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Rev. 0

River Corridor Closure Contract

2011 River Corridor Closure Contractor Revegetation and Mitigation Monitoring Report

November 2011

For Public Release

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor

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ACRONYMS

BRMaP	Biological Radiation Management Plan
CTA	container transfer area
DNA	deoxyribonucleic acid
ERDF	Environmental Restoration Disposal Facility
FY	fiscal year
ISS	Interim Safe Storage
RCCC	River Corridor Closure Contract
RDR/RAWP	remedial design report/remedial action work plan
SSA	soil staging area

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
ton	0.907	metric ton	metric ton	1.102	ton
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
cups	0.24	liters	liters	0.264	gallons
pints	0.47	liters	cubic meters	35.315	cubic feet
quarts	0.95	liters	cubic meters	1.308	cubic yards
gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
picocuries	37	millibecquerel	millibecquerels	0.027	picocuries

1.0 INTRODUCTION

This report documents the status of revegetation projects and natural resources mitigation efforts conducted for remediated waste sites and other activities associated with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* cleanup of National Priorities List waste sites at Hanford. This report contains the vegetation monitoring data that was collected in the spring and summer of 2011 from the River Corridor Closure Contractor's (RCCC) revegetation and mitigation areas on the Hanford Site.

The extent of each revegetation effort varied depending on the surrounding habitat, existing conditions, and future land-use designation of the area. The purpose of monitoring revegetation efforts is to measure the progress of plant succession and to evaluate the success of different planting techniques to improve RCCC site restoration success. Each area will be discussed separately and will include a brief description of the revegetation activities and the results from the 2011 monitoring efforts.

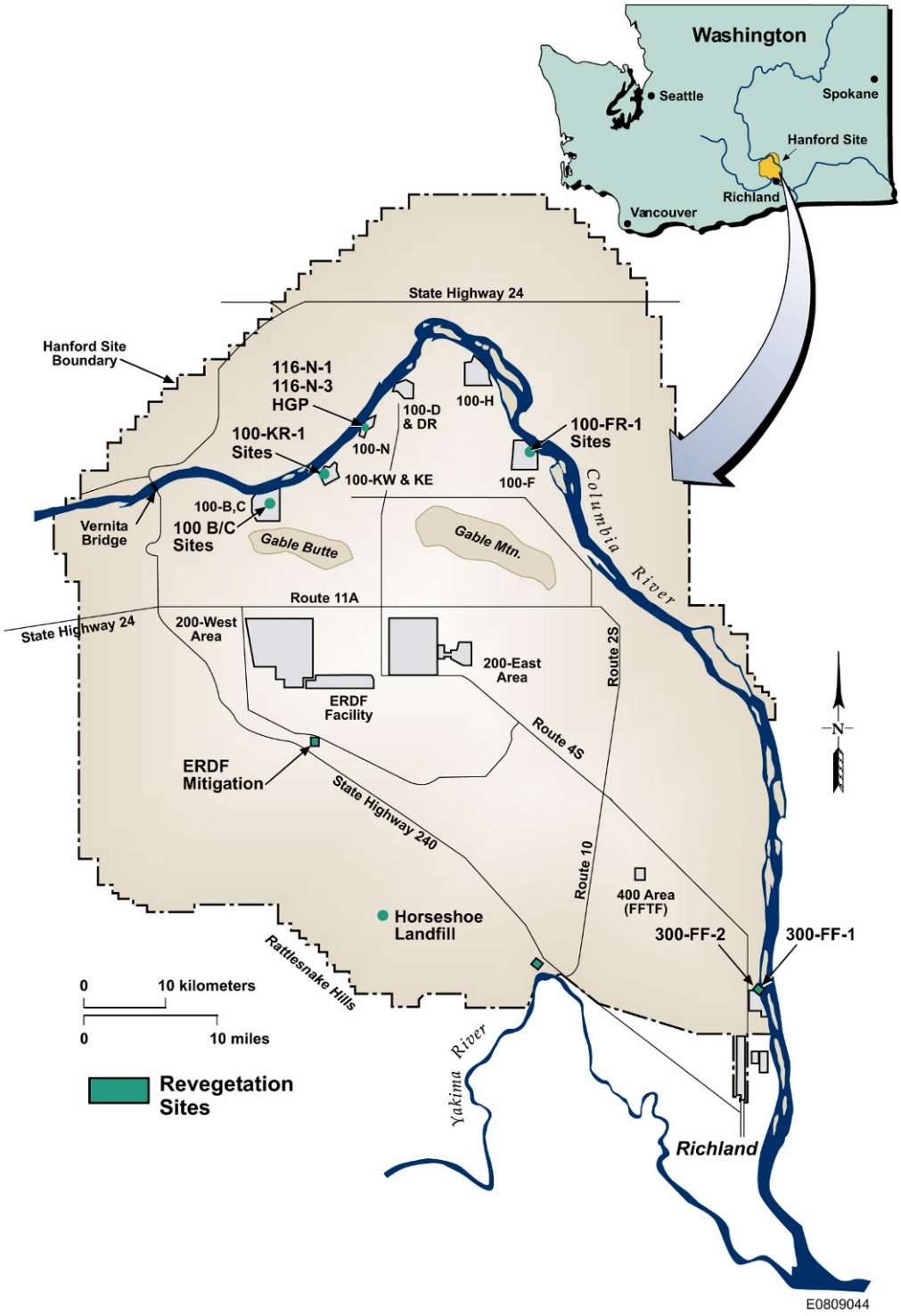
This report provides fifth-year survey results for the revegetated areas at 300-8, 618-4, 116-N-1, 100-C-9, and 118-B-2&3. Fourth-year monitoring was conducted at 182-F, 118-F-2, 118-F-1, 126-F-2, 100-F-26, 118-F-5, 118-C-1, 100-B-14, and 118-B-1. Third-year monitoring was performed at 118-F-6, 120-F-1, 1607-F1, 618-7, 600-111, and 600-149. Second-year monitoring was performed at 618-13, 100-B-27, and 100-B-28 (Figure 1).

Results from previous years' monitoring are provided in reports for each respective year (Lindsey and Johnson 2010, Lindsey et al. 2009, Lindsey and Gano 2008, and Gano and Lindsey 2007). The data tables from 2007, 2008, 2009, and 2010 are in Appendices A, B, C, and D of this report.

1.1 METHODS USED TO EVALUATE VEGETATION RECOVERY

Monitoring of revegetation and mitigation areas consisted of measuring the canopy cover of all plant species found on a site; the frequency of occurrence; and the survival of transplanted sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and spiny hopsage (*Grayia spinosa*) seedlings. All values were then converted to percentages. Canopy cover and frequency measurements were obtained using the methods described in *Steppe Vegetation of Washington* (Daubenmire 1970). Canopy coverage is defined in Daubenmire (1970) as "the percentage of ground surface included in the vertical projection of a polygon drawn around the extremities of undisturbed foliage of a plant." This method provides a measure of the amount of ground covered by each species. Because it is possible, in dense stands of vegetation for species to overlap one another, total measured vegetative cover can exceed 100%. Within each location, a series of plot frames (15 to 25 plot frames) were analyzed for the canopy cover of each species present. Frequency is represented as the percentage of occurrences that a species is observed in the number of plot frames measured. For example, if a species was represented in 10 out of 25 plot frames, its frequency would be 10/25 x 100 = 40%. Species that were observed within a revegetated area, but were not counted in a plot frame, were recorded as occurrences in the data tables, and denoted as an "X" in the tables.

Figure 1. Hanford Site Showing Locations of Revegetation Sites.



The relative magnitude of a frequency rating in comparison to a canopy coverage rating provides an index of species distribution and its influence within a vegetation community. At sites where shrubs were planted, survival was measured by counting a representative number of plants at the site, determining if the plants were dead or alive, and then calculating the percent survival.

This report uses taxonomic nomenclature from *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973). Some of the plant taxonomic names have been updated, and the revised names are provided in Appendix E of this report. Plant identification was conducted using the nomenclature in Hitchcock and Cronquist (1973) and also in *Vascular Plants of the Hanford Site* (Sackschewsky and Downs 2001).

The type and extent of each revegetation effort is based on the location of the project and the future land designation of that area. For example, portions of the 300 Area, including the 300-FF-1 Process Ponds and Burial Grounds restoration area, have been designated for future industrial use. Therefore, the objective of the revegetation effort is long-term interim stabilization. The *Hanford Site Biological Resources Management Plan* (BRMaP) (DOE-RL 2001) prescribes seeding crested wheatgrass (*Agropyron cristatum*); however, to increase species diversity over the 28.3-ha (69.9-ac) area, five additional grass species were planted. The objective of revegetation at most remedial action sites is to restore the land to plant communities that are dominated by native plants that will eventually provide wildlife habitat. Secondary objectives often include using different planting methods and techniques to improve success, while incorporating experience and knowledge gained from previous plantings.

Success criteria differ for each site with consideration of varying soil types and microclimatic conditions. For example, sandy areas promote different species with differing recovery rates and plant densities than those found in rocky soils; therefore, the criteria for judging success will be different. All sites will be evaluated based on the plant canopy cover, plant community composition, and survival and growth rates of the planted shrubs. These criteria are detailed in the *Revegetation Manual for the Environmental Restoration Contractor* (McLendon et al. 1997). A revegetation effort will be considered successful if the area is stabilized to prevent erosion and is dominated by recovering stands of native shrubs, forbs, and grasses. Areas identified for future industrial use may be stabilized with wheatgrass (*Agropyron*) varieties because of the potential for future land disturbance.

According to the Hanford Meteorological Station, the Hanford Site experienced cooler than normal temperatures during the spring of 2011. The average temperature during spring was 49.9 °F, which is 4.1° below normal. This ties the spring of 2011 as the second coldest spring on record. April was 0.3° below normal, May was 3.9°below normal, and June was 2.4° below normal. Overall native species diversity was down. The departure from normal temperatures may have been a significant factor in this observed change, delaying growth until later in the spring than usual. It is not expected that the reduction across the sites would have been due to the loss of stem density of any species, but subsequent monitoring at these sites may help to explain this trend.

2.0 300 AREA

Remediation in the 300-FF-2 Operable Unit began in 2004 with the remediation of the 300-8 Aluminum Shavings waste site, 600-47, and the 300-18 waste sites. Remediation at the 618-7 Burial Ground began in 2007 and was completed and revegetated in December 2008. Remediation of the 618-13 Burial Ground was initiated in January 2009 and continued for approximately 2 months. The site was revegetated in January 2010. Fifth-year monitoring efforts will be done at 618-4 in 2012.

2.1 300-8 ALUMINUM SHAVINGS

The 300-8 Aluminum Shavings site remediation included scraping the top 0.6 m (2 ft) of soil and debris from the surface. The excavations were not backfilled but recontoured to blend with the adjacent area. The site was broadcast seeded with a mixture of crested and bluebunch wheat grasses and mulched with straw the first week of January 2007.

Fifth-year monitoring was conducted at the 300-8 site on May 2, 2011 (Figure 2). The purpose of this revegetation remains interim stabilization; however, native plants have also become established at the site. Native cover increased over this site 14.7% in 2011 (Table 1). Native species made up 15 of the 28 species present. This high diversity is due to the intact sagebrush habitat that exists adjacent to the site. This shows the significance of maintaining sections of established habitat within or adjacent to remediation areas, even if the remaining habitat is minute in comparison.

2.2 618-7 BURIAL GROUND

The 618-7 site was broken down into three areas for monitoring, to show variation between the different portions of the plot. The container transfer area (CTA) was treated as a separate site, and the burial ground was split to have a north and south transect. The substrate on the north transect consists of fist-sized cobbles, while the south transect received a top dressing of fine-grained soil that was salvaged from the CTA area prior to the installation of the CTA. These areas were broadcast seeded with a mixture of native grasses including Sandberg's bluegrass, Indian ricegrass, bluebunch wheatgrass, prairie junegrass, bottlebrush squirreltail, and needle-and-thread grass. In addition, 134 kg/ha of Triple-16 fertilizer was added to the sites along with 4,480 kg/ha of straw mulch that was spread and crimped into the soil surface. Sagebrush and bitterbrush plugs were then planted into the seeded areas at 1,235 plants/ha.

The majority of the planted CTA area was bladed and graveled as part of a project not associated with the RCCC. As such, monitoring was not conducted at that portion of the 618-7 site. Third-year monitoring was performed at the remainder of the 618-7 site on May 3, 2011. Sandberg's bluegrass was the dominant species (Table 2). Native canopy cover increased at both the north cobble and south topsoil transects, up 22.3% at the north cobble portion and 5.9% more native canopy cover on the southern portion. The majority of this increase is accounted for by the increase in Sandberg's bluegrass in both areas. Sandberg's bluegrass increased 19.4% on the northern portion. A total of 10 native species were recorded on the site in 2011, down from 15 in 2010. Invasive species cover remains low (between 11 and 23%) for both the north cobble and south topsoil sites.

Figure 2. 300-8 Aluminum Shavings Waste Site in 2011.

Table 1. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	36.6	96.0
Agropyron cristatum[a] (crested wheatgrass)	16.0	84.0
Agropyron spicatum (bluebunch wheatgrass)	16.0	84.0
Holosteum umbellatum[a] (jagged chickweed)	4.1	68.0
Poa sandbergii (Sandberg's bluegrass)	3.7	68.0
salsola kali[a] (Russian thistle)	2.4	96.0
Draba verna[a] (spring whitlowgrass)	2.0	60.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.5	40.0
Festuca octoflora (slender sixweeks)	0.6	24
Erodium cicutarium[a] (storksbill)	0.3	12.0
Sisymbrium altissimum[a] (tumble mustard)	0.2	8.0
Artemisia tridentata (big sagebrush)	0.2	8.0
Oryzopsis hymenoides (Indian ricegrass)	0.2	8.0
Ambrosia acanthicarpa (bur ragweed)	0.2	8
Lactuca serriola[a] (prickly lettuce)	0.1	4.0
Eriogonum niveum (snow buckwheat)	0.1	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4
Epilobium paniculatum (tall willowherb)	0.1	4.0
Balsamorhiza careyana (Carey's balsamroot)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Machaeranthera canescens (hoary aster)	X	X
Chrysothamnus vicidiflorus (green rabbitbrush)	X	X
Oenothera pallida (pale evening primrose)	X	X
Melilotus alba[a] (sweetclover)	X	X
Phacelia hastata (whiteleaf scorpionweed)	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X
Crust	18.5	100.0
Soil	57.6	100.0
Litter	39.9	100.0
Total canopy cover (litter not included)	84.4	
Total Invasive % Cover	61.8	
Total Native % Cover	22.6	

[a] Invasive species

X = present but not counted in plot frames

Table 2. Percent Canopy Cover and Frequency of Occurrence at 618-7 in 2011.

Species	% Cover North Cobble	% Cover South Topsoil	% Freq of Occ North Cobble	% Freq of Occ South Topsoil
Poa sandbergii (Sandberg's bluegrass)	42.3	58.4	96.0	96.0
Bromus tectorum[a] (cheatgrass)	13.6	8.0	96.0	88.0
Salsola kali[a] (Russian thistle)	8.6	2.3	92.0	92.0
Agropyron spicatum (bluebunch wheatgrass)	4.9	0.8	76.0	32.0
Sitanion hystrix (bottlebrush squirreltail)	4.0	0.2	60.0	8.0
Lactuca serriola[a] (prickly lettuce)	0.9	--	36.0	--
Grayia spinosa (spiny hopsage)	0.2	X	8.0	X
Sisymbrium altissimum[a] (tumble mustard)	0.1	0.1	4.0	4.0
Erodium cicutarium[a] (storksbill)	0.1	0.6	4.0	24.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	X	4.0	X
Oryzopsis hymenoides (Indian ricegrass)	0.1	0.2	4.0	8.0
Tragopogon dubius[a] (yellow salsify)	0.1	--	4.0	--
Melilotus alba[a] (sweetclover)	0.0	--	0.0	--
Holosteum umbellatum[a] (jagged chickweed)	--	0.1	--	4.0
Draba verna[a] (spring whitlowgrass)	--	0.7	--	8.0
Poa bulbosa[a] (bulbous bluegrass)	--	0.1	--	4.0
Achillea millefolium (yarrow)	X	--	X	--
Artemisia tridentata (big sagebrush)	X	0.1	X	4.0
Machaeranthera canescens (hoary aster)	X	--	X	--
Oenothera pallida (pale evening primrose)	--	X	--	X
Crust	2.0	5.9	100.0	100.0
Soil	70.6	61.4	100.0	100.0
Litter	24.0	32.1	100.0	100.0
Total canopy cover (litter not included)	75.0	71.6		
Total Invasive % Cover	23.4	11.9		
Total Native % Cover	51.6	59.7		
Change in Native % Cover from 2010	+23.3	+5.9		

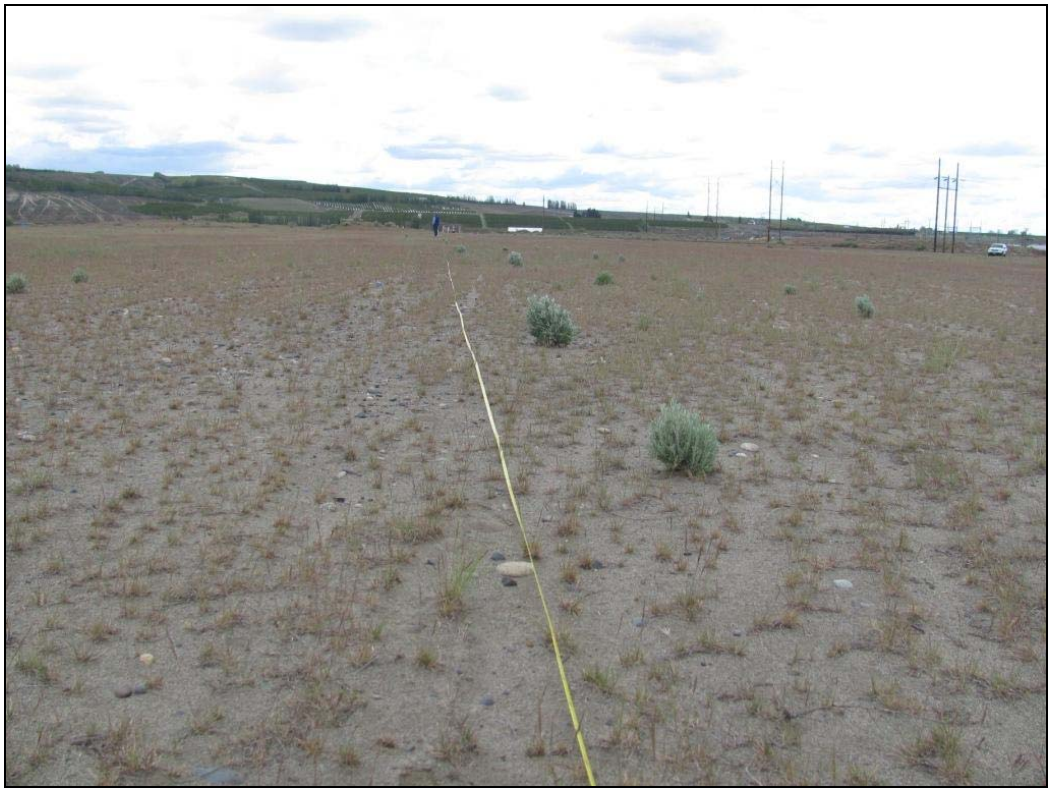
[a] Invasive species
X = present but not counted in plot frames
-- = Species not observed on site

Native canopy cover remains higher on the southern transect, however, native cover on the north is only down 8.1% compared to a significant difference of 25.5% in 2010. The cobble substrate does not appear to be as much of a limiting factor as anticipated. Native canopy and a higher diversity of native species was anticipated on the southern portion due to the seedbank

present in the topsoil, however, many species are better adapted to growing in topsoil than large river-cobble.

The established sagebrush monitoring transect was evaluated for shrub survival on May 3, 2011. The transect measures 100.3 m (329 ft) long and is located within the southern portion of the site. Transect monitoring estimates sagebrush survival at 83% (down 5% from 2010) and bitterbrush survival at 25% (down 25% from 2010) (Figure 3). Of the sagebrush seedlings still alive, 6.9% of them are blooming this year.

Figure 3. Sagebrush Transect on 618-7 Burial Ground (2011).



2.3 618-13 BURIAL GROUND

The 618-13 Burial Ground consisted of a mound of soil approximately 4.6 to 6.1 m (15 to 20 ft) high by 38 m (125 ft) long by 15 ft wide, covered with 0.6 m (2 ft) of clean soil. The mound of soil and debris was removed to grade and verified to be clean. The soil remaining at the site following removal of the mound is native sands and the seed bed for revegetation of the site. The area disturbed during remediation of the 618-13 Burial Ground was approximately one-half of an acre. The site was broadcast seeded with bluebunch wheatgrass, Sandberg's bluegrass, Indian ricegrass, needle-and-thread grass, and bottlebrush squirreltail grass seeds, and planted with bitterbrush and sagebrush seedlings in mid-January 2010.

Second-year monitoring of the 618-13 site was conducted on May 2, 2011. Cheatgrass was the dominant species at 56.2% canopy cover followed by Sandberg's bluegrass at 24.2% (Table 3).

Native species on the site yielded a total of 26.2%, up slightly from 2010. Because the size of the site, a shrub monitoring transect was not established on the site.

