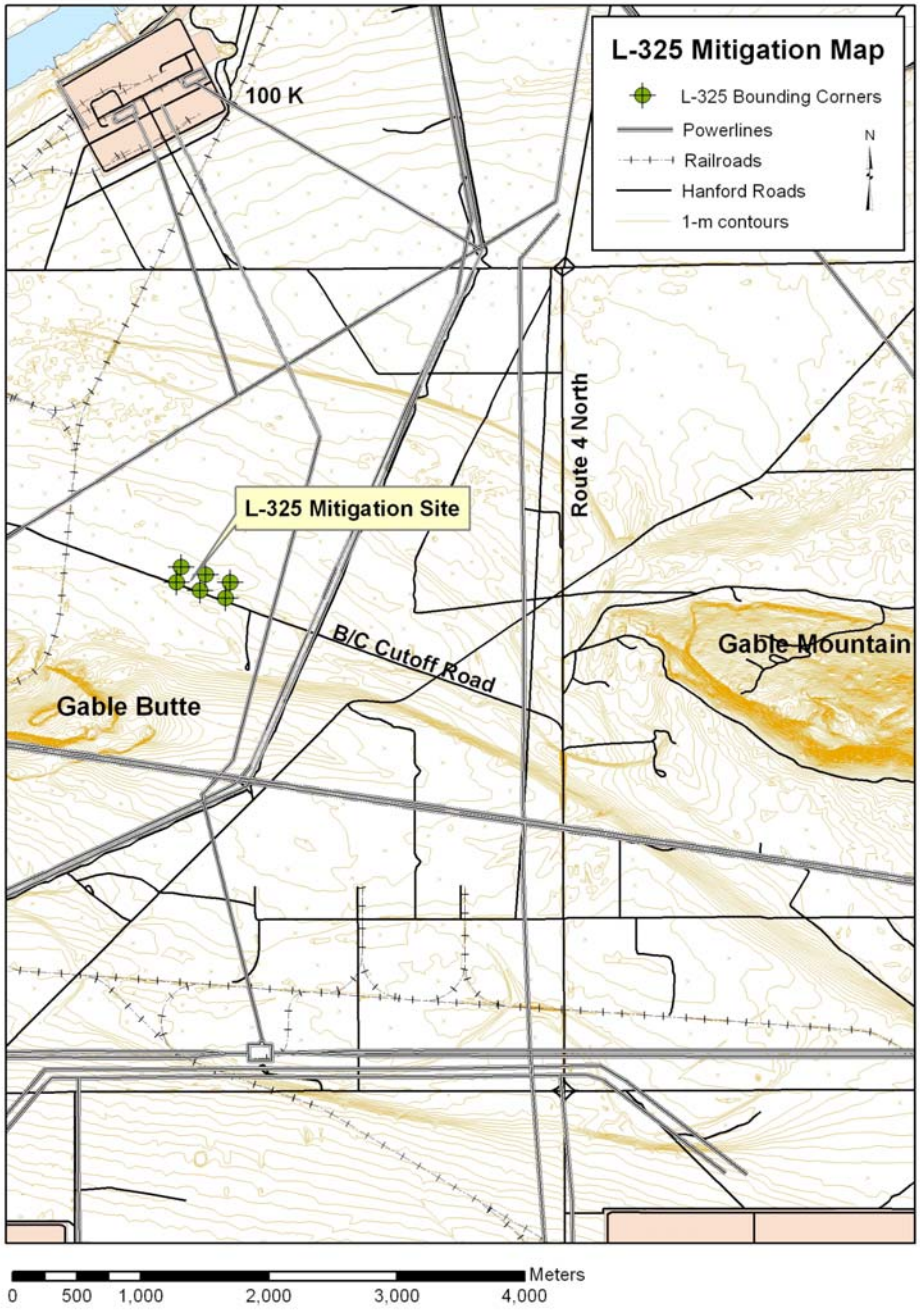

Figure 1. Location of the L-325 Compensatory Mitigation Site in Relation to the B/C Cutoff Road and Gable Butte

Table 1. L-325 Mitigation Project Monitoring Summary for the FY2008 Planting Year (Seedling type: 10-in^3 container-grown plug)