Table 3. Percent Canopy Cover and Frequency of Occurrence at 600-13 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	56.2	93.3
Poa sandbergii (Sandberg's bluegrass)	24.2	100.0
Sisymbrium altissimum[a] (tumble mustard)	7.0	86.7
Salsola kali[a] (Russian thistle)	2.3	93.3
Agropyron spicatum (bluebunch wheatgrass)	1.8	73.3
Erodium cicutarium[a] (storksbill)	0.8	33.3
Lactuca serriola[a] (prickly lettuce)	0.3	13.3
Festuca octoflora (slender sixweeks)	0.2	6.7
Oryzopsis hymenoides (Indian ricegrass)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Hordeum leporinum[a] (hare barley)	X	X
Crust	4.7	100.0
Soil	41.5	100.0
Litter	52.2	100.0
Total canopy cover (litter not included)	92.8	
Total Invasive % Cover	66.7	
Total Native % Cover	26.2	
Change in Native % Cover from 2010	+1.7	

[a] Invasive species
X = present but not counted in plot frames

3.0 100 AREA SITES

3.1 116-N-1

The 116-N-1 crib and trench were remediated to remedial action objectives, remedial action goals, and closure performance standards established by the U.S. Environmental Protection Agency and Washington State Department of Ecology in concurrence with the U.S. Department of Energy, Richland Operations Office (DOE-RL). The goals and objectives are documented in the *100-NR-1 Interim Remedial Action Record of Decision* (Ecology 2000) and *Remedial Design Report/Remedial Action Work Plan for the 100-NR-1 Treatment, Storage, and Disposal Units* (DOE-RL 2000).

Revegetation activities on the 116-N-1 crib and trench were conducted in December 2006. Native grass species were planted along with sagebrush at 1,235 plants/ha. Fifth-year monitoring was performed at the site in April 19, 2011 (Figure 4). Sandberg's bluegrass cover remained steady this year at 21.5% compared to 23.8 % in 2010. Cheatgrass cover however, was up from 6.4 % in 2010 to 40.4% this year (Table 4). Sagebrush cover and frequency has increased to 2.4% and 36% respectively compared to 1.8% and 16% in 2010. Total native cover has increased slightly to 30.8%. Sagebrush survival could not be measured this year because construction of a well-pad has destroyed one end of the monitoring transect, however, sagebrush has become well established at the site (Figure 4).

Figure 4. 116-N-1 Waste Site (2011) (Insert: Sagebrush in Bloom).

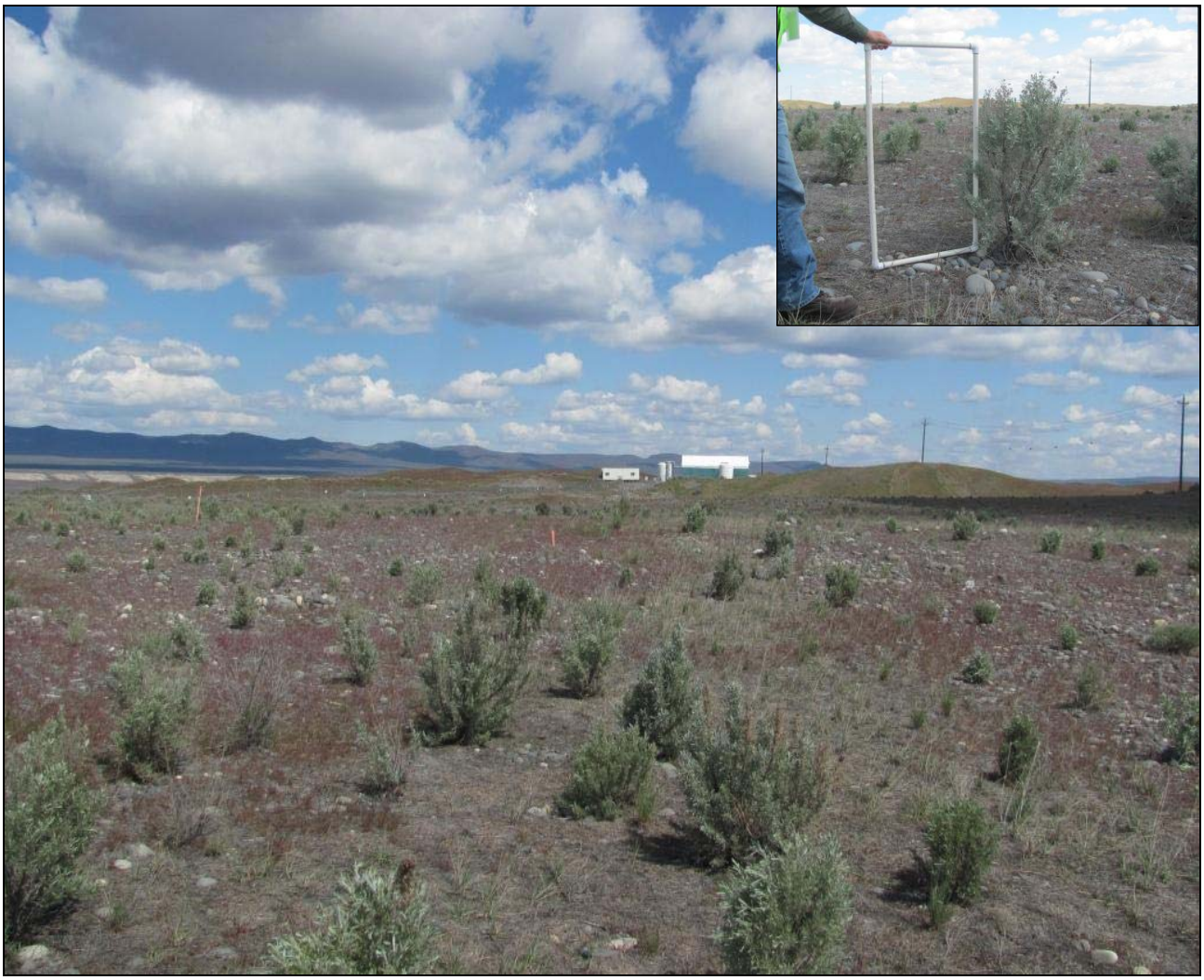


Table 4. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	40.4	96.0
Poa sandbergii (Sandberg's bluegrass)	21.5	92.0
Agropyron spicatum (bluebunch wheatgrass)	4.6	48.0
Artemisia tridentata (big sagebrush)	2.4	36.0
Agropyron dasytachyum (thickspike wheatgrass)	1.9	36.0
Salsola kali[a] (Russian thistle)	1.2	48.0
Sisymbrium altissimum[a] (tumble mustard)	1.2	48.0
Holosteum umbellatum [a] (jagged chickweed)	0.2	8.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	8.0
*Oryzopsis hymnoides (*Indian ricegrass)	0.1	4.0
Chaenactis douglasii (hoary falseyarrow)	0.1	4.0
Centaurea diffusa[a] (diffuse knapweed)	X	X
Achillea millefolium (yarrow)	X	X
Crust	0.0	88.0
Soil	46.0	92.0
Litter	45.0	92.0
Total canopy cover (litter not included)	73.8	
Total Invasive % Cover	43.0	
Total Native % Cover	30.8	
Change in Native % Cover from 2010	+1.2	

[a] Invasive species
X = present but not counted in plot frames

3.2 100-F SITES PLANTED IN 2008

Areas that were revegetated between December 2007, and February 2008, and that were monitored in 2011 include the 118-F-1, 118-F-2, 182-F, 183-F East Clearwell, 100-F-26, and 118-F-5. These sites were remediated to meet the objectives for interim closure as established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005a) and in the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Interim Action ROD) (EPA 1999). These sites were broadcast seeded with a mixture of native grasses including Sandberg's bluegrass, Indian ricegrass, bluebunch wheatgrass, prairie junegrass, bottlebrush squirreltail, and needle-and-thread grass. In addition, 134 kg/ha of Triple-16 fertilizer was added to the sites along with 4,480 kg/ha of straw mulch that was spread and crimped into the soil surface. Sagebrush plugs were then planted into the seeded areas at 1,200 plants/ha.

3.2.1 118-F-1

Fourth-year monitoring was conducted at the 118-F-1 site in 2011 (Figure 5). Sandberg's bluegrass became the dominant species monitored this year, increasing from 9.3% to 23.2% cover and 92% frequency of occurrence (Table 5). Thirteen native species were observed at the site, up three from the previous year. As anticipated, planted native grasses continue to thrive and out-compete the Russian thistle. Percent cover of native species is up 8.9% from 2010.

Sagebrush monitoring showed 60% survival, and of the surviving sagebrush, 46.7% were in bloom. This high survival, combined with a high percentage of blooming shrubs, provides early indication that the sagebrush planting was successful on this portion of the site. In contrast, no shrubs were observed alive on the second transect as of 2009. Heavily compacted soils on that portion of the site are a contributing factor to the poor sagebrush success (Figure 5). This is an excellent example of the necessity of ripping compacted soils prior to initiating revegetation efforts. Sagebrush recruits were observed on 10% of the plot. The remaining portions of the plot would benefit from additional shrub planting efforts.

3.2.2 118-F-2

Fourth-year monitoring was performed at the 118-F-2 site on May 11, 2011 (Figure 5). Sandberg's bluegrass remained the dominant species on the site, and increased over 11% from 2010 with 100% frequency of occurrence within the plot frames (Table 6). Fifteen native species were observed on the site in 2011. This represents high diversity for a site only in its third year. Overall, the native species on the site increased 11.5%.

Sagebrush monitoring was also counted on this site in 2011. Shrub survival remained stable at 12.5% from 2010, after a 2-year decrease. If sagebrush recruitment is not observed during the 2012 monitoring, the site will need to be rectified.

3.2.3 182-F

This site was divided into a north and south area, to distinguish between the backfilled northern plot where the soil is mostly coarse river cobble and the more fine-grained soil on the southern plot. The south plot was used as a staging area and had been invaded by nonnative species prior to revegetation, while the north plot lacked vegetation.

Fourth-year monitoring was performed at the 182-F site on May 17, 2011 (Figure 6). The dominant species with respect to canopy cover at both portions of the site was cheatgrass (Table 7). However, canopy cover in both areas significantly increased since 2010 monitoring. Sandberg's bluegrass was the next dominant native grass with cover of Russian thistle remaining low. These sites are very diverse, likely due to the presence of native topsoil on the south area. There were only 14 native species recorded across the two sites compared to 19 in 2010, along with 11 nonnative species, down 4 from the previous year. The data showed more native cover on the north compared to the south; however, both areas were dominated by nonnative cover. This site provides a good side-by-side comparison of areas that were revegetated at the same time; however, results are clouded by the presence of weedy species at the start of revegetation at the south site. This site will continue to provide an interesting comparison between revegetation with cobble versus fine-grained soil substrates. Sagebrush recruitment was observed on the north end of the site.

Figure 5. Compacted Soil at 118-F-1 Waste Site (2010) (Below: Planted Sagebrush at 118-F-2 at Soil Staging Area [2011]).

Table 5. Percent Canopy Cover and Frequency of Occurrence at 118-F-1 in 2011.

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	23.2	92.0
Bromus tectorum[a] (cheatgrass)	20.7	64.0
Salsola kali[a] (Russian thistle)	8.8	96.0
Holosteum umbellatum[a] (jagged chickweed)	2.3	52.0
Sitanion hystrix (bottlebrush squirreltail)	1.7	12.0
Agropyron spicatum (bluebunch wheatgrass)	1.0	20.0
Sisymbrium altissimum[a] (tumble mustard)	0.3	12.0
Draba verna[a] (spring whitlowgrass)	0.2	8.0
Erodium cicutarium[a] (storksbill)	0.1	4.0
Artemisia tridentata (big sagebrush)	0.1	4.0
Epilobium paniculatum (tall willowherb)	0.1	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Achillea millefolium (yarrow)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Oryzopsis hymenoides (Indian ricegrass)	X	X
Grayia spinosa (spiny hopsage)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Agoseris heterophylla (mountain dandelion)	X	X
Machaeranthera canescens (hoary aster)	X	X
Melilotus alba[a] (sweetclover)	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X
Chaenactis douglasii (hoary falseyarrow)	X	X
Erigeron pumilus (shaggy fleabane)	X	X
Hordeum leporinum[a] (hare barley)	X	X
Crust	8.7	100.0
Soil	45.0	100.0
Litter	31.6	100
Total canopy cover (litter not included)	58.6	
Total Invasive % Cover	32.5	
Total Native % Cover	26.1	
Change in Native % Cover from 2010	+8.9	

[a] Invasive species
X = present but not counted in plot frames

Table 6. Percent Canopy Cover and Frequency of Occurrence at 118-F-2 in 2011.

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	20.4	100.0
Bromus tectorum[a] (cheatgrass)	16.5	84.0
Salsola kali[a] (Russian thistle)	6.8	96.0
Sitanion hystrix (bottlebrush squirreltail)	3.5	44.0
Machaeranthera canescens (hoary aster)	1.7	12.0
Holosteum umbellatum[a] (jagged chickweed)	1.4	36.0
Sisymbrium altissimum[a] (tumble mustard)	0.9	16.0
Achillea millefolium (yarrow)	0.6	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	12.0
Agropyron spicatum (bluebunch wheatgrass)	0.2	8.0
Draba verna[a] (spring whitlowgrass)	0.2	8.0
Oryzopsis hymenoides (Indian ricegrass)	0.2	8.0
Lactuca seriola[a] (prickly lettuce)	0.1	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4.0
Centaurea diffusa[a] (diffuse knapweed)	X	X
Artemisia tridentata (big sagebrush)	X	X
Descurainia pinnata (western tansymustard)	X	X
Grayia spinosa (spiny hopsage)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Lepidium perfoliatum[a] (clasping pepperweed)	X	X
Sphaeralcea munroana (Monro's globemallow)	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X
Chaenactis douglasii (hoary falseyarrow)	X	X
Erigeron pumilus (shaggy fleabane)	X	X
Phacelia hastata (whiteleaf scorpionweed)	X	X
Erigeron poliospermus (cushion fleabane)	X	X
Crust	1.8	100.0
Soil	54.9	100.0
Litter	26.5	100.0
Total canopy cover (litter not included)	52.9	
Total Invasive % Cover	26.0	
Total Native % Cover	26.9	
Change in Native % Cover from 2010	+11.5	

[a] Invasive species
X = present but not counted in plot frames

Figure 6. 182-F in 2011.

Table 7. Percent Canopy Cover and Frequency of Occurrence at 182-F in 2011. (2 Pages)

Species	% Cover North	% Cover South	% Freq of Occ North	% Freq of Occ South
Bromus tectorum[a] (cheatgrass)	63.3	55.6	100.0	100.0
Poa sandbergii (Sandberg's bluegrass)	10.0	0.6	53.3	4.0
Tragopogon dubius[a] (yellow salsify)	8.8	--	33.3	--
Draba verna[a] (spring whitlowgrass)	3.3	0.3	33.3	12.0
Artemisia tridentata (big sagebrush)	2.8	0.1	46.7	4.0
Salsola kali[a] (Russian thistle)	2.2	6.3	86.7	96.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.0	X	6.7	X
Holosteum umbellatum[a] (jagged chickweed)	0.7	1.1	26.7	24.0
Centaurea diffusa[a] (diffuse knapweed)	0.5	2.3	20.0	32.0
Sitanion hystrix (bottlebrush squirreltail)	0.3	1.9	13.3	36.0
Erodium cicutarium[a] (storksbill)	0.2	5.9	6.7	60.0
Sisymbrium altissimum[a] (tumble mustard)	0.2	0.1	6.7	4.0
Agropyron spicatum (bluebunch wheatgrass)	0.2	0.1	6.7	4.0
Oryzopsis hymenoides (Indian ricegrass)	--	0.6	--	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.0	42.0	0.0	72.0

Table 7. Percent Canopy Cover and Frequency of Occurrence at 182-F in 2011. (2 Pages)

Species	% Cover North	% Cover South	% Freq of Occ North	% Freq of Occ South
Vicia cracca[a] (bird vetch)	--	0.1	--	4.0
Machaeranthera canescens (hoary aster)	--	0.1	--	4.0
Sporobolus cryptandrus (sand dropseed)	X	2.8	X	16.0
Grayia spinosa (spiny hopsage)	X	--	X	--
Sphaeralcea munroana (Munro's globemallow)	X	X	X	X
Artemisia campestris (Pacific sage)	X	--	X	--
Achillea millefolium (yarrow)	--	X	--	X
Lactuca serriola[a] (prickly lettuce)	--	X	--	X
Vebena bracteata (big-bract verbena)	--	X	--	X
Astragulus succumbens (crouching milkvetch)	--	X	--	X
Crust	4.0	10.9	100.0	100.0
Soil	33.3	17.7	100.0	100.0
Litter	64.7	80.3	100.0	100.0
Total canopy cover (litter not included)	93.5	119.9		
Total Invasive % Cover	70.3	113.7		
Total Native % Cover	14.3	3.4		
Change in Native % Cover from 2010	+6.3	-17.1		

[a] Invasive species
X = present but not counted in plot frames
-- = Species not observed on site

3.2.4 126-F-2 (183-F) East Clearwell

The 126-F-2 (183-F) East Clearwell revegetation was monitored for the fourth year on May 9, 2011 (Figure 7). Monitoring showed a significant increase of 68.5% in overall canopy cover from 2010 (Table 8). Overall, native species cover on the site increased 14.5%. Cheatgrass remained the dominant species with respect to canopy cover with a significant increase of 36%. The dominant native species this year was Sandberg's bluegrass at 22%, followed by gray rabbitbrush at 1.3% cover, and bottlebrush squirreltail at 1.2% cover. Monitoring efforts are indicating that cobble substrate in not a limiting factor in canopy cover; in fact canopy cover and native species cover both increased.

Due to the relatively small size of this revegetation, no sagebrush transect was established on the site. However, sagebrush survival appears to be extremely high at the site (Figure 7). Planted tubelings are already blooming, which is relatively uncommon for a site that is this young. Sagebrush seedlings (recruits) were observed for the first time on this site in 2010. This, along with the observed high survival rates, is indicative of successful reintroduction of sagebrush to this site.

Figure 7. Sagebrush Growing on 126-F-2.

Table 8. Percent Canopy Cover and Frequency of Occurrence at 126-F-2 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	41.2	100.0
Poa sandbergii (Sandberg's bluegrass)	22.2	93.3
Salsola kali[a] (Russian thistle)	4.8	93.3
Holosteum umbellatum[a] (jagged chickweed)	2.5	66.7
Centaurea diffusa[a] (diffuse knapweed)	2.2	20.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.3	20.0
Sisymbrium altissimum[a] (tumble mustard)	1.2	46.7
Sitanion hystrix (bottlebrush squirreltail)	1.2	46.7
Achillea millefolium (yarrow)	0.7	26.7
Draba verna[a] (spring whitlowgrass)	0.3	13.3
Agropyron spicatum (bluebunch wheatgrass)	0.2	6.7
Artemisia tridentata (big sagebrush)	0.2	6.7
Ambrosia acanthacarpa (bur ragweed)	0.2	6.7
Ranunculus testiculatus[a] (bur buttercup)	0.2	6.7
Astragulus succumbens (crouching milkvetch)	0.2	6.7
Poa bulbosa[a] (bulbous bluegrass)	0.2	6.7
Grayia spinosa (spiny hopsage)	X	X
Plantago patagonica (Indian wheat)	X	X
Hordeum leporinum[a] (hare barley)	X	X
Melilotus alba[a] (sweetclover)	X	X
Sphaeralcea munroana (Munro's globemallow)	X	X
Crust	5.0	100
Soil	40.7	100
Litter	39.0	100
Total canopy cover (litter not included)	78.5	
Total Invasive % Cover	52.5	
Total Native % Cover	26.0	
Change in Native % Cover from 2010	+14.5	

[a] Invasive species
X = present but not counted in plot frames

3.2.5 100-F-26 Pipelines

Fourth-year monitoring was performed at the 100-F-26 site on May 11, 2011. Monitoring showed an increase in both native and nonnative canopy cover. Nonnative canopy cover increased 20% from 2010, while native species cover increased 7.2% (Table 9). Continued monitoring at this site is expected to show the planted bunchgrasses are becoming established

on the site, Sandberg's bluegrass and bottlebrush squirreltail, becoming more dominant and beginning to out-compete the nonnative species. In 2011 cheatgrass remained the dominant species overall in regard to canopy cover and frequency, however Sandberg's bluegrass did increase in canopy cover 5%. No sagebrush monitoring transect was established on the site. Sagebrush has become established; however, some areas show a relatively thin stand, likely due to the compacted soils present (Figure 8). No shrubs were observed blooming on the site, but as the existing planted shrubs mature and begin to produce seed, they areas currently lacking shrubs on the site will begin to fill in.

Figure 8. Compacted Soil at 100-F-26.

Table 9. Percent Canopy Cover and Frequency of Occurrence at 100-F-26 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	50.0	100.0
Poa sandbergii (Sandberg's bluegrass)	25.5	100.0
Salsola kali[a] (Russian thistle)	2.2	86.7
Sisymbrium altissimum[a] (tumble mustard)	1.8	40.0
Sitanion hystrix (bottlebrush squirreltail)	1.8	40.0
Holosteum umbellatum[a] (jagged chickweed)	1.5	60.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.3	20.0
Centarea diffusa[a] (diffuse knapweed)	1.3	20.0
Artemisia tridentata (big sagebrush)	1.3	20.0
Agropyron spicatum (bluebunch wheatgrass)	1.2	13.3
Erodium cicutarium[a] (storksbill)	0.7	26.7
Draba verna[a] (spring whitlowgrass)	0.5	20.0
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Oryzopis hymenoides (Indian ricegrass)	X	X
Grayia spinosa (spiny hopsage)	X	X
Machaeranthera canescens (hoary aster)	X	X
Hordeum leporinum[a] (hare barley)	X	X
Erigeron pumilis[a] (shaggy fleabane)	X	X
Crust	6.3	100.0
Soil	26.2	100.0
Litter	57.7	100.0
	89.2	
Total Invasive % Cover	58.0	
Total Native % Cover	31.2	
Change in Native % Cover from 2010	+7.2	

[a] Invasive species
X = present but not counted in plot frames

3.2.6 118-F-5 Burial Ground

The 118-F-5 site was separated into two monitoring areas, the burial ground and the soil staging area (SSA), so that a comparison can be made between the contrasting soil types at the two areas. The burial ground was backfilled with coarse cobble from a local borrow area, while the soil staging area's substrate is native topsoil. The same revegetation effort was performed at both sites.

Fourth-year monitoring was conducted at the 118-F-5 site on May 9, 2011 (Figure 9). Both areas showed a significant increase in overall canopy cover on the site. The burial ground

canopy increased 32% overall, while the SSA increased over 78%, however native species canopy cover decreased in both areas (Table 10). Both areas showed very low native canopy cover during this year's monitoring, despite an increase observed in 2010. Both areas continue to be dominated by nonnative species, especially cheatgrass. The burial ground showed 60% cover of cheatgrass, while 52% cover was recorded at the soil staging area. If the bunchgrasses at these sites do not begin to compete with the cheatgrass in 2012, additional effort may be required for these sites to meet restoration goals.

Shrub survival was monitored at one transect on the soil staging area and one transect on the burial ground. Sagebrush survival was 21.95% on the SSA and 31% on the burial ground. In addition, 11 spiny hopsage plants were recorded on the soil staging area monitoring transect in 2008. Only one of those hopsage plants remained alive during 2011 monitoring. Sagebrush recruits were observed in areas where shrub survival was higher.

Figure 9. 118-F-5 (2011).

Table 10. Percent Canopy Cover and Frequency of Occurrence at 118-F-5 in 2011.

Species	% Cover BG	% Cover SSA	% Freq of Occ BG	% Freq of Occ SSA
Bromus tectorum[a] (cheatgrass)	60.3	52.3	100.0	100.0
Salsola kali[a] (Russian thistle)	5.8	4.0	100.0	93.3
Holosteum umbellatum[a] (jagged chickweed)	1.3	13.0	53.3	73.3
Machaeranthera canescens (hoary aster)	1.3	1.3	20.0	20.0
Oryzopsis hymenoides (Indian ricegrass)	0.7	0.5	26.7	20.0
Poa sandbergii (Sandberg's bluegrass)	0.5	1.2	20.0	13.3
Sisymbrium altissimum[a] (tumble mustard)	0.5	1.2	20.0	46.7
Agropyron spicatum (bluebunch wheatgrass)	0.2	0.2	6.7	6.7
Draba verna[a] (spring whitlowgrass)	0.2	2.3	6.7	60.0
Festuca octoflora (slender sixweeks)	0.2	0.5	6.7	20.0
Poa bulbosa[a] (bulbous bluegrass)	0.2	0.2	6.7	6.7
Chondrilla juncea[a] (rush skeletonweed)	0.2	X	6.7	X
Mircrosteris gracilis (pink microsteris)	--	0.7	--	26.7
Ambrosia acanthicarpa (bur ragweed)	--	0.2	--	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	--	X	--	X
Centaurea diffusa[a] (diffuse knapweed)	X	--	X	--
Achillea millefolium (yarrow)	X	X	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	1.3	X	20.0
Artemisia tridentata (big sagebrush)	X	0.2	X	6.7
Sitanion hystrix (bottlebrush squirreltail)	X	--	X	--
Conyza canadensis (mares tail)	X	--	X	--
Grayia spinosa (spiny hopsage)	--	X	--	X
Erigonum niveum (snow buckwheat)	--	X	--	X
Plantago patagonica (Indian wheat)	--	X	--	X
Chaenactis douglasii (hoary falseyarrow)	--	X	--	X
Crust	5.8	1.2	100.0	100.0
Soil	52.3	43.0	100.0	100.0
Litter	37.5	35.2	100.0	100.0
Total canopy cover (litter not included)	71.3	79.0		
Total Invasive % Cover	68.5	73.0		
Total Native % Cover	2.8	6.0		
Change in Native % Cover from 2010	-6.2	-2.6		

[a] Invasive species
BG = burial ground
SSA = soil staging area
X = present but not counted in plot frames
-- = Species not observed on site

3.3 2009 REVEGETATION AT 100-F

The 118-F-6, 120-F-1, and the 1607-F1 waste sites were revegetated in November 2008 and planted with Sandberg's bluegrass, Indian ricegrass, bluebunch wheatgrass, prairie junegrass, bottlebrush squirreltail, and needle-and-thread grass. In addition, 134 kg/ha of Triple-16 fertilizer was added to the sites along with 4,480 kg/ha of straw mulch that was spread and crimped into the soil surface. Sagebrush, hopsage, and bitterbrush plugs were then planted into the seeded areas at 1,200 plants/ha.

3.3.1 118-F-6 Burial Ground

The 118-F-6 revegetation was monitored for the third year on May 10, 2011. Sandberg's bluegrass took over as the dominant species on the site with a 10% canopy cover increase. Cheatgrass decreased 23% from the previous year. Overall canopy cover decreased from 2010; however, native species canopy cover increased 9% and out-competed nonnative species. Nine native species were observed on the site compared to only seven nonnatives (Table 11).

Shrub monitoring showed sagebrush survival continuing to decrease down from 57% in 2010 to 50% this year (Figure 10). Of the 11 antelope bitterbrush recorded along the original transect, none remained alive in 2011. Overall shrub survival is at the low end in terms of meeting restoration goals. Additional revegetation actions will likely be required at this site.

Figure 10. Sagebrush Transection on 118-F-6.

Table 11. Percent Canopy Cover and Frequency of Occurrence at 118-F-6 in 2011.

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	26.9	100.0
Bromus tectorum[a] (cheatgrass)	15.2	56.0
Salsola kali[a] (Russian thistle)	8.2	100.0
Holosteum umbellatum[a] (jagged chickweed)	1.7	48.0
Sitanion hystrix (bottlebrush squirreltail)	1.6	24.0
Draba verna[a] (spring whitlowgrass)	0.4	16.0
Sisymbrium altissimum[a] (tumble mustard)	0.2	8.0
Agropyron spicatum (bluebunch wheatgrass)	0.1	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	4.0
Achillea millefolium (yarrow)	0.1	4.0
Descurainia pinnata (western tansymustard)	0.1	4.0
Oryzopsis hymenoides (Indian ricegrass)	X	X
Cardaria draba[a] (whitetop)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Machaeranthera canescens (hoary aster)	X	X
Artemisia tridentata (big sagebrush)	X	X
Crust	3.3	100.0
Soil	44.1	100.0
Litter	35.3	100.0
Total canopy cover (litter not included)	54.6	
Total Invasive % Cover	25.7	
Total Native % Cover	28.9	
Change in Native % Cover from 2010	+9.6	

[a] Invasive species
X = present but not counted in plot frames

3.3.2 120-F-1 Glass Dump

Vegetation monitoring was performed at 120-F-1 site for the third year on May 5, 2011 (Figure 11). Russian thistle cover increased significantly, from only 2% cover in 2010 to 72% in 2011 (Table 12). Cheatgrass is now the dominant vegetation on the site, followed by jagged chickweed, and then planted Sandberg's bluegrass. Overall canopy cover increased 78%, but was largely contributed to nonnative species. Native species canopy cover dropped 20%, and only 15 native species were observed compared to 21 natives observed in the previous year. The native topsoil was stockpiled and redistributed across this site, providing a seed source and good soil to provide for this high species diversity. High native diversity is anticipated at this site, despite a drop in numbers this year. Another contributing factor is the adjacent native habitat to this site, showing the importance of minimizing impacts and maintaining intact habitat

in remediation areas. Planted sagebrush were observed as occurrences on this site but due to the small size, no monitoring transect was established.

3.3.3 1607-F1 Septic Tank

Third-year vegetation monitoring was performed at the 1607-F1 site on May 10, 2011 (Figure 12). Russian thistle remained the dominant species on the site, canopy cover increased 38% overall (Table 13). Sandberg's bluegrass continued to increase in canopy cover from 14% in 2009 to 16% in 2010 and 18% in 2011, although cheatgrass was the dominant grass on the site at 70% cover. This is still a relatively young revegetation area, as the planted perennial bunchgrasses, such as bottlebrush squirreltail and bluebunch wheatgrass, continue to grow and mature they will likely begin to outcompete the annual nonnative species for resources.

The sagebrush monitoring performed at the site showed 56% survival rate, which is stable from the previous year. Although this represents a significant drop from initial monitoring, it has become stable with 33% of the surviving shrubs in bloom. Shrub survival is still meeting restoration goals at this time. Subsequent monitoring efforts will show if the blooming shrubs begin to generate recruits at the site.

Figure 11. High Percentage of Introduced Species at 120-F-1 (2011).

Table 12. Percent Canopy Cover and Frequency of Occurrence at 120-F-1 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	72.2	100.0
Holosteum umbellatum[a] (jagged chickweed)	41.3	100.0
Poa sandbergii (Sandberg's bluegrass)	9.2	100.0
Plantago patagonica (Indian wheat)	3.8	26.7
Salsola kali[a] (Russian thistle)	2.2	86.7
Draba verna[a] (spring whitlowgrass)	1.2	46.7
Sitanion hystrix (bottlebrush squirreltail)	1.0	6.7
Sisymbrium altissimum[a] (tumble mustard)	0.5	20.0
Achillea millefolium (yarrow)	0.3	13.3
Sphaeralcea munroana (Munro's globemallow)	0.2	6.7
Machaeranthera canescens (hoary aster)	0.2	13.3
Microsteris gracilis (pink microsteris)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Artemisia tridentata (big sagebrush)	X	X
Lactuca seriola[a] (prickly lettuce)	X	X
Balsamorhiza careyana (Carey's balsamroot)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Chrysothamnus visidiflorus (green rabbitbrush)	X	X
Phlox longifolia (longleaf phlox)	X	X
Oenothera pallida (pale evening primrose)	X	X
Astragalus sclerocarpus (stalked pod milkvetch)	X	X
Crust	4.8	100
Soil	42.8	100
Litter	61.3	100
Total canopy cover (litter not included)	132.2	
Total Invasive % Cover	117.3	
Total Native % Cover	14.8	
Change in Native % Cover from 2010	-20.0	

[a] Invasive species
X = present but not counted in plot frames

Figure 12. Sagebrush at 1607-F1, Reactor in Background (2011).

Table 13. Percent Canopy Cover and Frequency of Occurrence at 1607-F-1 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	69.5	100.0
Poa sandbergii (Sandberg's bluegrass)	18.2	86.7
Holosteum umbellatum[a] (jagged chickweed)	10.0	80.0
Erodium cicutarium[a] (storksbill)	9.5	60.0
Salsola kali[a] (Russian thistle)	3.3	100.0
Sisymbrium altissimum[a] (tumble mustard)	1.7	33.3
Centaurea diffusa[a] (diffuse knapweed)	0.3	13.3
Draba verna[a] (spring whitlowgrass)	0.2	6.7
Tragopogon dubius[a] (yellow salsify)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Achillea millefolium (yarrow)	X	X
Artemisia tridentata (big sagebrush)	X	X
Grayia spinosa (spiny hopsage)	X	X
Sitainion hystrix (bottlebrush squirreltail)	X	X
Sphaeralcea muroana (Munro's globemallow)	X	X
Machaeranthera canescens (hoary aster)	X	X
Sporobolus cryptandrus (sand dropseed)	X	X
Erigeron pumilus (shaggy fleabane)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Crust	0.2	100.0
Soil	28.8	100.0
Litter	49.3	100.0
Total canopy cover (litter not included)	112.8	
Total Invasive % Cover	94.7	
Total Native % Cover	18.2	
Change in Native % Cover from 2010	-5.1	

[a] Invasive species
X = present but not counted in plot frames

3.4 100-B/C SITES PLANTED IN 2007

In 2007, the following waste sites in the 100-B/C Area were revegetated: 100-B-8, a portion of 100-B-14, 100-C-9, 126-B-3, 128-B-2, 128-B-3, 118-B-2, 118-B-3, and 1607-B-2. These sites were remediated to meet the objectives for interim closure as established in the 100 Area RDR/RAWP (DOE-RL 2005a) and in the Interim Action ROD (EPA 1999).

The total area that was revegetated was approximately 40.5 ha (100 ac). The sites were backfilled with pit-run gravel from borrow pit 24 and then revegetated by broadcast seeding with a native grass seed mix that included Sandberg's bluegrass, needle-and-thread grass, Indian

ricegrass, bluebunch wheatgrass, prairie junegrass, and bottlebrush squirreltail. Triple-16 fertilizer and polyacrylamide was applied with the grass seed. Upon the completion of seeding, the entire area was mulched with 4.5 metric tons/ha straw and crimped into the soil surface to prevent wind erosion. Upon completion of seeding, the sites were planted with sagebrush at approximately 1,300 plants/ha (530 plants/ac).

Fifth-year vegetation monitoring was performed at the 100-C-9 site on April 20, 2011 (Figure 13). This site was divided into three areas, each with separate vegetation monitoring sets and sagebrush transects, in order to increase the resolution of the monitoring. Transect 1 remains the most successful area at this site, with Sandberg's being the dominant species and nonnative canopy cover at 39.8%. Sandberg's bluegrass increased significantly on transects 2 and 3 and is expected to outcompete cheatgrass in the coming years. Transect 2 showed a 12% increase of Sandberg's bluegrass while transect 3 had a 48% increase in Sandberg's bluegrass from 2010. Bluebunch wheatgrass increased across all of the sites, and showed up in more than 20% of the plot frames. It is anticipated to see the perennial bunchgrasses competing well with nonnatives as it grows and matures. Native species canopy cover was up across all three areas; 19%, 36%, and 47% respectively (Table 14). On transects 1 and 2 native canopy cover dominated nonnative species.

Sagebrush monitoring at Transect 1 showed 88% survival, with 13% of those shrubs in bloom. Transect 2 remained at 95% survival, with 11% of the alive shrubs in bloom. Transect 3 also remained at a constant 62% survival, with 100% of the shrubs recorded alive in 2010 still surviving. Of these surviving shrubs, 38% of the shrubs on this site bloomed in the previous year. So although T3 shows lower survival rates, more of the remaining shrubs are blooming, which may in turn result in a greater level of recruitment. Sagebrush recruitment was observed across all transects. All three of the transects have stabilized regarding survival rates, have had high blooming percentages, and have started recruiting new volunteer sagebrush. This site is expected to continue to do well in the future.

Table 14. Percent Canopy Cover and Frequency of Occurrence at 100-C-9 in 2011.

Species	T1 % Cover	T2 % Cover	T3 % Cover	T1 % Freq of Occ	T2 % Freq of Occ	T3 % Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	39.8	34.3	55.7	100.0	100.0	100.0
Bromus tectorum[a] (cheatgrass)	19.2	47.5	64.8	100.0	100.0	100.0
Salsola kali[a] (Russian thistle)	2.5	2.3	4.2	100.0	93.3	100.0
Agropyron spicatum (bluebunch wheatgrass)	1.5	1.3	1.5	26.7	20.0	26.7
Sisymbrium altissimum[a] (tumble mustard)	0.7	0.2	0.2	26.7	6.7	6.7
Holosteum umbellatum[a] (jagged chickweed)	0.3	0.3	16.3	13.3	13.3	53.3
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	0.5	0.3	13.3	20.0	13.3
Erodium cicutarium[a] (storksbill)	--	0.2	12.0	--	6.7	40.0
Artemesia tridentata (big sagebrush)	2.3	2.0	0.5	26.7	13.3	20.0
Lactuca seriola[a] (prickly lettuce)	0.3	--	--	13.3	--	--
Oryzopisis hymnoides (Indian ricegrass)	0.5	1.7	--	20.0	33.3	--
Epilobium paniculatum (tall willowherb)	0.2	--	--	6.7	--	--
Tragopogon dubius[a] (yellow salsify)	X	--	--	X	--	--
Sitanion hystrix (bottlebrush squirreltail)	X	0.3	--	X	13.3	--
Chaenactic douglasii[a] (hoary falseyarrow)	X	0.2	--	X	6.7	--
Centaurea diffusa[a] (diffuse knapweed)	X	0.5	3.3	X	20.0	66.7
Machaeranthera canescens (hoary aster)	X	0.5	0.3	X	20.0	13.3
Ranunculus testiculatus[a] (bur buttercup)	X	--	--	X	--	--
Festuca octoflora (slender sixweeks)	--	0.3	--	--	13.3	--
Eriogonum vimineum (broom buckwheat)	--	13.0	--	--	40.0	--
Poa bulbosa[a] (bulbous bluegrass)	--	0.2	0.3	--	6.7	13.3
Erigeron poliospermus (cushion fleabane)	--	--	0.2	--	--	6.7
Crust	0.0	0.0	0.0	100.0	100.0	100.0
Soil	69.5	54.0	27.0	100.0	100.0	100.0
Litter	33.5	50.5	73.0	100.0	100.0	100.0
Total canopy cover (litter not included)	67.7	91.9	159.2			
Total Invasive % Cover	23.0	51.4	101.2			
Total Native % Cover	44.7	54.0	58.5			
Change in Native % Cover from 2010	+19.0	+36.2	+46.8			

[a] Invasive species
X = present but not counted in plot frames
-- = Species not observed on site

Figure 13. Sagebrush Transect at 100-C-9 (Left: 2008; Right: 2011) (Below: 100-C-9 [2011]; Insert 2008).

3.5 100-B/C SITES PLANTED IN 2008

In December 2007 and January 2008 the 100-B-14, 118-B-1, and 118-C-1 sites were revegetated. These sites were remediated to meet the objectives for interim closure as established in the 100 Area RDR/RAWP (DOE-RL 2005a) and in the Interim Action ROD (EPA 1999). These areas were broadcast seeded with a mixture of native grasses including Sandberg's bluegrass, Indian ricegrass, bluebunch wheatgrass, prairie junegrass, bottlebrush squirreltail, and needle-and-thread grass. In addition, 134 kg/ha of Triple-16 fertilizer was added to the sites along with 4,480 kg/ha of straw mulch that was spread and crimped into the soil surface. Sagebrush plugs were then planted into the seeded areas at 930 plants/ha.

3.5.1 100-B-14 Pipelines

Fourth-year monitoring was performed at the 100-B-14 site on April 26, 2011. Cheatgrass remains the dominant species with respect to canopy cover at this site, recorded at 53% canopy cover, an increase of 33% (Table 15). Sandberg's bluegrass also increased significantly, up 27% from 2010 monitoring. Overall, canopy cover was up 73%, a significant increase likely do to recovering from time of planting. Six native species were observed on the site this year, with an overall increase in canopy cover of 25%. It is expected to see the bunchgrasses to do well and compete with the cheatgrass in 2012.

Two sagebrush transects were established on this site in May 2008. First-year survival counts in May 2009 determined shrub survival on transect T1 to be 7% and T2 to be 65%. Monitoring in 2011 showed that the 7% of surviving shrubs from 2009 remain, but will require rectification. Survival of planted shrubs on transect T2 was up slightly to 67% due to plants incorrectly counted as dead. In January 2010, 560 sagebrush seedlings were planted across the 100-B-14 site within areas where shrub distribution was visually sparse to compensate for low shrub survival estimated on transect T1 in May 2009.

3.5.2 118-B-1 Burial Ground

On April 27, 2011, fourth-year vegetation monitoring was performed at the 118-B-1 site (Figure 15). This site is separated into two monitoring areas, the SSA and burial ground, so that differences can be observed. The SSA has soil with a greater proportion of fine-grained material than the burial ground, and because the same planting treatment was performed on each site, the different soil types can be compared in terms of the vegetative community it supports over the 5 years of monitoring. The SSA was not monitored in 2011 as it will be used to support remedial activities at 100-C-7:1. Greater concentrations and volumes of contaminated soils from 100-C-7:1 resulted in large excavations, requiring additional stockpiling areas. To keep contamination as close to the site as possible, the SSA was selected for close proximity and monitoring data showed it was not on target to meet restoration goals.

Sandberg's bluegrass took over as the dominant species on the burial ground, at 57% canopy cover; followed by cheatgrass and Russian thistle (Table 16). Canopy cover of bluebunch wheatgrass doubled from 2010. Continued growth and recruitment of Sandberg's bluegrass, along with the other planted grasses observed on the site is expected to result in the continued depression of the presence of Russian thistle on the site. Native cover increased 39%, with seven native species observed in 2011, down from 13 in 2010.

Figure 14. Spiny Hopsage and Sagebrush Observed at 100-B-14 (Bottom: Bunchgrasses).

Table 15. Percent Canopy Cover and Frequency of Occurrence at 100-B-14 in 2011.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	52.5	100.0
Poa sandbergii (Sandberg's bluegrass)	34.6	96.0
Holosteum umbellatum[a] (jagged chickweed)	10.2	84.0
Salsola kali[a] (Russian thistle)	5.8	96.0
Agropyron spicatum (bluebunch wheatgrass)	2.6	28.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.3	32.0
Poa bulbosa[a] (bulbous bluegrass)	1.2	8.0
Sisymbrium altissimum[a] (tumble mustard)	1.0	40.0
Centaurea diffusa[a] (diffuse knapweed)	0.8	12.0
Artemisia tridentata (big sagebrush)	0.8	12.0
Melilotus alba[a] (sweetclover)	0.8	8.0
Draba verna[a] (spring whitlowgrass)	0.6	24.0
Festuca octoflora (slender sixweeks)	0.2	4.0
Epilobium paniculatum (tall willowherb)	0.1	4.0
Lactuca seriola[a] *(*prickly lettuce*)*	X	X
Tragopogon dubius[a] *(*yellow salsify)	X	X
Ranunculus testiculatus[a] *(*bur buttercup*)*	X	X
Crust	0.1	100.0
Soil	5.5	100.0
Litter	34.2	100.0
Total canopy cover (litter not included)	112.5	
Total Invasive % Cover	72.9	
Total Native % Cover	39.6	
Change in Native % Cover from 2010	+25.4	

[a] Invasive species
X = present but not counted in plot frames

Figure 15. 118-B-1 Burial Ground (2011) (Left: Sagebrush Recruit; Right: Overview).