Time Zero	**Line number**					
Winter 2008 Planting Condition*:	P1	P2-08	P3-08	P4	Condition Totals (all lines)	% of Total
1	**Not Planted in FY08**	84	98	**Not Planted**	182	91%
2		0	0		0	0%
3		3	9		12	6%
4		2	0		2	1%
5		0	3		3	2%
6		0	0		0	0%
7		0	0		0	0%
8		0	1		1	1%
9		0	0		0	0%
Total # monitored		89	111		200	
Seedling density (plants/ha)		890	1110		1000	

Time One	**Line number**					
Summer 2008 Survival Code**	P1	P2-08	P3-08	P4	Totals by Survival Code**	% of Surviving Seedlings in Code
1		67	69		136	93%
-1		4	6		10	7%
0		18	36		54	
Total # monitored		89	111		200	
Total # survived (1 and -1)		71	75		146	
Percent survival (1 and -1)		80	68		**73%**	

* Condition Codes:
1 = planted correctly
2 = planted too deep
3 = planted too shallow
4 = Obvious air gaps
5 = multiple plants
6 = too deep with air gaps
7 = too deep with multiple plants
8 = too shallow with air gaps

** Survival Codes:
1 = healthy
-1 = marginal health
0 = dead

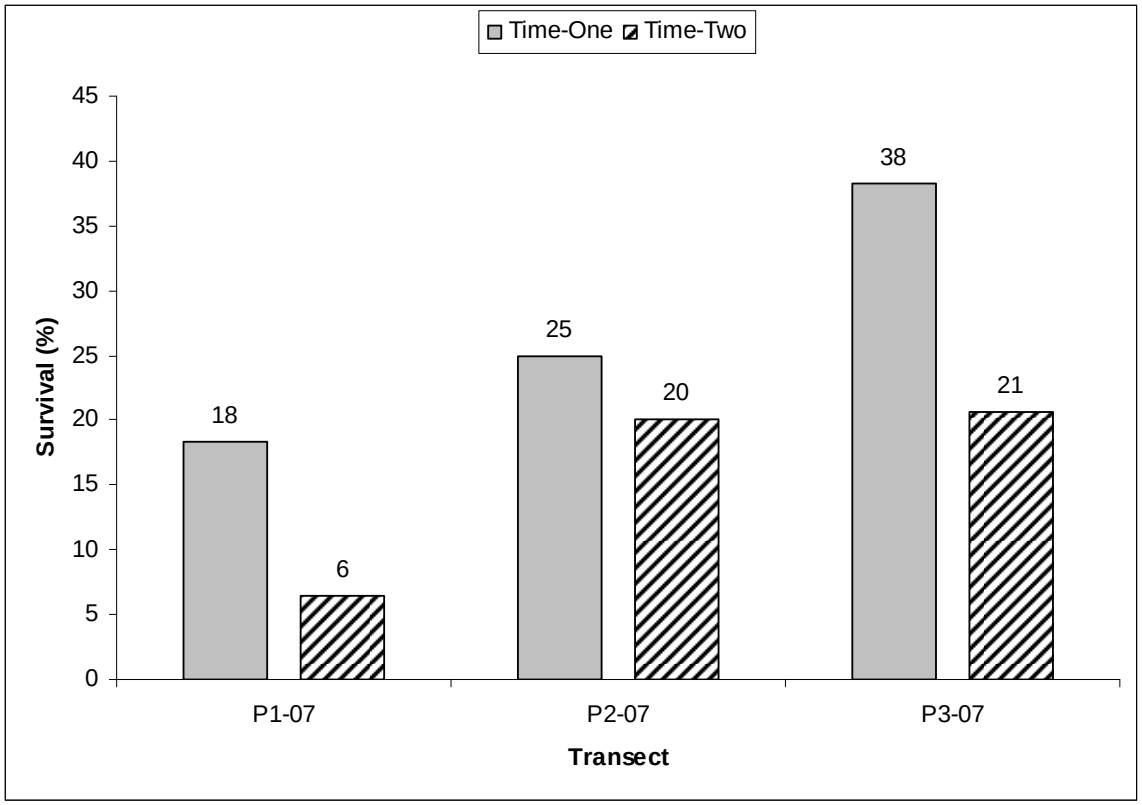

Figure 2. L-325 Sagebrush Mitigation Project: Time-two Survival Summary of the FY07 Planting (Seedling type: 4-in^3 container-grown plug)