Table 16. Percent Canopy Cover and Frequency of Occurrence at 118-B-1 in 2011. (2 Pages)

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	57.4	96.0
Bromus tectorum[a] (cheatgrass)	42.0	96.0
Salsola kali[a] (Russian thistle)	16.3	96.0
Agropyron spicatum (bluebunch wheatgrass)	5.9	40.0
Sisymbrium altissimum[a] (tumble mustard)	0.5	20.0
Holosteum umbellatum[a] (jagged chickweed)	0.2	8.0
Draba verna[a] (spring whitlowgrass)	0.1	4.0
Erodium cicutarium [a] (storksbill)	0.1	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	4.0
Centaurea diffusa[a] (diffuse knapweed)	1.0	20.0
Artemisia tridentata (big sagebrush)	1.7	12.0
Lactuca seriola[a] (prickly lettuce)	0.2	8.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4.0
Erigeron pumilus (shaggy fleabane)	0.1	4.0
Festuca octoflora (slender sixweeks)	0.1	4.0
Vulpia myuros[a] (rattail fescue)	0.1	4.0
Hordeum leporinum[a] (hare barley)	0.1	4.0
Tragopogon dubius[a] (yellow salsify)	X	X
Chaenactis douglasii (hoary falseyarrow)	X	X
Melilotus alba[a] (sweetclover)	X	X
Crust	0.7	100
Soil	27.1	100

Table 16. Percent Canopy Cover and Frequency of Occurrence at 118-B-1 in 2011. (2 Pages)

Species	% Cover	% Freq of Occ
Litter	69.9	100
Total canopy cover (litter not included)	126.0	
Total Invasive % Cover	60.7	
Total Native % Cover	65.3	
Change in Native % Cover from 2010	+39.4	

[a] Invasive species
X = present but not counted in plot frames

A sagebrush monitoring transect was established on the 118-B-1 Burial Ground in May 2008. Shrub survival estimates in April 2011 estimated shrub survival at 42% with 67% of those plants blooming. To compensate for reduced sagebrush survival on the burial ground, 1,350 sagebrush seedlings were planted on the burial ground within areas that had visually reduced shrubs densities in January 2010. Sagebrush recruits were observed on the site in 2011 (Figure 15). Although survival rates are down slightly, recruits were observed, and blooming percentages of surviving shrubs was very high. It is expected to see more recruits in the following years and survival rates to stabilize.

3.5.3 118-C-1 Burial Ground

Fourth-year monitoring could not be conducted at 118-C-1 in 2011 as it was also used as a stockpiling area for 100-C-7 and 100-C-7:1 remedial action.

3.6 100-B/C SITES PLANTED IN 2009

In December 2009 through February 2010 the 100-B-27 and100-B-28 sites, along with several other small sites, were revegetated. These sites were remediated to meet the objectives for interim closure as established in the 100 Area RDR/RAWP (DOE-RL 2005a) and in the Interim Action ROD (EPA 1999). These areas were broadcast seeded with a mixture of native grasses including Sandberg's bluegrass, Indian ricegrass, bluebunch wheatgrass, bottlebrush squirreltail, and needle-and-thread grass. In addition, 134 kg/ha of Triple-16 fertilizer was added to the sites along with 4,480 kg/ha of straw mulch that was spread and crimped into the soil surface. Sagebrush and spiny hopsage plugs were then planted into the seeded areas at 1,235 plants/ha.

3.6.1 100-B-28 Sodium Dichromate Transfer Pipeline

Second-year revegetation monitoring was performed at the 100-B-28 site April 26, 2011 (Figure 16). The site is dominated by Sandberg's bluegrass at 38% with a 100% frequency rate, followed by Russian thistle and bluebunch wheatgrass (Table 17). Six of the 18 species observed were native and outcompeted nonnative species in canopy cover by 56%. Native species are expected to continue to do well and diversify as the site matures.

A shrub monitoring transect was established in 2010 to provide a reference for shrub survival across the plot. Planted sagebrush and spiny hopsage tubelings were recorded along the transect. Sixty-seven sagebrush and 36 hopsage were recorded along the 100-m (328.1-ft)long transect. Sagebrush survival was recorded at 68%, down 28% from the previous year, while hopsage was recorded at 68% survival. Blooming shrubs were not observed at this stage of monitoring.

Figure 16. 100-B-28 Sodium DichromateTransfer Pipeline in 2011.

Table 17. Percent Canopy Cover and Frequency of Occurrence at 100-B-28 in 2011.

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	82.7	100.0
Salsola kali[a] (Russian thistle)	25.3	100.0
Agropyron spicatum (bluebunch wheatgrass)	13.0	84.0
Bromus tectorum[a] (cheatgrass)	9.0	100.0
Sisymbrium altissimum[a] (tumble mustard)	2.0	88.0
Draba verna[a] (spring whitlowgrass)	1.3	72.0
Holosteum umbellatum[a] (jagged chickweed)	1.0	64.0
Lactuca seriola[a] (prickly lettuce)	0.8	60.0
Hordeum leporinum[a] (hare barley)	0.7	56.0
Sitanion hystrix (bottlebrush squirreltail)	0.5	52.0
Ranunculus testiculatus[a] (bur buttercup)	0.5	52.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	48.0
Poa bulbosa[a] (bulbous bluegrass)	0.3	48.0
Chorispora tenella[a] (blue mustard)	0.3	48.0
Grayia spinosa (spiny hopsage)	0.2	44.0
Epilobium paniculatum (tall willowherb)	X	X
Erodium cicutarium[a] (storksbill)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Crust	2.2	100.0
Soil	18.0	100.0
Litter	78.2	100.0
Total canopy cover (litter not included)	138.0	
Total Invasive % Cover	41.3	
Total Native % Cover	96.7	
Change in Native % Cover from 2010	+56.2	

[a] Invasive species
X = present but not counted in plot frames

3.6.2 100-B-27 Sodium Dichromate Spill

The revegetation at the 100-B-27 site was monitored for the second time on April 27, 2011 (Figure 17). While conducting the initial vegetation monitoring on the site, seed germination on the western portion was significantly lower than the eastern portion. The eastern portion of the site was planted on February 10, 2010, while the western half of the site was planted on February 25, 2010. On September 1, 2010, the site was walked down again to evaluate the seeding success and it was decided that the western portion of the site would need to be rectified. The site was rectified in fall 2010. Native grasses dominated both areas in 2011, with

Sandberg's bluegrass at 19% canopy cover on the east and 30% on the west. Seven native species were observed on the site, native species canopy cover dominated nonnative by 20% with an overall increase in 39% increase from 2010 (Table 18).

An 82-m (269-ft) long shrub monitoring transect was established on the eastern portion of the site, and a 99-m (324.8-ft) long transect was established on the western portion post rectification in April 2011. Sagebrush survival on the east remained stable. First-year monitoring on the west showed a 99% survival rate of sagebrush and 95% survival rate of spiny hopsage.

Figure 17. 100-B-27 Sodium Dichromate Spill Site (2011) (Top: Western Portion Rectified [2010]; Bottom: Sagebrush and Bunchgrasses on East.

Table 18. Percent Canopy Cover and Frequency of Occurrence at 100-B-27 in 2011.

Species	% Cover East	% Cover West	% Freq of Occ East	% Freq of Occ West
Poa sandbergii (Sandberg's bluegrass)	18.5	30.3	100.0	100.0
Bromus tectorum[a] (cheatgrass)	4.8	2.8	93.3	80.0
Salsola kali[a] (Russian thistle)	21.3	4.2	93.3	100.0
Agropyron spicatum (bluebunch wheatgrass)	24.8	4.0	100.0	93.3
Sisymbrium altissimum[a] (tumble mustard)	2.3	3.5	60.0	73.3
Grayia spinosa (spiny hopsage)	--	0.2	--	6.7
Tragopogon dubius[a] (yellow salsify)	--	0.2	--	6.7
Sitanion hystrix (bottlebrush squirreltail)	--	3.7	--	53.3
Chorispora tenella[a] (blue mustard)	--	0.7	--	26.7
Poa bulbosa[a] (bulbous bluegrass)	--	0.2	--	6.7
Holosteum umbellatum[a] (jagged chickweed)	0.2	--	6.7	--
Artemisia tridentata (big sagebrush)	0.2	0.5	6.7	20.0
Descurainia pinnata (western tansymustard)	4.7	--	26.7	--
Lactuca serriola[a] (prickly lettuce)	0.7	--	26.7	--
Oryzopsis hymenoides (Indian ricegrass)	1.2	--	13.3	--
Sitanion hystrix (bottlebrush squirreltail)	0.7	--	26.7	--
Hordeum leporinum[a] (Hare barley)	0.2	--	6.7	--
Ranunculus testiculatus[a] (bur buttercup)	0.2	--	6.7	--
Melilotus alba[a] (sweetclover)	X	--	X	--
Centaurea repens[a] (diffuse knapweed)	X	--	X	--
Crust	0.2	0.0	100.0	100.0
Soil	36.0	20.2	100.0	100.0
Litter	61.5	75.2	100.0	100.0
Total canopy cover (litter not included)	79.7	50.2		
Total Invasive % Cover	29.7	11.5		
Total Native % Cover	50.0	38.7		
Change in Native % Cover from 2010	+39.1			

[a] Invasive species
X = present but not counted in plot frames
-- = Species not observed on site

4.0 600 AREA SITES

Remedial action of waste sites 600-111 and 600-149:2 within the 100-IU-2 Operable Unit were initiated in 2008. The remedial action objectives and goals were established by the U.S. Environmental Protection Agency and the Washington State Department of Ecology, in concurrence with the DOE-RL and documented in the Interim Action ROD (EPA 1999). The sites were excavated to the extent required to meet specified soil cleanup levels, the contaminated materials were disposed of at the Environmental Restoration Disposal Facility (ERDF), and the sites were backfilled and contoured to match the adjacent area in December 2008. These areas were broadcast seeded with a mixture of native grasses including Sandberg's bluegrass, Indian ricegrass, bluebunch wheatgrass, prairie junegrass, bottlebrush squirreltail, and needle-and-thread grass. In addition, 134 kg/ha of Triple-16 fertilizer was added to the sites along with 4,480 kg/ha of straw mulch that was spread and crimped into the soil surface. Sagebrush and bitterbrush plugs were then planted into the seeded areas at 1,235 plants/ha.

4.1 600-111 CRITICALITY MASS LABORATORY

Third-year revegetation monitoring was done at the 600-111 site on May 3, 2011 (Figure 18). Sandberg's bluegrass increased 37% from 2010 and was observed as the dominant species at the site with a frequency of 80%. As expected, Russian thistle, cheatgrass, and tumble mustard covers remained low (Table 19). Overall, native canopy cover increased 22% on the site and out-competed nonnative species by 6%. Five native species were observed on the site, a decrease from 2010.

The shrub monitoring transect established in 2009 was evaluated for survival during the May site visit. Of the sagebrush and hopsage monitored, survival was calculated to be 68% and 80%. Survival rates of sagebrush increased significantly, most likely due to surviving shrubs counted incorrectly as dead. Overall shrub survival on the transect is 72% with 2% of those shrubs in bloom. Monitoring of these shrubs will continue for the next 4 years.

4.2 600-149:2 SMALL ARMS RANGE

The revegetated 600-149:2 site was monitored for the third time on May 3, 2011 (Figure 19). Sandberg's bluegrass took over as the dominant species at 86% cover and 100% frequency, an increase of 80% canopy cover from 2010. Overall native species dominated canopy cover by 58% with a site wide increase of 67% from last year (Table 20). Six native species were observed on the site this year, with the adjacent mature landscape it is expected to see an increase in native diversity as the site matures. Sagebrush recruitments were also observed on the site, not from the seedlings planted as they are not yet blooming but from the shrubs surrounding the site.

Figure 18. 600-111 Site of Former Criticality Mass Laboratory (2011) (Top: Planted Sagebrush and Grasses [2011 Monitoring]; Bottom: End of Sagebrush Transect [2011]).

Table 19. Percent Canopy Cover and Frequency of Occurrence at 600-111 in 2011.

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	40.0	80.0
Bromus tectorum[a] (cheatgrass)	20.0	100.0
Holosteum umbellatum[a] (jagged chickweed)	9.5	60.0
Salsola kali[a] (Russian thistle)	2.0	80.0
Sisymbrium altissimum[a] (tumble mustard)	1.7	33.3
Draba verna[a] (spring whitlowgrass)	0.7	26.7
Artemesia tridentata (big sagebrush)	0.2	6.7
Erodium cicutarium[a] (storksbill)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Achillea millefolium (yarrow)	X	X
Grayia spinosa (spiny hopsage)	X	X
Tragopon dubius[a] (yellow salsify)	X	X
Lepidium perfoliatum[a] (clasping pepperweed)	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X
Crust	32.0	100.0
Soil	46.8	100.0
Litter	41.2	100.0
Total canopy cover (litter not included)	74.2	
Total Invasive % Cover	34.0	
Total Native % Cover	40.2	
Change in Native % Cover from 2010	+21.9	

[a] Invasive species
X = present but not counted in plot frames

Figure 19. Sagebrush on 600-149:2 Small Arms Range (2011).

Table 20. Percent Canopy Cover and Frequency of Occurrence at 600-149:2 2011. (2 Pages)

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	86.0	100.0
Holosteum umbellatum[a] (jagged chickweed)	13.5	93.3
Bromus tectorum[a] (cheatgrass)	10.0	100.0
Agropyron spicatum (bluebunch wheatgrass)	2.2	20.0
Sisymbrium altissimum[a] (tumble mustard)	2.2	53.3
Draba verna[a] (spring whitlowgrass)	2.0	80.0
Lactuca seriola[a] (prickly lettuce)	1.0	6.7
Salsola kali[a] (Russian thistle)	0.8	33.3
Festuca octoflora (slender sixweeks)	0.5	20.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	6.7
Tragopogon dubius[a] (yellow salsify)	0.2	6.7
Hordeum leporinum[a] (hare barley)	0.2	6.7

Table 20. Percent Canopy Cover and Frequency of Occurrence at 600-149:2 2011. (2 Pages)

Species	% Cover	% Freq of Occ
Poa bulbosa[a] (bulbous bluegrass)	0.2	6.7
Achillea millefolium (yarrow)	X	X
Artemisia tridentata (big sagebrush)	X	X
Crust	14.0	100.0
Soil	14.0	100.0
Litter	86.0	100.0
Total canopy cover (litter not included)	118.8	
Total Invasive % Cover	30.0	
Total Native % Cover	88.8	
Change in Native % Cover from 2010	+67.1	

[a] Invasive species
X = present but not counted in plot frames

5.0 REVEGETATION MITIGATION

In 2003, the ERDF began Phase III expansion to construct disposal cells 5 and 6. Construction of the new cells occurred entirely within the disturbed footprint of the ERDF fence. However, an area south of the perimeter fence was impacted by placement of the overburden pile. The *Revised Mitigatin Action Plan for the Environmental Restoration Disposal Facility* (DOE-RL 2005b) was updated to develop appropriate mitigation strategies for this and future expansions.

At the time of the initial construction of the ERDF in 1995, a majority of the 4.1-km^2 (1.6-mi^2) area was dominated by mature sagebrush and late successional grasses and forbs and considered high-quality, Level III habitat, as defined in BRMaP (DOE-RL 2001). Compensatory mitigation actions conducted for the construction of ERDF Cells 1 through 4 were based on a replacement ratio of 3:1 as appropriate for Level III sagebrush habitat. The large fire in the summer of 2000 burned most of the 4.1-km^2 (1.6-mi^2) area identified for future ERDF expansion. Although the area has started to recover, it is no longer dominated by an overstory of sagebrush and no longer fits the definition of Level III habitat. Late successional grasses and forbs are still present; however, live mature sagebrush are sparse and the area now meets the definition of Level II habitat. However, since the understory of grasses and forbs are still intact and a small component of sagebrush still exists, some level of mitigation/rectification was needed. The Mitigation Action Plan (DOE-RL 2005b) determined that the appropriate mitigation ratio for the area south and east of ERDF would be 1:1. Construction activities at ERDF and impacts from expanding Borrow Pit 30 to supply gravel, required that approximately 20 ha (50 ac) of mitigation be performed.

To maximize the effectiveness of the mitigation effort, sagebrush was planted on 25 ha (62 acres) that included four 4-ha (10-acre) islands separated by 100 m (328 ft) in

February 2007. Each island was planted at a density of 1,000 plants/ha (400 plants/ac). The areas between the islands were planted at a density of 444 plants/ha (180 plants/ac) in an area south of ERDF that straddles the Army Loop Road (Figure 20). This configuration takes advantage of the Army Loop Road, which could serve as fire break or natural location to fight a fire if one should threaten this area.

In addition to planting sagebrush, 10 artificial burrowing owl nest boxes were installed in the area (Figure 20 and 21). Burrowing owls have been observed in this area previously, and this will increase the opportunity for nesting pairs to become established in the area.

The burrowing owl nest boxes were maintained and monitored during 2011. There is some information in the available literature that shows that disturbance around the entry of an artificial burrow may attract owls. So during maintenance, which typically involves removing soil and debris from the opening of the tunnels, soil was dug out in front of the entry to imitate the soil mound at the opening of a badger burrow (Figure 21). Burrowing owl pellets were observed for the first time during the spring of 2011, indicating burrowing owl activity (Figure 21).

Third-year monitoring of mitigation for disposal cells 5 and 6 that was conducted in 2009 of the sagebrush transects planted along the Army Loop Road yielded survival of 22% and 36%. To compensate for the low shrub survival, 7,200 sagebrush seedlings were planted in January 2010 at the same time as the mitigation for planting of 31,100 seedlings for the construction of the ERDF disposal super cell 9 and expansion and use of Pit 30. The rectification planting along with the super cell 9 mitigation planting were installed along the north side of the BC Cutoff road (Figure 22). First-year monitoring of the super cell 9 mitigation monitoring transects had mixed results. The sagebrush seedlings planted between November 30 and December 3, 2009, just before an extended period of freezing temperatures and frozen ground had dismal survival, estimated less than 5% survived and is considered a complete loss. Shrubs planted after January 4, 2010, were monitored by vendor with plant survival ranging from 10% to 62%. To compensate for the reduced shrub survival within super cell 9 mitigation planting and construction of ERDF disposal cell 10, an additional 56,500 seedlings will be planted in the fall of fiscal year (FY) 2011 north of the BC Cutoff road. The previously monitored plants plus all new installations will be monitored for survival in 2012.

Figure 20. ERDF Mitigation Site Along Army Loop Road.

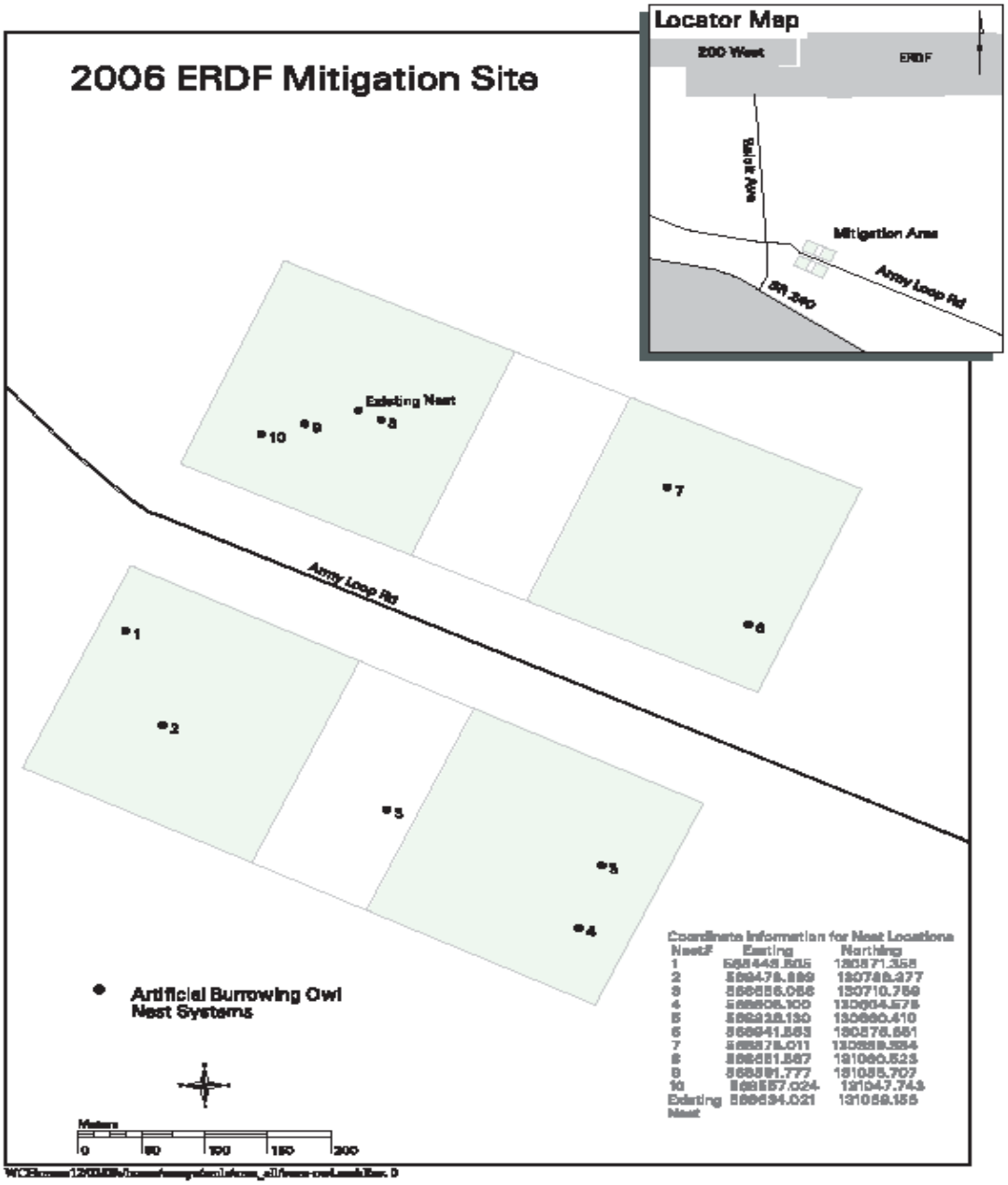


Figure 21. Burrowing Owl Nest Box Maintenance (Left: Before Maintenance; Right: Burrowing Owl Pellets [2011]; Below: Entrance After Maintenance).

Figure 22. ERDF Mitigation Sagebrush Planting North of BC Cuttoff Road (January 2010).

6.0 BAT MITIGATION PROJECTS

Bat mitigation projects have been conducted at two reactor sites, 105-D/DR and 105-F, to mitigate for roosting habitat that was lost as a result of the Interim Safe Storage (ISS) projects at these reactors. The purpose of the ISS projects was to remove all of the ancillary structures from the reactor buildings, seal all penetrations, and install new steel roofs to prevent intrusion from animals. Ecological reviews conducted prior to the initiation of these projects identified the presence of multiple bat species utilizing the reactors as maternity roosts, where they rear their young. These bats are listed as Washington State priority species at communal roosts and breeding areas and require mitigation according to the BRMaP (DOE-RL 2001). The mitigation projects conducted at the reactor sites included establishing the process water tunnels at 100-D Area as alternative roost sites and installing artificial roost boxes at 105-F Reactor. A third mitigation project was initiated at the 183-F Clearwell in July 2007 to begin investigating a colony of more than 2,000 bats that were using the facility. The facility was slated for eventual demolition, so a mitigation plan was needed to determine the path forward for this facility and the bats occupying it.

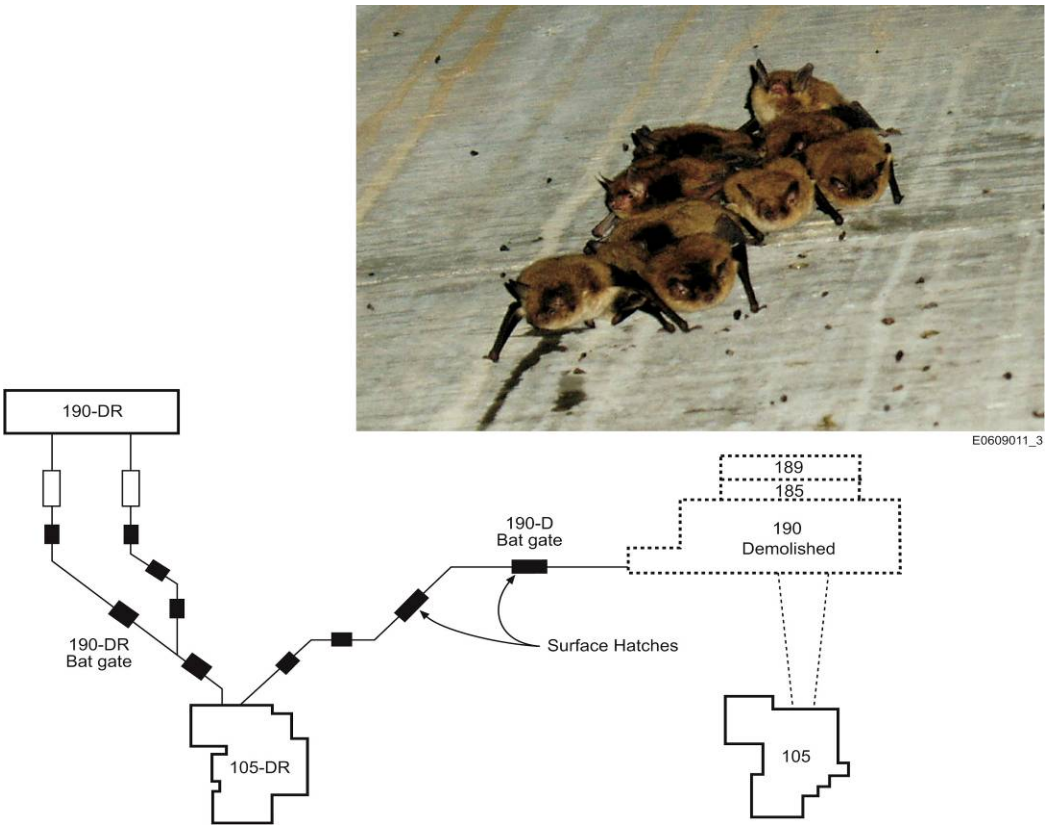
6.1 BAT MITIGATION AT 190-D AND –DR PROCESS WATER TUNNELS

Bat mitigation project at 100-D Area was initiated when a suspected maternity roost was discovered in one of the process water tunnels connected to the 105-DR Reactor. The ISS project plan included isolating the tunnels from the reactor, which would eliminate the bats' access to the tunnels and cause the loss of the maternity roost. Approval and concurrence from the DOE-RL in CCN 060625, "Mitigation for Loss of Bat Habitat in the 105-DR Reactor Facility" (DOE-RL 1998), provided direction to maintain bat access and mitigate for roosting habitat that would be lost as a result of ISS. Alternate accesses were provided on both tunnel systems that entered the 105-DR valve pit by installing bat gates on access hatches (Figure 23). One tunnel originated at the 190-D Water Pump House, as a redundant water supply, and two tunnels

originated from the 190-DR Water Pump House that come together just west of the valve pit. The original purpose of these tunnels was to provide the primary cooling water supply for the 105-DR Reactor (Figure 24). The noncontaminated process water tunnels are built with a zig-zag design to allow for expansion of the piping. Each straight leg of the tunnels contains a surface hatch to provide access in case a pipe section had to be replaced. These surface hatches provide the actual roost sites for the bats because of the solar heating of the hatch covers, providing a favorable site to rear young. The bat gates were placed over hatches on both tunnel systems. The gate on the 190-D tunnel was installed in fall 1998 and the gate on the 190-DR tunnel system was installed in fall 1999.

Figure 23. 190-DR Bat Gate.

Figure 24. 190-D/DR Tunnel System.



Monitoring of bat roosting began in July 1999. The gate on the 190-D tunnel had been installed and the tunnels were still accessible from the reactor valve pit. There were approximately 19 bats observed in the 190-D tunnel and 36 in the 190-DR tunnels. No inspection of the tunnels was made during 2000; however, a small number of bats were observed emerging from the gates in August 2000 approximately 1 hour after sundown, which verified that they had found the bat gate entrance and were continuing to use the tunnels. No observations were made during 2001.

The 190-D tunnel has not been entered since the reactor valve pit was backfilled because there is no walk-in access available. However, video recording of the emergence from the bat gate at the 190-D tunnel, using an infrared video camera, allowed for an estimation of the population using this structure. On July 7, 2010, approximately 340 individuals were observed exiting through the bat gate. This number is much higher than the 30 to 40 individuals that have been counted previously, using manual counting techniques. This now represents a very sizable colony, but the relationship between this colony and the colony at the 190-DR tunnels is not well understood. The 190-DR tunnels were accessible from the 190-DR north valve house (at the west end of the tunnel) until 2005 when the valve houses were demolished along with the 190-DR facility. At the completion of the demolition project, a walk-in door was provided in the south tunnel where it connected to the valve house. Inspections of the 190-DR tunnels have been conducted from 2002 to 2005, and the number of bats roosting in the hatches was counted. The numbers counted were as follows: 107 in 2002, 99 in 2003, 98 in 2004, and 97 in 2005. A second inspection was made on July 27, 2005, and a total of 170 bats were counted. The bats appeared to roost at all the hatches except the ones where the bat gates are located.

Often the majority of the population would roost in the same hatch which would contain several small clusters of mothers with their young and contain from 5 to 50 individuals.

In July 2006, it was discovered that someone had placed chicken wire over the entrance to the 190-DR bat gate during the previous winter, which prevented the bats from flying through the gate and roosting in the tunnel. The chicken wire was immediately removed and the tunnel was again inspected for bats on September 21, 2006. There were about 20 bats found roosting as individuals and small clusters. Because the roost site in 190-DR was not available to the bats for most of the summer of 2006, the bat gate on190-D tunnel was monitored for emerging bats on August 9, 2006, and 25 to 35 bats were counted emerging from the tunnel. The bats would often circle the bat gate and occasionally go back in, making it difficult to get an accurate count.

In 2007, mist netting was performed at the 190-DR process water tunnel in order to capture bats. This was done in conjunction with other bat monitoring activities going on the 183-F Clearwell. The purpose was to determine which species were present and to determine genetic relationships of the bats at the 100-D Area site to bats of the same species in the 183-F Clearwell. Morphometric measurements and deoxyribonucleic acid (DNA) samples were collected to definitively determine the species and any genetic relationships between the two sites. The species present in the 190-DR tunnel are Yuma Myotis (*Myotis yumanensis*), as determined by morphometrics, acoustic analysis, and DNA analysis. Eighteen bats were captured on August 28, 2007, and four on September 11, 2007. The population was a mix of adults and juveniles, and only three individuals were males. On September 13, 2007, a team entered the 190-DR tunnels to do a visual inspection of the bats present. Video and still photographs were taken of the bats within the roost, and 108 bats were counted on the video. Several clusters of 10 to 25 bats were observed, indicating the hatches were again being used as a maternity roost. Two data loggers were deployed during the same entrance; they will log temperature/relative humidity data at the roost sites. This data will be compared to that found in the 183-F Clearwell, to see how the temperature trends compare between the structures.

A walkdown was performed to assess the number of bats using the roost on September 22, 2008. The total number of bats observed in the 190-DR tunnel was 67.

Monitoring in 2009 included entry into the 190-DR tunnel on September 16, 2009, to videotape bats and capture individuals. The video photography is used to count the total number of bats using the structure, and captured individuals are assessed to determine species, sex, age, and reproductive status. During the entry, two nulliparous adult females (individuals that have never given birth), two parous adult females (individuals that have given birth), and three nulliparous juveniles were captured. The presence of juveniles shows that this site remains a viable maternity roost. A total of 77 bats were observed in the 190-DR tunnel, with 63 of them (roosting in several clusters) observed in one of the hatches, indicating the site is still functioning as a maternity roost. This number is up slightly from the number recorded in 2008, but is not near the 170 recorded in July 2007. The differing numbers may be due to the timing of the monitoring, a shift of the maternity colony to another facility, a reduction in population, or other unknown factors.

Monitoring of the 190-DR tunnel in 2010 was delayed until September 27. A total of 32 bats were observed during the walkdown. Due to the late timing of this walkdown, it is not known whether a larger colony is still using the facility. One nulliparous female and two males were captured and hand released.

No monitoring was conducted during the 2011 season. A remediation project is being planned to remove the steel pipes within the two tunnel systems beginning in late October 2011. The project will take place while the bats are away from the tunnels during the winter months. After removal of the pipes, the tunnels will be restored to their original configuration in time for the spring roosting season of 2012.

Figure 25. Yuma Myotis Observed in the 190-DR Tunnel on September 27, 2010.

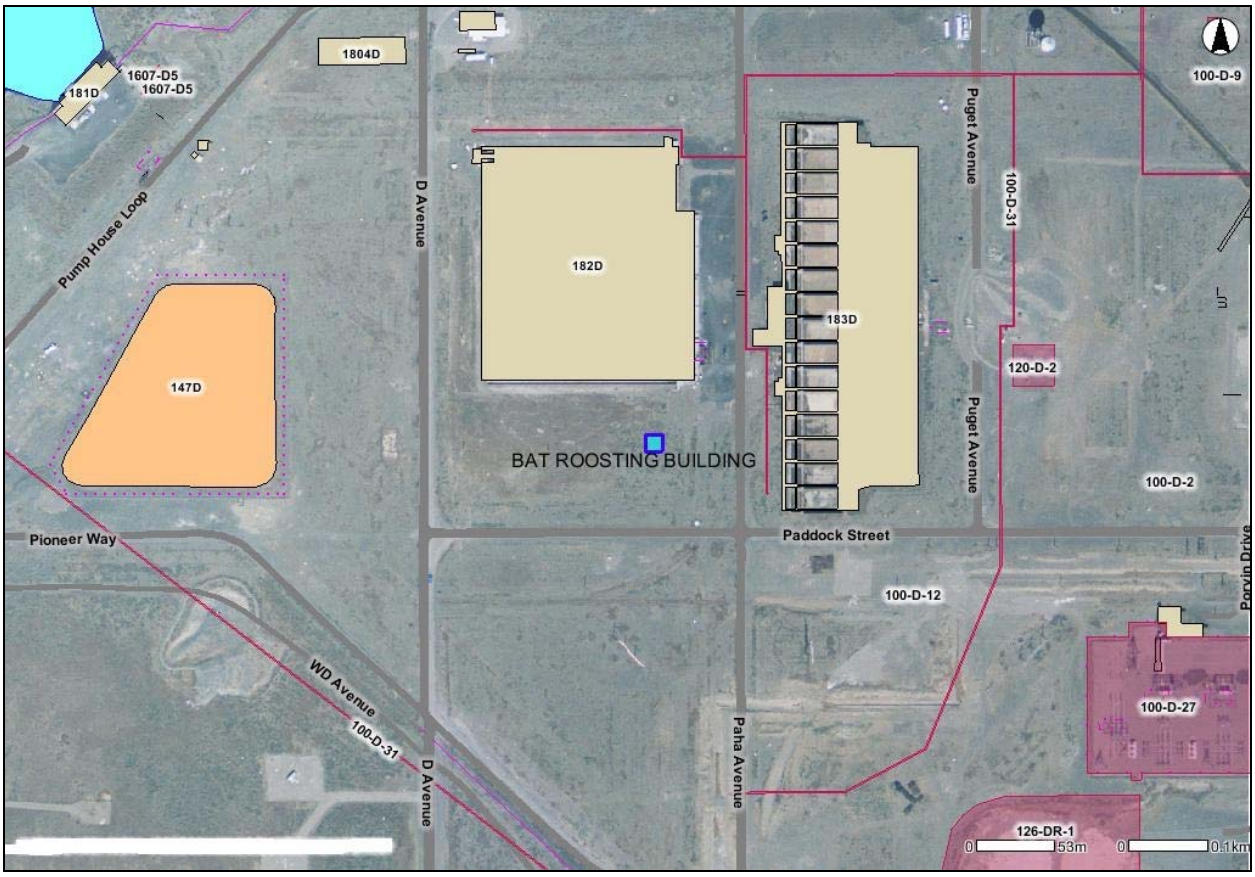
6.2 BAT MITIGATION AT THE 183-D WATER TREATMENT PLANT

The 183-D Water Treatment Plant is scheduled for demolition beginning in FY2012. The project will demolish the Headhouse, the flocculation basins, the filter building, and one of the clearwells. In preparation for demolition, a bat survey was conducted at the facility to determine whether bats were using any part of the facility as roosting habitat. The work was started in spring 2009 and was completed in March 2011 (Lindsey et al. 2011). The study concluded that Yuma myotis were likely using the headhouse for a night roost and that it was very likely that an undiscovered maternity roost existed somewhere within part of the facility that were inaccessible. Also, a maternity colony of pallid bats (*Antrozous pallidus*) was observed emerging from a crack in the cinder block on the south wall of the headhouse. Because pallid bats are listed by the state of Washington as a Priority Species, mitigation is required according to DOE-RL (2001) to maintain the viability of the colony.

To mitigate for habitat that will be lost by the demolition of the facility, one of two clearwells will be preserved, in addition to the construction of an alternate roost site near the headhouse (Figure 26 and 27). This mitigation effort provides no net loss to the roosting habitat. The alternate roost construction was completed in September 2011 and is expected to provide suitable habitat for the pallid bat maternity colony, but it is unknown whether it would be a suitable replacement for the Yuma myotis. Leaving one of the clearwells in place will be critical for this reason, as the Yuma myotis are known to night roost in the clearwell. The clearwell and artificial bat roost will be monitored in future years.

Figure 26. Artificial Bat Roost at 100-D Constructed in 2011.

Figure 27. Artificial Bat Roost Location at 100-D.



6.3 BAT MITIGATION AT 100-F REACTOR

Bats had been observed on several occasions roosting inside the 105-F Reactor building during the initial phases of the ISS project which began in FY2000. In spring 2003, a maternity colony of pallid bats (*Antrozous pallidus*) was observed in the upper areas of the reactor building. Other species (*Myotis* sp.) were also observed in the reactor. The 105-F Reactor had served as both a communal roost and a breeding area for these bat species, therefore, mitigation efforts were initiated to remove the bats from the building unharmed and provide an alternate roosting habitat.

As the new roof was being completed in August 2003, steps were taken to remove the bats from the building to prevent them from being trapped inside. The main ground-floor entrance to the building was left open to serve as the only access to the building. After a week of acclimation to the new access, a piece of plywood with three 5-cm (2-in.) slots cut in it was placed over the door to narrow the entrance. The slots were fitted with landing boards mounted on the inside of the door to allow the bats to land and crawl out. The first night after the board was installed, the narrowed entrance was observed to ensure the bats could get out. The slotted door was left in place for 1 week and on September 8, 2003, exclusion netting was installed loosely over the slotted door and stapled to the top and sides so the bats had to crawl through the slots and out the bottom of the netting to get out. Once out, they could not get back in.

Alternative roosts were provided by installing eight commercially-made bat roosts (Figure 28). Bat boxes designed to house pallid bats were installed on the east side of the building (boxes 1 and 2), the south side (boxes 4 and 6), the west side of the building (box 7), and one on a utility pole approximately 50 m (164 ft) north-east of the building (box 8). Two boxes designed for *Myotis* bats were installed on the south side of the building (boxes 3 and 5).

Follow-up surveys confirmed that the pallid bats were utilizing the boxes mounted on the building. Because of the difficulty of counting bats inside the boxes, it is impossible to get an exact count; however, it was estimated that the colony contained approximately 30 individuals in September 2003 using box number 1 exclusively. Very few *Myotis* bats were observed roosting in bat boxes designed for them (boxes 3 and 5).

The following spring the pallid bats returned from winter hibernation to use the boxes on the reactor. During 2004, they continued to primarily use box 1 on the northeast side of the building, but by the end of the summer, they had used all of the pallid bat boxes on the reactor building (1, 2, 4, 6, and 7) but had not used the one mounted on the utility pole (8). Myotis continued to infrequently use boxes 3 and 5, but not as a maternity colony.

In 2006, the pallid bats began returning to the roost site at 105-F Reactor in April. Fresh pallid bat guano was observed under the boxes on April 11, 2006. During the spring months (April and May) the bats appeared to prefer the roosts on the south side of the building, probably because these sites were the warmest. As the summer progressed, they appeared to prefer boxes 1 and 2 on the east side of the building. On August 3, 2006, all boxes were inspected for the presence of bats. Boxes 1 and 2 appeared to have approximately the same number of bats present (judged by how many could be counted by looking into the entrance from below). The emergence of bats from box 2 was observed and a total of 41 bats were counted. Assuming box 1 had approximately the same number of individuals present, the population could have been as high as 80 individuals. This is a substantial increase since the mitigation project began in 2003 when the population was estimated to be approximately 30.

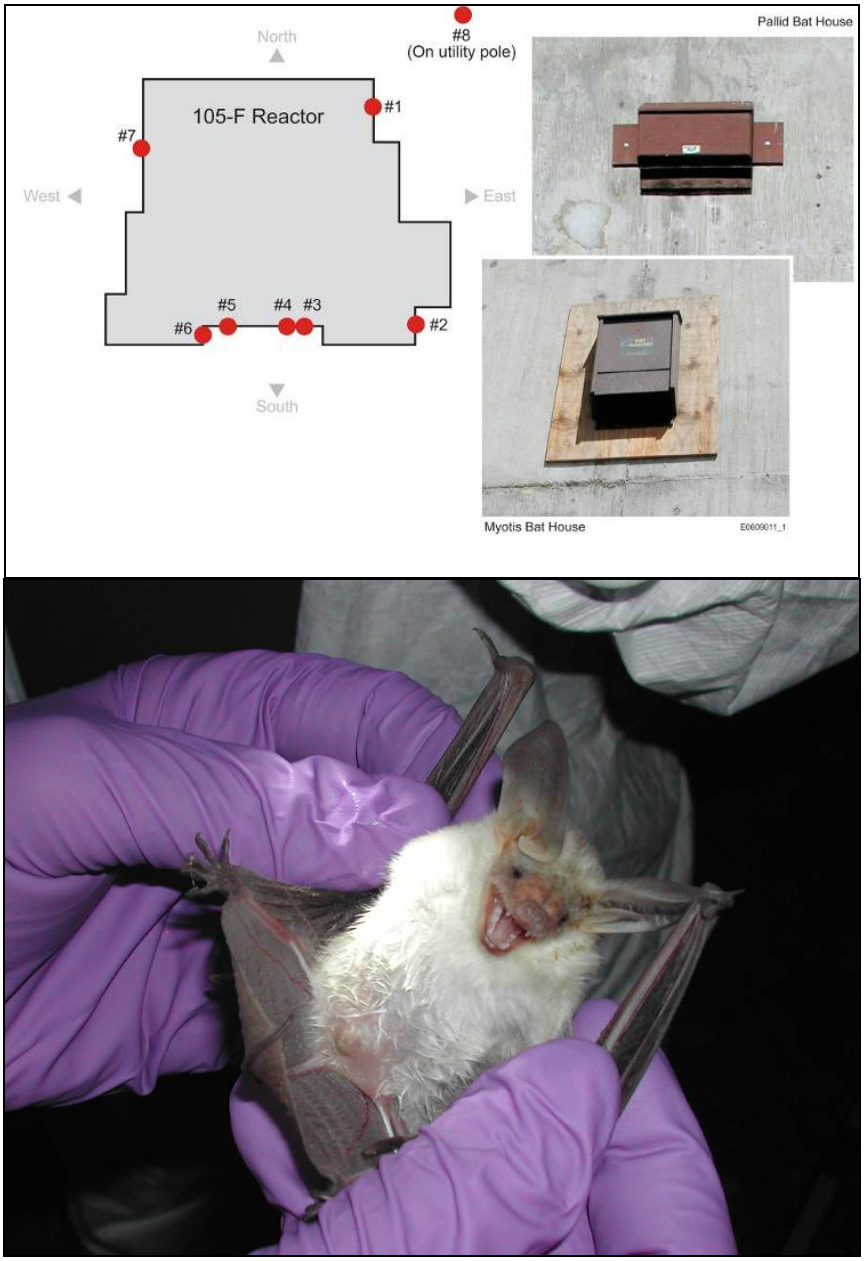
Due to the excavation of waste sites around the 105-F Reactor building, no surveys or counts were conducted at the bat houses in 2007. Visual inspections, as well as acoustic surveys and the presence of bat guano confirmed that the Pallid bats did return in 2007.

On September 25, 2008, mist netting was conducted at the 105-F Reactor to determine if the roost site was still active. Pallid bats were observed in 3 of the 8 boxes (boxes 2, 7, and 8). Nine pallid bats and one *Myotis yumanensis* were captured in two nets. All of the pallid bats were female and some appeared to have given birth this year indicating this is still a successful maternity colony. One of the bats captured was a recapture of an individual that was banded in September 2006.

Monitoring for 2009 was performed at 105-F Reactor on August 31. Two mist nets were placed near the reactor, and two infrared video cameras were set up to record emergence at two of the seven bat boxes. Two nulliparous juvenile pallid bats were captured in the mist nets (Figure 28), showing that this site remains an active and successful maternity colony. One of the individuals was light tagged, which consists of attaching a small glo-stick to the bat to allow the bat to be identified in flight. The calls of the bat were recorded, as intended, but the bat was also observed entering the eve of the 105-F Reactor roof. This shows that bats may potentially be using the eves of the 105-F Reactor roof for roosting habitat. There is still evidence, in the form of guano, that bats are using the bat houses around the different sides of the reactor. A video camera was placed on bat box 2 and 4 to record emergence for 1 hour. No bats were

observed exiting box 2, however, between 19 and 34 pallid bats were observed using box 4. Over the hour, bats were observed entering and exiting the box, making an exact count impossible.

Figure 28. Top: Location of Bat Boxes Placed at 105-F Reactor; Bottom: Female Pallid Bat Captured at the 105-F Reactor During 2010 Monitoring.



During monitoring at the 105-F Reactor, acoustic detectors were being used to record bat echolocation calls. Many pallid bat calls were recorded, including several "social calls," which the bats are using for communication rather than navigation. These "social calls" are diagnostic of pallid bats and are often the only way to tell their calls from the calls of big brown bats (*Eptesicus fuscus*). In addition, one Yuma myotis, one small-footed myotis, and five western pipistrel (*Pipistrellus hesperus*) calls were recorded on August 31, 2009. This shows the high level of bat activity in the area included multiple species, which is another indication of how ideal the area is for supporting bats.

Between 53 and 76 pallid bats were recorded exiting one of the bat boxes at the 105-F on June 16, 2010. It becomes difficult to accurately count the number of individuals using a specific box, due to individuals exiting and returning to the boxes throughout the night. Due to the many roosting areas available to the pallid bats in this area, including 8 bat boxes and the whole reactor, it is not possible to accurately assess population size. On August 17, 2010, a triple-high mist net was deployed near the 105-F Reactor. Four pallid bats were captured, all were observed to be nulliparous juvenile females in good condition.

One mist-net session was conducted at 105-F on June 22, 2011, no bats were captured; however, many were observed emerging from the bat boxes. There was evidence in the form of fresh guano beneath all bat boxes that the pallid colony is very healthy and using all boxes.

6.4 183-F CLEARWELL MATERNITY COLONY

A bat habitat mitigation project began at the 183-F Clearwell during summer 2007. Preliminary counts estimated the population at over 2,000 individuals, making this colony one of the largest in the state of Washington. Because the clearwell is a maternity roost, it is considered a priority habitat by the Washington State Department of Fish and Wildlife. This colony was studied because the clearwell structure was slated to be demolished and a mitigation plan needed to be developed to prevent significant impact or loss of the maternity colony. Information needed in order to advise on mitigation actions included determining the bat species present, and the habitat conditions that make the clearwell such an attractive and successful roost site. Roost sites with this many individuals are unusual, and it was important to understand how the facility was being used to determine the potential impacts from the various endstate options.

A combination of morphological measurements, acoustic analysis of echolocation calls, and DNA analysis was performed on bats collected during 2007 and 2008, and these data were used for species determination. The initial morphological measurements and acoustic analysis indicated that the colony is composed of Yuma myotis (*Myotis yumanensis*). Results from the DNA analysis of skin tissue samples confirmed the identification as Yuma myotis.

The results of the bat study at the 183-F clearwell showed that the facility is very complex and is suitable for bat roosting in many locations during different times of the year. The building supports one of the largest maternity colonies of bats in the state, and may also support some level of winter activity. For these reasons, the project report stated that the preferred mitigation for the site would be to leave the clearwell and flume in place, and to place signs and fencing around the facility to prevent unauthorized entry (Gano et al. 2009).

In January 2009 the U.S. Department of Energy sent a letter to Washington Closure Hanford staff stating that they intend to maintain the 183-F clearwell and flume long term. In order to allow the colony to thrive, they instructed Washington Closure Hanford to install passive human-

access restrictions to the facility including signs and fencing. The fencing and signage were constructed in April 2009.

Mitigation monitoring was performed at the 183-F clearwell and flume during August 2009. Two mist nets were set up near the clearwell hatch, and infrared cameras were placed at the clearwell hatch and flume entrance to count emergence. A total of eight Yuma myotis and one small-footed myotis were captured in the mist nets. There were five nulliparous female Yuma myotis and three parous female Yuma myotis; all individuals were adults. The small-footed myotis was a nonreproductive adult male. When released, the small-footed myotis was seen entering the clearwell through the open hatch. This was the first evidence of a second species using the clearwell. Adult males do not typically roost with a congregation of females, so this is not an indication that a second species is using the facility as a maternity roost.

In 2009, video monitoring was performed for 1 hour at the clearwell hatch and 1 hour at the flume entrance beginning at the start of the emergence. A total of 2,367 bats were counted over 62 minutes of emergence at the 183-F clearwell hatch. The emergence was observed to continue for 15 minutes following the end of the video. The polynomial average was extracted out to estimate the remainder of the emergence, and the total emergence was estimated to include 2,640 individuals. Approximately 120 bats were observed exiting the flume entrance.

No mist netting was performed at the clearwell in 2010. Emergence counts were performed at the site using an infrared video camera on June 16, 2010, and again on August 17. A total of 3,539 bats were observed emerging from the facility on June 16, and 3,637 were observed emerging on August 17. These numbers represent the largest population recorded to date at this facility and confirm the clearwell as the largest known colony of bats in the state of Washington.

Monitoring at the clearwell in 2011 consisted of one mist-net session on August 23, 2011, and two emergence counts of 4,114 and 3,777 (videotaping with infrared lighting) on June 22and August 23, 2011, respectively. The respective counts were 4,114 in June and 3,777 in August (Figure 30). These counts compared with 2009 and 2010 indicate the colony is continuing to grow. The reason for the slight drop in the August count, of approximately 300, could be from several possibilities. The expectation was that the number would be up to some degree from recruitment of new offspring into the population. It could be that some of the bats may have already begun to disperse. Another possibility is that some may have been roosting in the flume (which was not monitored during this session). Whatever the cause, the colony continues to remain strong and increasing from year to year.

The mist-net session captured 30 Yuma bats (Myotis yumanensis) (Figure 29). A total of 27 females were captured (12 adults and 15 juveniles); and of the adult females, seven were post-lactating and were five nulliparous. A total of three males were captured (1 nonreproductive adult and 2 juveniles). All bats captured appeared to be in good condition, with no observed health issues.

The 2011 monitoring information shows that the roost continues to support a large maternity colony. The importance of monitoring colonies is heightened with the emergence of white nose syndrome (WNS) in the eastern United States. It is important that baselines can be established prior to any impacts from WNS, and that any emergence of WNS can be quickly identified. The monitoring of this colony, as well as the other colonies that have been identified, will continue to be reported on in this document in coming years. This information can be used for comparison

from year to year, to determine if there are any changes in the condition of the bats or the status of the colonies.

Figure 29. Yuma Myotis Captured August 23, 2011, from 183-F (Top and Bottom).

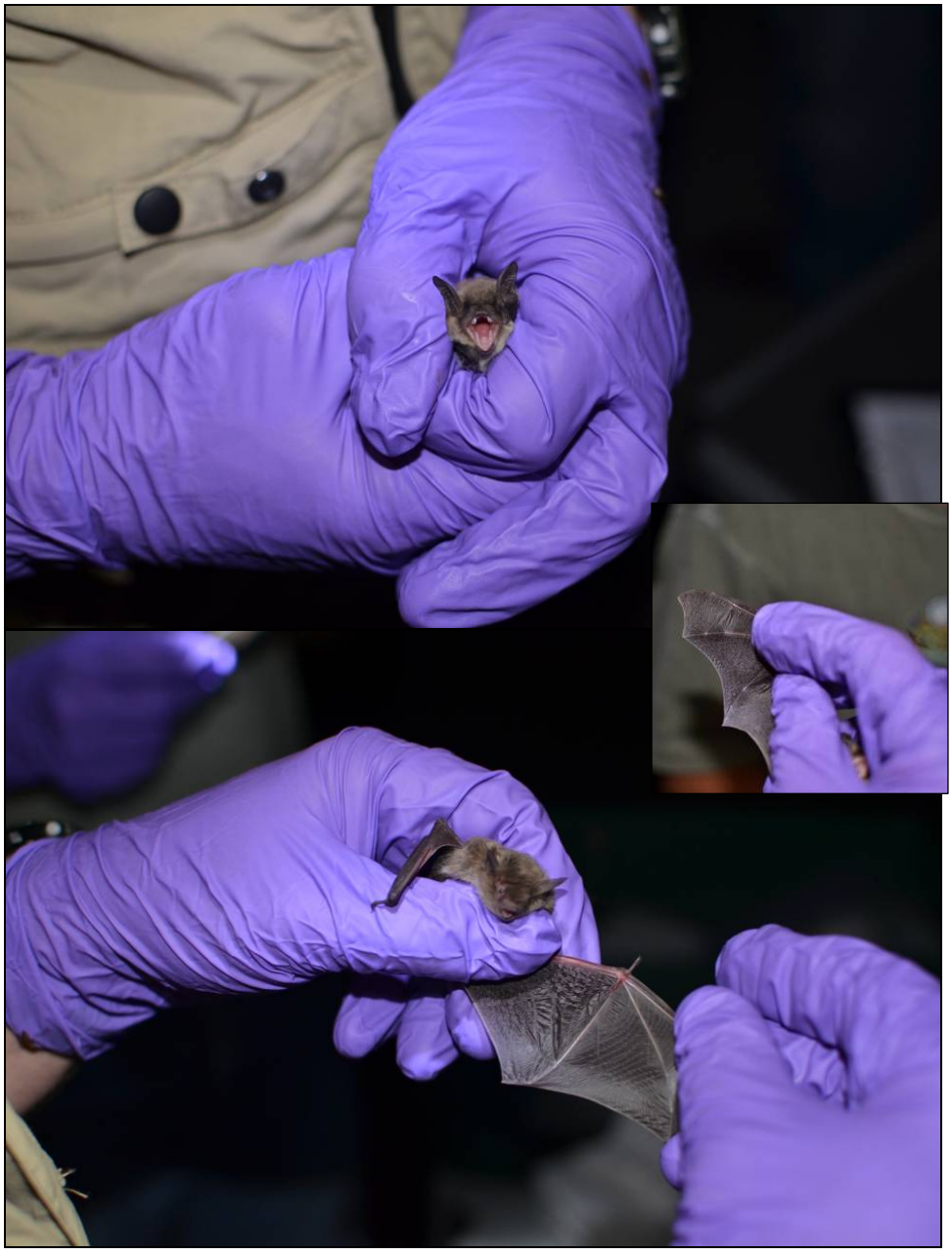


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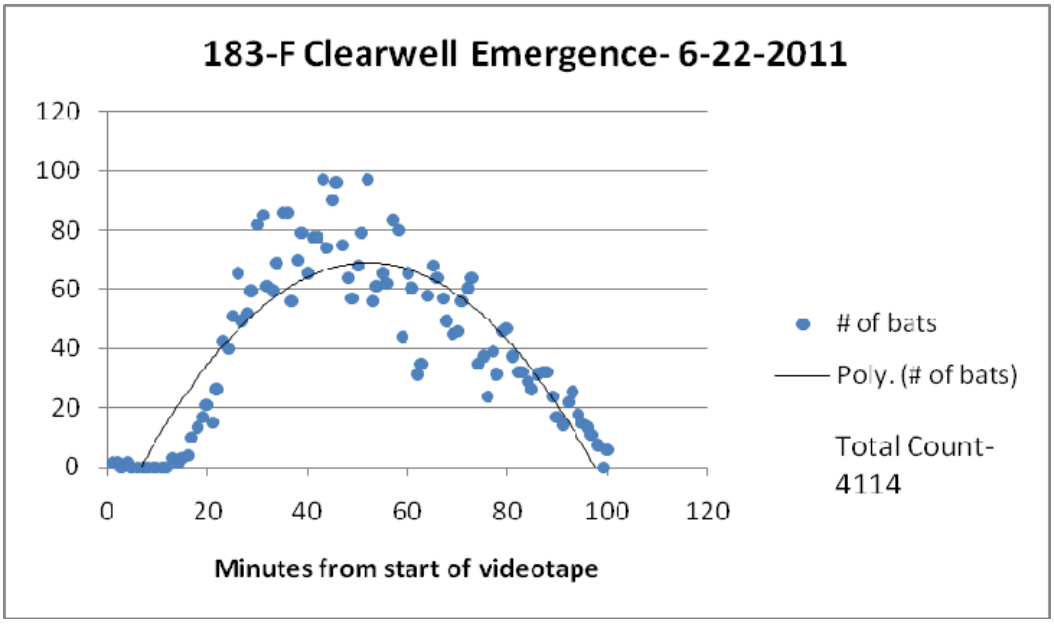
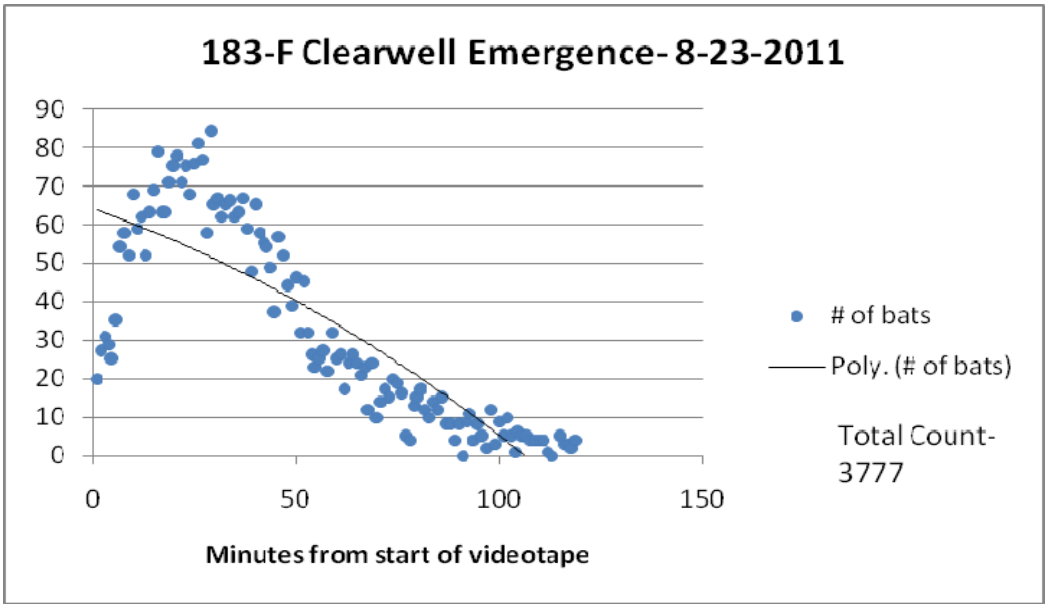
Figure 30. Bat Emergence Counts at 183-F (2011).





7.0 SNAKE MITIGATION

In November 2005, remediation of a portion of the 128-B-3 Burn Pit excavated an area containing several large boulders. The void spaces between the boulders contained an active snake hibernaculum (den), which several rattlesnakes were brought to the surface during the excavation of the burn pit debris.

Snake hibernacula often contain mixed species of snakes. In the Columbia Basin, species such as the western rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis catenifer*), yellow-belly racer (*Coluber constrictor*), and potentially the striped whipsnake (*Masticophis taeniatus*) often den together for the winter (Larsen 1997). Though not often popular with the general public, snakes play an important role in a healthy ecosystem by keeping small mammal and insect populations in check. They also serve as a prey species for higher trophic species such as coyotes and raptors. The Hanford Site provides suitable habitat for this species and it has been recorded on site on very rare occasions. Because the striped whipsnake will den with rattlesnakes, and because denning sites are critically important to maintaining healthy snake populations, it is important to preserve these sites (Larsen 1997).

By the time the hibernaculum at the 128-B-3 site was discovered, it was too late to preserve the site; it had been destroyed during the excavation. However, as the remediation continued, a mitigation plan was developed to reconstruct the hibernaculum. The clean boulders were segregated and stockpiled until the site was cleared for backfilling in fall 2006. The boulders were then pushed back into the excavation, forming several void spaces that could potentially be used by snakes. In addition to re-creating a habitat for snakes, the void spaces were expected to provide habitat for numerous other species including deer mice (*Peromyscus maniculatus*), bushy-tailed woodrats (*Neotoma cinerea*), Nuttall's cottontail rabbits (*Sylvilagus nuttalli*), porcupines (*Erethizon dorsatum*), and possibly even coyotes (*Canis latrans*).

The site has been monitored for wildlife usage by searching the site for tracks and scat each spring since 2007. Evidence of Nuttall's cottontail, North American porcupine**,** and bushy-tailed woodrat usage has been observed, but no snakes have been seen. Because of the secretive nature of snakes, it is difficult to determine their presence. The most efficient method to determine whether a location is being used by snakes is to set up a specialized snake trap.

During April 2010, the site was monitored using a drift fence in association with funnel traps to determine if snakes have found the reconstructed hibernaculum. Snakes will typically enter hibernacula in late September to October time frame and leave around mid- to late April. Monitoring was performed in the spring, when snakes are typically found leaving winter hibernacula for summer foraging areas. The drift fence was placed along one side of the boulder pit, as the purpose of this monitoring is to determine whether snakes are using the location, not to conduct a complete inventory.

Approximately 36.6 m (120 ft) of silt fencing was placed (staked) around the north side of the hibernaculum on April 13, 2010 (Figure 32). The bottom 5 cm (2 in.) of the fence was dug into the soil to prevent snakes from going under the fence. Four funnel traps (Row and Blouin-Demiers 2006) were placed down the length of the fence. Snakes leaving the hibernaculum would encounter and move along the fence, potentially going into the funnel traps. The drift fence trap was open for five trap-nights and closed/removed on April 22, 2010.

No snakes were captured during this study's trapping period. As stated previously, the purpose of this monitoring was to assess the effectiveness of this artificial snake den in replacing the previously existing snake habitat. Continued monitoring will help to determine the extent of use by snakes, if any, at this mitigation site.

Figure 31. Monitoring at the 128-B-3 Snake Den.

In August 2011, a snake hibernaculum was constructed at Waste Information Data System site 600-109 (Figure 33) to take advantage of available materials. This project does not replace an impacted den site at this waste site. This hibernaculum is built in an east-west orientation with a southern aspect, and is approximately 12 m (40 ft) long and 1.5 m (5 ft) deep. It is constructed of cobbles and boulders. The rock was placed in a manner to create void spaces down to the 1.5 m (5 ft) depth to provide adequate winter hibernation conditions (above 0 °C), but also provides pathways near the surface and openings for spring time sunning and emergence. This constructed den site will be monitored for use in subsequent years.

Another snake hibernaculum mitigation project of similar design is planned for fall 2011 at Waste Information Data System site 600-3 to mitigate for a western rattlesnake (*Crotalus viridis*) den that was discovered in March 2010 during remediation operations at 600-3.

Figure 32. 600-109 Snake Hibernaculum.

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APPENDIX A

2010 REVEGETATION MONITORING RESULTS

APPENDIX A

2010 REVEGETATION MONITORING RESULTS

Table A-1. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2010.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	56.1	100.0
Agropyron cristatum[a] (crested wheatgrass)	8.9	68.0
Poa sandbergii (Sandberg's bluegrass)	4.3	56.0
Salsola kali[a] (Russian thistle)	1.7	68.0
Holosteum umbellatum[a] (jagged chickweed)	1.4	56.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.4	36.0
Draba verna[a] (spring whitlowgrass)	1.0	40.0
Festuca octoflora (slender sixweeks)	0.5	20.0
Oryzopsis hymenoides (Indian ricegrass)	0.4	16.0
Artemisia tridentata (big sagebrush)	0.2	8.0
Machaeranthera canescens (hoary aster)	0.2	8.0
Sisymbrium altissimum[a] (tumble mustard)	0.1	4.0
Plantago patagonica (Indian wheat)	0.1	4.0
Oenothera pallida (pale eveningprimrose)	0.1	4.0
Hymenopappus filifolius (Columbia cutleaf)	X	X
Melilotus alba[a] (sweetclover)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Erodium cicutarium[a] (storksbill)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Balsamorhiza careyana (Carey's balsamroot)	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X
Eriogonum niveum (snow buckwheat)	X	X
Layia glandulosa (white-daisy tidytips)	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X
Biotic crust	8.5	88.0
Bare soil	49.3	100.0
Litter	45.7	96.0
Total canopy cover (litter not included)	76.4	
Total Invasive % Cover	72.8	
Total Native % Cover	7.9	
Change in Native % Cover from 2009	+2.9	

[a] Invasive species
X = species present but not counted in plot frames

Table A-2. Percent Canopy Cover and Frequency of Occurrence at the 618-7 Burial Ground in 2010. (2 Pages)

Species	% Cover North Cobble	% Freq of Occ North Cobble	% Cover South Topsoil	% Freq of Occ South Topsoil
Poa sandbergii (Sandberg's bluegrass)	22.9	100.0	50.4	100.0
Bromus tectorum[a] (cheatgrass)	3.2	68.0	11.4	88.0
Salsola kali[a] (Russian thistle)	8.9	100.0	1.7	68.0
Agropyron spicatum (bluebunch wheatgrass)	2.5	60.0	1.2	48.0
Sisymbrium altissimum[a] (tumble mustard)	2.5	60.0	0.9	36.0
Sitanion hystrix (bottlebrush squirreltail)	2	60.0	0.7	8.0
Artemisia tridentata (big sagebrush)	X	X	0.6	4.0
Oryzopsis hymenoides (Indian ricegrass)	0.7	28.0	0.6	24.0
Lactuca serriola[a] (prickly lettuce)	0.5	20.0	X	X
Erodium cicutarium[a] (storksbill)	--	--	0.4	16.0
Draba verna[a] (spring whitlowgrass)	0.2	8.0	0.2	8.0
Vulpia myuros[a] (rattail fescue)	0.2	8.0	--	--
Ambrosia acanthicarpa (bur ragweed)	0.2	8.0	--	--
Holosteum umbellatum[a] (jagged chickweed)	--	--	0.1	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	X	X	0.1	40
Poa bulbosa[a] (bulbous bluegrass)	--	--	0.1	4.0
Festuca octoflora (slender sixweeks)	--	--	0.1	4.0
Descurainia pinnata (western tansymustard)	--	--	0.1	4.0
Machaeranthera canescens (hoary aster)	--	--	X	X
Hordeum leporinum[a] (hare barley)	--	--	X	X
Gilia leptomeria (Great Basin gilia)	--	--	X	X
Microsteris gracilis (pink microsteris)	--	--	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X	X	X
Melilotus alba[a] (sweetclover)	X	X	X	X
Grayia spinosa (spiny hopsage)	--	--	X	X
Purshia tridentata (antelope bitterbrush)	--	--	X	X
Eriogonum niveum (snow buckwheat)	X	X	--	--
Grayia spinosa (spiny hopsage)	X	X	--	--
Tragopogon dubius[a] (yellow salsify)	X	X	--	--
Mentzelia albicaulis (whitestem stickleaf)	--	--	X	X
Biotic crust	0.0	0.0	0.0	0.0
Bare soil	57.9	100.0	47.2	100.0
Litter	33.4	100.0	46.6	100.0
Total canopy cover (litter not included)	43.8		68.6	
Total Invasive % Cover	15.5		14.8	

Table A-2. Percent Canopy Cover and Frequency of Occurrence at the 618-7 Burial Ground in 2010. (2 Pages)

Species	% Cover North Cobble	% Freq of Occ North Cobble	% Cover South Topsoil	% Freq of Occ South Topsoil
Total Native % Cover	28.3		53.8	
Change in Native % Cover from 2009	+22.0		+32.8	

[a] Invasive species
X = species present but not counted in plot frames

Table A-3. Percent Canopy Cover and Frequency of Occurrence at 618-13 in 2010.

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	14.3	93.3
Salsola kali[a] (Russian thistle)	11.8	86.7
Bromus tectorum[a] (cheatgrass)	9.8	66.7
Agropyron spicatum (bluebunch wheatgrass)	6.3	86.7
Sisymbrium altissimum[a] (tumble mustard)	4.0	93.3
Sitanion hystrix (bottlebrush squirreltail)	1.3	53.3
Oryzopsis hymenoides (Indian ricegrass)	1.2	46.7
Artemisia tridentata (big sagebrush)	0.5	20.0
Ambrosia acanthicarpa (bur ragweed)	0.5	20.0
Lactuca serriola[a] (prickly lettuce)	0.3	13.3
Hordeum leporinum[a] (hare barley)	0.2	6.7
Amsinckia lycopsoides (tarweed fiddleneck)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Kochia scopari[a] (kochia)	X	X
Purshia tridentata (antelope bitterbrush)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Draba verna[a] (spring whitlowgrass)	X	X
Erodium cicutarium[a] (storksbill)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Biotic crust	0.0	0.0
Bare soil	35.8	100.0
Litter	61.0	100.0
Total canopy cover (litter not included)	50.7	
Total Invasive % Cover	26.2	
Total Native % Cover	24.5	

[a] Invasive species
X = species present but not counted in plot frames

Table A-4. Percent Canopy Cover and Frequency of Occurrence at Hanford Generating Plant Topsoil in 2010. (2 Pages)

Species	% Cover Topsoil	% Freq of Occ Topsoil	% Cover Cobble	% Freq of Occ Cobble
Poa sandbergii (Sandberg's bluegrass)	39.1	96.0	37.0	96.0
Bromus tectorum[a] (cheatgrass)	25.7	96.0	6.3	76.0
Sisymbrium altissimum[a] (tumble mustard)	4.1	68.0	1.2	48.0
Salsola kali[a] (Russian thistle)	2.6	48.0	1.5	60.0
Holosteum umbellatum[a] (jagged chickweed)	2.5	80.0	0.2	8.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.4	16.0	2.0	60.0
Agropyron spicatum (bluebunch wheatgrass)	0.1	4.0	1.4	36.0
Ranunculus testiculatus[a] (bur buttercup)	1.1	24.0	--	--
Sitanion hystrix (bottlebrush squirreltail)	0.2	8.0	1.0	20.0
Descurainia pinnata (western tansymustard)	X	X	0.9	16.0
Draba verna[a] (spring whitlowgrass)	0.8	32.0	0.3	12.0
Centaurea diffusa[a] (diffuse knapweed)	0.8	32.0	0.5	20.0
Chorispora tenella[a] (blue mustard)	0.8	32.0	0.1	4.0
Festuca octoflora (slender sixweeks)	0.1	4.0	0.6	24.0
Erodium cicutarium[a] (storksbill)	0.1	4.0	0.4	16.0
Epilobium paniculatum (tall willowherb)	X	X	0.3	12.0
Amsinckia lycopsoides (tarweed fiddleneck)	0.3	12.0	--	--
Achillea millefolium (yarrow)	0.2	8.0	0.2	8.0
Epilobium paniculatum (tall willowherb)	0.2	8.0	--	--
Machaeranthera canescens (hoary aster)	0.1	4.0	0.2	8.0
Artemisia tridentata (big sagebrush)	0.2	8.0	0.1	4.0
Microsteris gracilis (pink microsteris)	0.1	4.0	--	--
Oryzopsis hymenoides (Indian ricegrass)	0.1	4.0	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X	0.1	4.0
Sphaeralcea munroana (Munro's globemallow)	X	X	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X	--	--
Lactuca serriola[a] (prickly lettuce)	X	X	0.1	4.0
Lepidium perfoliatum[a] (clasping pepperweed)	X	X	--	--
Verbascum thapsus[a] (common mullein)	--	--	X	X
Agropyron cristatum (crested wheatgrass)	--	--	X	X
Eriogonum niveum (snow buckwheat)	--	--	X	X

Table A-4. Percent Canopy Cover and Frequency of Occurrence at Hanford Generating Plant Topsoil in 2010. (2 Pages)

Species	% Cover Topsoil	% Freq of Occ Topsoil	% Cover Cobble	% Freq of Occ Cobble
Biotic crust	0.1	4.0	7.4	64.0
Bare soil	0.2	8.0	47.9	100.0
Litter	0.2	8.0	33.0	100.0
Total canopy cover (litter not included)	79.6		54.4	
Total Invasive % Cover	38.5		10.7	
Total Native % Cover	41.1		43.7	
Change in Native % Cover from 2009	-13.1		-34.2	

[a] Invasive species
X = species present but not counted in plot frames
-- Species not observed on site

Table A-5. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	23.8	100.0
Bromus tectorum[a] (cheatgrass)	6.4	100.0
Agropyron dasytachyum (thickspike wheatgrass)	2.4	20.0
Artemisia tridentata (big sagebrush)	1.8	16.0
Salsola kali[a] (Russian thistle)	1.3	52.0
Agropyron spicatum (bluebunch wheatgrass)	1.2	48.0
Sisymbrium altissimum[a] (tumble mustard)	1.1	44.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	12.0
Holosteum umbellatum[a] (jagged chickweed)	0.2	8.0
Chaenactis douglasii (hoary falseyarrow)	0.1	4.0
Lactuca serriola[a] (prickly lettuce)	0.1	4.0
Melilotus alba[a] (sweetclover)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Erigeron filifolius (threadleaf fleabane)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Descurainia pinnata (western tansymustard)	X	X
Draba verna[a] (spring whitlowgrass)	X	X
Oryzopsis hymenoides (Indian ricegrass)	X	X
Agastache occidentalis (western horsemint)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X

Table A-5. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Grayia spinosa (spiny hopsage)	X	X
Achillea millefolium (yarrow)	X	X
Epilobium paniculatum (tall willowherb)	X	X
Biotic crust	0.0	0.0
Bare soil	38.9	100.0
Litter	46.5	100.0
Total canopy cover (litter not included)	38.7	
Total Invasive % Cover	9.1	
Total Native % Cover	29.6	
Change in Native % Cover from 2009	-18.9	

[a] Invasive species
X = species present but not counted in plot frames

Table A-6. Percent Canopy Cover and Frequency of Occurrence at 118-F-1 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Salsola kali[a] (Russian thistle)	19.5	92.0
Poa sandbergii (Sandberg's bluegrass)	14.0	100.0
Bromus tectorum[a] (cheatgrass)	5.2	52.0
Sisymbrium altissimum[a] (tumble mustard)	1.9	36.0
Poa bulbosa[a] (bulbous bluegrass)	1.8	16.0
Sitanion hystrix (bottlebrush squirreltail)	1.6	8.0
Agropyron spicatum (bluebunch wheatgrass)	1.0	40.0
Artemisia tridentata (big sagebrush)	0.6	4.0
Lactuca serriola[a] (prickly lettuce)	0.3	12.0
Holosteum umbellatum[a] (jagged chickweed)	0.1	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Epilobium paniculatum (tall willowherb)	X	X
Achillea millefolium (yarrow)	X	X
Descurainia pinnata (western tansymustard)	X	X
Machaeranthera canescens (hoary aster)	X	X
Grayia spinosa (spiny hopsage)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Crust	0.0	0.0
Soil	56.4	100.0
Litter	36.1	100.0

Table A-6. Percent Canopy Cover and Frequency of Occurrence at 118-F-1 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Total canopy cover (litter not included)	46.0	
Total Invasive % Cover	28.8	
Total Native % Cover	17.2	
Change in Native % Cover from 2009	-6.1	

[a] Invasive species
X = species present but not counted in plot frames

Table A-7. Percent Canopy Cover and Frequency of Occurrence at 118-F-2 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	9.3	100.0
Salsola kali[a] (Russian thistle)	4.3	92.0
Sitanion hystrix (bottlebrush squirreltail)	2.2	48.0
Bromus tectorum[a] (cheatgrass)	1.9	56.0
Oryzopsis hymenoides (Indian ricegrass)	1.1	44.0
Agropyron spicatum (bluebunch wheatgrass)	1.0	40.0
Sisymbrium altissimum[a] (tumble mustard)	0.9	16.0
Machaeranthera canescens (hoary aster)	0.5	20.0
Draba verna[a] (spring whitlowgrass)	0.4	16.0
Achillea millefolium (yarrow)	0.4	16.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.4	16.0
Poa bulbosa[a] (bulbous bluegrass)	0.3	12.0
Descurainia pinnata (western tansymustard)	0.2	8.0
Agropyron dasytachyum (thickspike wheatgrass)	0.1	4.0
Lepidium perfoliatum[a] (clasping pepperweed)	0.1	4.0
Festuca octoflora (slender sixweeks)	0.1	4.0
Centaurea diffusa[a] (diffuse knapweed)	0.1	4.0
Cryptantha fendleri (Fendler's cryptantha)	0.1	4.0
Holosteum umbellatum[a] (jagged chickweed)	0.1	4.0
Ambrosia acanthicarpa (bur ragweed)	X	X
Artemisia tridentata (big sagebrush)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Grayia spinosa (spiny hopsage)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X
Eriogonum vimineum (broom buckwheat)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X

Table A-7. Percent Canopy Cover and Frequency of Occurrence at 118-F-2 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Vicia cracca[a] (bird vetch)	X	X
Conyza canadensis[a] (mare's tail)	X	X
Cryptantha circumscissa (matted cryptantha)	X	X
Crust	0.0	0.0
Soil	55.0	100.0
Litter	32.5	100.0
Total canopy cover (litter not included)	23.5	
Total Invasive % Cover	8.1	
Total Native % Cover	15.4	
Change in Native % Cover from 2009	-16.8	

[a] Invasive species
X = species present but not counted in plot frames

Table A-8. Percent Canopy Cover and Frequency of Occurrence at 182-F in 2010. (2 Pages)

Species	% Cover North	% Cover South	% Freq of Occ North	% Freq of Occ South
Bromus tectorum[a] (cheatgrass)	8.8	44.2	93.3	100.0
Poa sandbergii (Sandberg's bluegrass)	4.8	14.5	100.0	84.0
Salsola kali[a] (Russian thistle)	1.3	2.9	53.3	96.0
Sitanion hystrix (bottlebrush squirreltail)	1.5	2.8	60.0	36.0
Poa bulbosa[a] (bulbous bluegrass)	0.3	2.7	13.3	32.0
Sisymbrium altissimum[a] (tumble mustard)	2.2	0.9	20.0	36.0
Sporobolus cryptandrus (sanddrop seed)	--	1.5	--	20.0
Centaurea diffusa[a] (diffuse knapweed)	0.5	1.4	20.0	16.0
Erodium cicutarium[a] (storksbill)	0.3	1.2	13.3	28.0
Agropyron spicatum (bluebunch wheatgrass)	0.8	0.6	33.3	24.0
Festuca octoflora (slender sixweeks)	0.5	0.5	20.0	20.0
Draba verna[a] (spring whitlowgrass)	0.3	0.3	13.3	12.0
Chrysothamnus nauseosus (gray rabbitbrush)	X	0.2	X	8.0
Epilobium paniculatum (tall willowherb)	0.2	--	6.7	--
Artemisia campestris (Pacific sage)	0.2	X	6.7	X
Holosteum umbellatum[a] (jagged chickweed)	--	0.1	--	4.0
Achillea millefolium (yarrow)	X	0.1	X	4.0
Artemisia tridentata (big sagebrush)	X	0.1	X	4.0

Table A-8. Percent Canopy Cover and Frequency of Occurrence at 182-F in 2010. (2 Pages)

Species	% Cover North	% Cover South	% Freq of Occ North	% Freq of Occ South
Oryzopsis hymenoides (Indian ricegrass)	--	0.1	--	4.0
Tragopogon dubius[a] (yellow salsify)	X	0.1	X	4.0
Ambrosia acanthicarpa (bur ragweed)	--	0.1	--	4.0
Astragalus caricinus (buckwheat milkvetch)	--	X	--	X
Astragalus sclerocarpus (stalked pod milkvetch)	--	X	--	X
Astragalus succumbens (crouching milkvetch)	X	--	X	--
Chaenactis douglasii (hoary falseyarrow)	--	X	--	X
Descurainia pinnata (western tansymustard)	--	X	--	X
Conyza canadensis[a] (mare's tail)	--	X	--	X
Lactuca serriola[a] (prickly lettuce)	X	X	X	X
Sphaeralcea munroana (Munro's globemallow)	X	X	X	X
Verbena bracteata[a] (big-bract verbena)	X	X	X	X
Vicia cracca[a] (bird vetch)	--	X	--	X
Sporobolus cryptandrus (sand dropseed)	X	--	X	--
Lepidium perfoliatum[a] (clasping pepperweed)	X	--	X	--
Crust	0.0	1.1	0.0	24.0
Soil	24.5	16.8	93.3	100.0
Litter	57.7	72.6	100.0	100.0
Total canopy cover (litter not included)	22.0	74.3		
Total Invasive % Cover	14.0	53.8		
Total Native % Cover	8.0	20.5		
Change in Native % Cover from 2009	-43.7	-9.4		

[a] Invasive species
X = species present but not counted in plot frames
-- Species not observed on site

Table A-9. Percent Canopy Cover and Frequency of Occurrence at 126-F-2 in 2010.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	4.7	86.7
Sitanion hystrix (bottlebrush squirreltail)	3.8	86.7
Poa sandbergii (Sandberg's bluegrass)	3.0	86.7
Salsola kali[a] (Russian thistle)	2.3	93.3
Agropyron spicatum (bluebunch wheatgrass)	1.5	60.0
Sisymbrium altissimum[a] (tumble mustard)	1.0	40.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.8	33.3
Oryzopsis hymenoides (Indian ricegrass)	0.8	33.3
Artemisia tridentata (big sagebrush)	0.5	20.0
Poa bulbosa[a] (bulbous bluegrass)	0.3	13.3
Machaeranthera canescens (hoary aster)	0.2	6.7
Ambrosia acanthicarpa (bur ragweed)	0.2	6.7
Plantago patagonica (Indian wheat)	0.2	6.7
Epilobium paniculatum (tall willowherb)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Achillea millefolium (yarrow)	0.2	6.7
Centaurea diffusa[a] (diffuse knapweed)	0.2	6.7
Astragalus succumbens (crouching milkvetch)	X	X
Erodium cicutarium[a] (storksbill)	X	X
Grayia spinosa (spiny hopsage)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Biotic crust	0.0	0.0
Bare soil	28.7	100.0
Litter	50.7	100.0
Total canopy cover (litter not included)	20.0	
Total Invasive % Cover	8.5	
Total Native % Cover	11.5	
Change in Native % Cover from 2008	-43.5	

[a] Invasive species
X = species present but not counted in plot frames

Table A-10. Percent Canopy Cover and Frequency of Occurrence at 100-F-26 in 2010.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	24.5	100.0
Poa sandbergii (Sandberg's bluegrass)	20.7	93.3
Salsola kali[a] (Russian thistle)	8.3	100.0
Sisymbrium altissimum[a] (tumble mustard)	5.3	80.0
Sitanion hystrix (bottlebrush squirreltail)	1.3	20.0
Agropyron spicatum (bluebunch wheatgrass)	1.0	40.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.5	20.0
Centaurea diffusa[a] (diffuse knapweed)	0.3	13.3
Erodium cicutarium[a] (storksbill)	0.2	6.7
Achillea millefolium (yarrow)	0.2	6.7
Artemisia tridentata (big sagebrush)	0.2	6.7
Lactuca serriola[a] (prickly lettuce)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Ambrosia acanthicarpa (bur ragweed)	X	X
Crust	0.0	0.0
Soil	42.8	100.0
Litter	50.0	100.0
Total canopy cover (litter not included)	62.8	
Total Invasive % Cover	38.8	
Total Native % Cover	24.0	
Change in Native % Cover from 2008	-30.5	

[a] Invasive species
X = species present but not counted in plot frames

Table A-11. Percent Canopy Cover and Frequency of Occurrence at 118-F-5 in 2010.

Species	% Cover BG	% Cover SSA	% Freq of Occ BG	% Freq of Occ SSA
Bromus tectorum[a] (cheatgrass)	22.2	49.3	100	93.3
Salsola kali[a] (Russian thistle)	5.7	3.6	100	66.7
Poa sandbergii (Sandberg's bluegrass)	3.8	2.9	87	73.3
Oryzopsis hymenoides (Indian ricegrass)	2.8	0.9	80	33.3
Agropyron spicatum (bluebunch wheatgrass)	1.8	0.5	40	20.0
Amsinckia lycopsoides (tarweed fiddleneck)	X	1.4	X	53.3
Sisymbrium altissimum[a] (tumble mustard)	1.0	1.4	40	53.3
Holosteum umbellatum[a] (jagged chickweed)	--	1.3	--	46.7
Microsteris gracilis (pink microsteris)	--	0.7	--	26.7
Stipa comata (needle-and-thread grass)	--	0.5	--	20.0
Poa bulbosa[a] (bulbous bluegrass)	0.5	X	20	X
Achillea millefolium (yarrow)	X	0.5	X	20.0
Draba verna[a] (spring whitlowgrass)	0.3	0.5	13	20.0
Ambrosia acanthicarpa (bur ragweed)	--	0.4	--	13.3
Artemisia tridentata (big sagebrush)	0.2	0.2	7	6.7
Machaeranthera canescens (hoary aster)	0.2	0.2	7	6.7
Sitanion hystrix (bottlebrush squirreltail)	0.2	--	7	--
Chrysothamnus nauseosus (gray rabbitbrush)	X	0.2	X	6.7
Plantago patagonica (Indian wheat)	X	X	X	X
Agoseris heterophylla (mountain dandelion)	X	--	X	--
Tragopogon dubius[a] (yellow salsify)	X	--	X	--
Sporobolus cryptandrus (sanddrop seed)	--	X	--	X
Grayia spinosa (spiny hopsage)	--	X	--	X
Agoseris heterophylla (mountain dandelion)	--	X	--	X
Lactuca serriola[a] (prickly lettuce)	--	X	--	X
Chondrilla juncea[a] (rush skeletonweed)	--	X	--	X
Centaurea diffusa[a] (diffuse knapweed)	--	X	--	X
Biotic crust	0	0	0	0
Soil	47.5	32.1	100	93.3
Litter	29.5	44.8	100	93.3
Total canopy cover (litter not included)	38.7	0.2		
Total Invasive % Cover	29.7	56.1		
Total Native % Cover	9.0	8.6		
Change in Native % Cover from 2009	+3.7	+3.4		

[a] Invasive species; X=species present but not counted in plot frames; -- = Species not observed on site

Table A-12. Percent Canopy Cover and Frequency of Occurrence at 118-F-6 in 2010.

Species	% Cover	% Freq of Occ
Salsola kali[a] (Russian thistle)	37.5	96.0
Poa sandbergii (Sandberg's bluegrass)	16.9	100.0
Sisymbrium altissimum[a] (tumble mustard)	3.2	32.0
Bromus tectorum[a] (cheatgrass)	2.1	44.0
Agropyron spicatum (bluebunch wheatgrass)	1.2	48.0
Agropyron dasytachyum (thickspike wheatgrass)	0.6	24.0
Oryzopsis hymenoides (Indian ricegrass)	0.4	16.0
Achillea millefolium (yarrow)	0.1	4.0
Descurainia pinnata (western tansymustard)	0.1	4.0
Artemisia tridentata (big sagebrush)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Purshia tridentata (antelope bitterbrush)	X	X
Balsamorhiza careyana (Carey's balsamroot)	X	X
Grayia spinosa (spiny hopsage)	X	X
Cardaria draba[a] (whitetop)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Sitanion hystrix (bottlebrush squirreltail)	X	X
Crust	0.1	4.0
Soil	70.2	96.0
Litter	24.3	96.0
Total canopy cover (litter not included)	62.1	
Total Invasive % Cover	42.8	
Total Native % Cover	19.3	
Change in Native % Cover from 2009	0	

[a] Invasive species
X = species present but not counted in plot frames

Table A-13. Percent Canopy Cover and Frequency of Occurrence at 120-F-1 in 2010.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	27.2	100.0
Poa sandbergii (Sandberg's bluegrass)	9.7	100.0
Holosteum umbellatum[a] (jagged chickweed)	4.0	93.3
Draba verna[a] (spring whitlowgrass)	2.3	93.3
Salsola kali[a] (Russian thistle)	1.7	66.7
Microsteris gracilis (pink microsteris)	1.7	66.7
Sisymbrium altissimum[a] (tumble mustard)	1.5	60.0
Agropyron spicatum (bluebunch wheatgrass)	1.0	40.0
Oryzopsis hymenoides (Indian ricegrass)	0.8	33.3
Plantago patagonica (Indian wheat)	0.8	33.3
Stipa comata (needle-and-thread grass)	0.5	20.0
Sitanion hystrix (bottlebrush squirreltail)	0.5	20.0
Achillea millefolium (yarrow)	0.3	13.3
Amsinckia lycopsoides (tarweed fiddleneck)	0.3	13.3
Lactuca serriola[a] (prickly lettuce)	0.3	13.3
Festuca octoflora (slender sixweeks)	0.2	6.7
Oenothera pallida (pale evening primrose)	0.2	6.7
Astragalus caricinus (buckwheat milkvetch)	0.2	6.7
Agoseris heterophylla (mountain dandelion)	0.2	6.7
Descurainia pinnata (western tansymustard)	0.2	6.7
Artemisia tridentata (big sagebrush)	X	X
Phacelia linearis (threadleaf phacelia)	X	X
Gilia leptomeria (Great Basin gilia)	X	X
Phlox longifolia (longleaf phlox)	X	X
Chaenactis douglasii (hoary falseyarrow)	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X
Astragalus sclerocarpus (stalked pod milkvetch)	X	X
Eriogonum niveum (snow buckwheat)	X	X
Biotic crust	0.0	0.0
Bare soil	42.7	100.0
Litter	33.2	100.0
Total canopy cover (litter not included)	53.5	
Total Invasive % Cover	18.7	
Total Native % Cover	34.8	
Change in Native % Cover from 2009	+18.3	

[a] Invasive species
X = species present but not counted in plot frames

Table A-14. Percent Canopy Cover and Frequency of Occurrence at 1607-F1 in 2010.

Species	% Cover	% Freq of Occ
Salsola kali[a] (Russian thistle)	28.0	100.0
Bromus tectorum[a] (cheatgrass)	18.5	100.0
Poa sandbergii (Sandberg's bluegrass)	16.2	100.0
Sitanion hystrix (bottlebrush squirreltail)	4.3	46.7
Sisymbrium altissimum[a] (tumble mustard)	3.8	60.0
Agropyron spicatum (bluebunch wheatgrass)	2.2	86.7
Erodium cicutarium[a] (storksbill)	0.5	20.0
Draba verna[a] (spring whitlowgrass)	0.3	13.3
Holosteum umbellatum[a] (jagged chickweed)	0.2	6.7
Achillea millefolium (yarrow)	0.2	6.7
Artemisia tridentata (big sagebrush)	0.2	6.7
Sphaeralcea munroana (Munro's globemallow)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Oryzopsis hymenoides (Indian ricegrass)	X	X
Descurainia pinnata (western tansymustard)	X	X
Plantago patagonica (Indian wheat)	X	X
Ambrosia acanthicarpa (bur ragweed)	X	X
Verbena bracteata[a] (big-bract verbena)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Sporobolus cryptandrus (sand dropseed)	X	X
Grayia spinosa (spiny hopsage)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X
Crust	0.0	0.0
Soil	57.0	100.0
Litter	39.5	100.0
Total canopy cover (litter not included)	74.7	
Total Invasive % Cover	51.3	
Total Native % Cover	23.3	
Change in Native % Cover from 2009	+6.8	

[a] Invasive species
X = species present but not counted in plot frames

Table A-15. Percent Canopy Cover and Frequency of Occurrence at 100-B-1 and 128-C-1 in 2010. (2 Pages)

Species	% Cover 100-B-1	% Cover 128-C-1	% Freq of Occ 100-B-1	% Freq of Occ 128-C-1
Poa sandbergii (Sandberg's bluegrass)	36.3	17.7	100.0	100.0
Bromus tectorum[a] (cheatgrass)	10.7	15.5	100.0	100.0
Salsola kali[a] (Russian thistle)	2.2	2.3	88.0	93.3
Agropyron spicatum (bluebunch wheatgrass)	2.0	1.2	40.0	13.3
Artemisia tridentata (big sagebrush)	1.1	0.8	44.0	33.3
Lactuca serriola[a] (prickly lettuce)	--	0.8	--	33.3
Draba verna[a] (spring whitlowgrass)	--	0.7	--	26.7
Sitanion hystrix (bottlebrush squirreltail)	0.2	0.7	8.0	26.7
Sisymbrium altissimum[a] (tumble mustard)	0.6	0.2	24.0	6.7
Microsteris gracilis (pink microsteris)	0.6	X	24.0	X
Chrysothamnus nauseosus (gray rabbitbrush)	--	0.5	--	20.0
Oryzopsis hymenoides (Indian ricegrass)	0.1	0.3	4.0	13.3
Holosteum umbellatum[a] (jagged chickweed)	0.1	0.2	4.0	6.7
Machaeranthera canescens (hoary aster)	--	0.2	--	6.7
Poa scabrella (pine bluegrass)	0.1	--	4.0	--
Lomatium macrocarpum (bigseed desertparsley)	0.1	--	4.0	--
Agropyron dasytachyum (thickspike wheatgrass)	0.1	--	4.0	--
Astragalus sclerocarpus (stalked pod milkvetch)	0.1	X	4.0	X
Descurainia pinnata (western tansymustard)		X		X
Amsinckia lycopsoides (tarweed fiddleneck)	X	--	X	--
Sphaeralcea munroana (Munro's globemallow)	X	X	X	X
Balsamorhiza careyana (Carey's balsamroot)	X	--	X	--
Grayia spinosa (spiny hopsage)	X	--	X	--
Erigeron pumilus (shaggy fleabane)	X	--	X	--
Centaurea diffusa[a] (diffuse knapweed)	--	X	--	X
Erodium cicutarium[a] (storksbill)	--	X	--	X
Erigeron poliospermus (cushion	--	X	--	X

Table A-15. Percent Canopy Cover and Frequency of Occurrence at 100-B-1 and 128-C-1 in 2010. (2 Pages)

Species	% Cover 100-B-1	% Cover 128-C-1	% Freq of Occ 100-B-1	% Freq of Occ 128-C-1
fleabane)				
Chondrilla juncea[a] (rush skeletonweed)	--	X	--	X
Crust	2.5	0.7	80.0	26.7
Soil	55.3	47.7	100.0	100.0
Litter	27.9	38.2	100.0	100.0
Total canopy cover (litter not included)	54.1	41.0		
Total Invasive % Cover	13.6	19.7		
Total Native % Cover	40.5	21.3		
Change in Native % Cover from 2009	-13.4	-18.4		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table A-16. Percent Canopy Cover and Frequency of Occurrence at 100-C-9 in 2010. (2 Pages)

Species	T1% Cover	T2% Cover	T3% Cover	T1 % Freq of Occ	T2 % Freq of Occ	T3 % Freq of Occ
Bromus tectorum[a] (cheatgrass)	7.3	17.5	28.7	100.0	100.0	100.0
Poa sandbergii (Sandberg's bluegrass)	21.7	12.2	9.8	100.0	100.0	100.0
Salsola kali[a] (Russian thistle)	2.5	2.2	2.0	100.0	86.7	80.0
Oryzopsis hymenoides (Indian ricegrass)	1.5	1.5	0.3	60.0	60.0	13.3
Chrysothamnus nauseosus (gray rabbitbrush)	0.8	1.3	0.3	33.3	53.3	13.3
Artemisia tridentata (big sagebrush)	0.2	1.3	0.5	6.7	20.0	20.0
Erigonum vimineum (broom buckwheat)	--	0.8	--	--	33.3	--
Agropyron spicatum (bluebunch wheatgrass)	0.7	0.5	0.3	26.7	20.0	13.3
Sisymbrium altissimum[a] (tumble mustard)	0.2	0.3	0.5	6.7	13.3	20.0
Holosteum umbellatum[a] (jagged chickweed)	0.3	0.3	0.3	13.3	13.3	13.3
Draba verna[a] (spring whitlowgrass)	0.2	0.3	0.3	6.7	13.3	13.3
Cryptantha circumscissa (matted cryptantha)	0.3	--	--	13.3	--	--

Table A-16. Percent Canopy Cover and Frequency of Occurrence at 100-C-9 in 2010. (2 Pages)

Species	T1% Cover	T2% Cover	T3% Cover	T1 % Freq of Occ	T2 % Freq of Occ	T3 % Freq of Occ
Festuca octoflora (slender sixweeks)	0.3	--	--	13.3	--	--
Centaurea diffusa[a] (diffuse knapweed)	--	0.2	0.5	--	6.7	20.0
Chaenactis douglasii (hoary falseyarrow)	--	0.2	--	--	6.7	--
Machaeranthera canescens (hoary aster)	X	X	--	X	X	--
Sporobolus cryptandrus (sanddrop seed)		X	--		X	--
Sitanion hystrix (bottlebrush squirreltail)	0.2	X	0.2	6.7	X	6.7
Tragopogon dubius[a] (yellow salsify)	--	X	--	--	X	--
Agropyron dasytachyum (thickspike wheatgrass)	--	X	X	--	X	X
Agropyron cristatum[a] (crested wheatgrass)	X	--	--	X	--	--
Achillea millefolium (yarrow)	X	--	--	X	--	--
Poa bulbosa[a] (bulbous bluegrass)	X	--	0.2	X	--	6.7
Lactuca serriola[a] (prickly lettuce)	X	--	--	X	--	--
Erodium cicutarium[a] (storksbill)	--	--	0.7	--	--	26.7
Sphaeralcea munroana (Munro's globemallow)	--	--	X	--	--	X
Biotic crust	0.0	0.0	0.0	0.0	0.0	0.0
Bare soil	68.5	69.5	59.3	100.0	100.0	100.0
Litter	0.3	28.0	30.8	100.0	100.0	100.0
Total canopy cover (litter not included)	36.2	38.7	44.5			
Total Invasive % Cover	10.5	20.8	33.0			
Total Native % Cover	25.7	17.8	11.7			
Change in Native % Cover from 2009	-8.9	+4.3	-9.5			

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table A-17. Percent Canopy Cover and Frequency of Occurrence at 100-B-14 in 2010.

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	14.5	100.0
Poa sandbergii (Sandberg's bluegrass)	7.8	100.0
Salsola kali[a] (Russian thistle)	6.1	92.0
Agropyron spicatum (bluebunch wheatgrass)	3.0	44.0
Sisymbrium altissimum[a] (tumble mustard)	1.9	76.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.2	48.0
Holosteum umbellatum[a] (jagged chickweed)	1.1	44.0
Festuca octoflora (slender sixweeks)	1.0	20.0
Epilobium paniculatum (tall willowherb)	0.8	32.0
Draba verna[a] (spring whitlowgrass)	0.7	28.0
Lactuca serriola[a] (prickly lettuce)	0.5	20.0
Artemisia tridentata (big sagebrush)	0.3	12.0
Chorispora tenella[a] (blue mustard)	0.2	8.0
Poa bulbosa[a] (bulbous bluegrass)	0.2	8.0
Chaenactis douglasii (hoary falseyarrow)	0.1	4.0
Tragopogon dubius[a] (yellow salsify)	0.1	4.0
Ranunculus testiculatus[a] (bur buttercup)	0.1	4.0
Achillea millefolium (yarrow)	X	X
Agoseris heterophylla (mountain dandelion)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Machaeranthera canescens (hoary aster)	X	X
Biotic crust	0.0	0.0
Bare soil	39.0	100.0
Litter	51.0	100.0
Total canopy cover (litter not included)	39.6	
Total Invasive % Cover	25.4	
Total Native % Cover	14.2	
Change in Native % Cover from 2009	-1.4	

[a] Invasive species
X = species present but not counted in plot frames

Table A-18. Percent Canopy Cover and Frequency of Occurrence at 118-B-1 in 2010. (2 Pages)

Species	% Cover BG	% Cover SSA	% Freq of Occ BG	% Freq of Occ SSA
Salsola kali[a] (Russian thistle)	25.7	6.9	100.0	96.0
Poa sandbergii (Sandberg's bluegrass)	19.5	16.3	96.0	100.0
Bromus tectorum[a] (cheatgrass)	13.2	14.0	88.0	96.0
Festuca octoflora (slender sixweeks)	3.2	0.7	16.0	28.0
Agropyron spicatum (bluebunch wheatgrass)	2.3	1.9	36.0	56.0
Sisymbrium altissimum[a] (tumble mustard)	2.0	1.5	40.0	60.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.7	0.1	28.0	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.7	X	8.0	X
Lactuca serriola[a] (prickly lettuce)	0.3	0.7	12.0	28.0
Epilobium paniculatum (tall willowherb)	--	0.5	--	20.0
Erodium cicutarium[a] (storksbill)	0.4	0.3	16.0	12.0
Draba verna[a] (spring whitlowgrass)	0.1	0.3	4.0	12.0
Artemisia tridentata (big sagebrush)	0.1	0.3	4.0	12.0
Ambrosia acanthicarpa (bur ragweed)	--	0.3	--	12.0
Centaurea diffusa[a] (diffuse knapweed)	0.2	0.1	8.0	4.0
Holosteum umbellatum[a] (jagged chickweed)	0.1	0.2	4.0	8.0
Achillea millefolium (yarrow)	X	0.2	X	8.0
Sitanion hystrix (bottlebrush squirreltail)	0.1	--	4.0	--
Melilotus alba[a] (sweetclover)	--	0.1	--	4.0
Microsteris gracilis (pink microsteris)		0.1		4.0
Machaeranthera canescens (hoary aster)	X	--	X	--
Layia glandulosa (white-daisy tidytips)	X	--	X	--
Vulpia myuros[a] (rat-tail fescue)	X	X	X	X
Verbena bracteata[a] (big-bract verbena)	--	X	--	X

Table A-18. Percent Canopy Cover and Frequency of Occurrence at 118-B-1 in 2010. (2 Pages)

Species	% Cover BG	% Cover SSA	% Freq of Occ BG	% Freq of Occ SSA
Sphaeralcea munroana (Munro's globemallow)	--	X	--	X
Biotic crust	0.0	0.0	0.0	0.0
Bare soil	38.1	50.5	100.0	100.0
Litter	55.0	43.7	100.0	100.0
Total canopy cover (litter not included)	68.6	44.5		
Total Invasive % Cover	42.7	24.1		
Total Native % Cover	25.9	21.1		
Change in Native % Cover from 2009	+4.9	+5.1		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table A-19. Percent Canopy Cover and Frequency of Occurrence at 118-C-1 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	8.8	93.3
Bromus tectorum[a] (cheatgrass)	3.2	93.3
Salsola kali[a] (Russian thistle)	3.2	93.3
Agropyron spicatum (bluebunch wheatgrass)	3.2	60.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.7	26.7
Sisymbrium altissimum[a] (tumble mustard)	0.5	20.0
Holosteum umbellatum[a] (jagged chickweed)	0.3	13.3
Draba verna[a] (spring whitlowgrass)	0.3	13.3
Lactuca serriola[a] (prickly lettuce)	0.2	6.7
Poa bulbosa[a] (bulbous bluegrass)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Erigeron poliospermus (cushion fleabane)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Artemisia tridentata (big sagebrush)	X	X
Machaeranthera canescens (hoary aster)	X	X
Biotic crust	1.0	6.7
Bare soil	57.5	93.3
Litter	36.3	93.3

Table A-19. Percent Canopy Cover and Frequency of Occurrence at 118-C-1 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Total canopy cover (litter not included)	21.0	
Total Invasive % Cover	7.8	
Total Native % Cover	12.8	
Change in Native % Cover from 2009	-0.9	

[a] Invasive species
X = species present but not counted in plot frames

Table A-20. Percent Canopy Cover and Frequency of Occurrence at 100-B-28 in 2010.

Species	% Cover	% Freq of Occ
Native grasses[b]	39.5	100.0
Bromus tectorum[a] (cheatgrass)	1.8	40.0
Salsola kali[a] (Russian thistle)	2.8	80.0
Sisymbrium altissimum[a] (tumble mustard)	2.5	66.7
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	13.3
Artemisia tridentata (big sagebrush)	0.3	13.3
Grayia spinosa (spiny hopsage)	0.3	13.3
Chorispora tenella[a] (blue mustard)	0.5	20.0
Holosteum umbellatum[a] (jagged chickweed)	0.2	6.7
Hordeum leporinum[a] (hare barley)	0.2	6.7
Centaurea diffusa[a] (diffuse knapweed)	0.2	6.7
Ranunculus testiculatus[a] (bur buttercup)	0.5	20.0
Draba verna[a] (spring whitlowgrass)	0.5	20.0
Lactuca serriola[a] (prickly lettuce)	0.2	6.7
Agoseris heterophylla (mountain dandelion)	X	X
Senecio vulgaris[a] (common groundsel)	X	X
Festuca octoflora (slender sixweeks)	X	X
Kochia scopari[a] (kochia)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Biotic crust	0.0	0.0
Bare soil	22.2	93.3
Litter	60.8	100.0
Total canopy cover (litter not included)	49.8	
Total Invasive % Cover	9.3	
Total Native % Cover	40.5	

[a] Invasive species
[b] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
X = species present but not counted in plot frames

Table A-21. Percent Canopy Cover and Frequency of Occurrence at 100-B-27 in 2010.

Species	% Cover	% Freq of Occ
Native grasses[b]	10.8	100.0
Bromus tectorum[a] (cheatgrass)	0.4	16.0
Salsola kali[a] (Russian thistle)	1.5	40.0
Sisymbrium altissimum[a] (tumble mustard)	0.7	28.0
Artemisia tridentata (big sagebrush)	0.1	4.0
Melilotus alba[a] (sweetclover)	0.1	4.0
Chenopodium album[a] (lamb's quarters)	X	X
Agoseris heterophylla (mountain dandelion)	X	X
Bromus japonicus[a] (Japenese brome)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Hordeum leporinum[a] (hare barley)	X	X
Chorispora tenella[a] (blue mustard)	X	X
Grayia spinosa (spiny hopsage)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Biotic crust	0.0	0.0
Bare soil	26.5	92.0
Litter	57.8	100.0
Total canopy cover (litter not included)	13.6	
Total Invasive % Cover	2.7	
Total Native % Cover	10.9	

[a] Invasive species
[b] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
X = species present but not counted in plot frames

Table A-22. Percent Canopy Cover and Frequency of Occurrence at Horseshoe Landfill and Soil Staging Area in 2010. (2 Pages)

Species	HSLF % Cover	SSA % Cover	HSLF % Freq of Occ	SSA % Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	22.3	38.5	100.0	100.0
Agropyron spicatum (bluebunch wheatgrass)	3.3	6.2	66.7	26.7
Artemisia tridentata (big sagebrush)	2.5	5.5	66.7	60
Bromus tectorum[a] (cheatgrass)	3.2	3.3	93.3	66.7
Chrysothamnus nauseosus (gray rabbitbrush)	1.8	--	73.3	--
Machaeranthera canescens (hoary aster)	1.3	0.2	53.3	6.7
Oryzopsis hymenoides (Indian ricegrass)	1.3	0.2	53.3	6.7
Sitanion hystrix (bottlebrush squirreltail)	1.0	0.5	40.0	20
Tragopogon dubius[a] (yellow salsify)	0.2	0.8	6.7	33.3
Sisymbrium altissimum[a] (tumble mustard)	X	0.7	X	26.7
Salsola kali[a] (Russian thistle)	0.7	0.3	26.7	13.3
Epilobium paniculatum (tall willowherb)	0.7	X	26.7	X
Amsinckia lycopsoides (tarweed fiddleneck)	--	0.5	--	20
Lupinus leucophyllus (velvet lupine)	X	0.3	X	13.3
Festuca octoflora (slender sixweeks)	0.2	X	6.7	X
Melilotus alba[a] (sweetclover)	0.2	--	6.7	--
Draba verna[a] (spring whitlowgrass)	0.2	--	6.7	--
Erigeron piperianus (Piper's daisy)	0.2	--	6.7	--
Lactuca serriola[a] (prickly lettuce)	X	0.2	X	6..7
Crepis atrabarba (slender hawksbeard)	--	0.2	--	6.7
Conyza canadensis (mares tail)	X	--	X	--
Holosteum umbellatuma (jagged chickweed)	--	X	--	X
Achillea millefolium (yarrow)	X	X	X	X
Agropyron cristatum[a] (crested wheatgrass)	X	--	X	--
Linum perenne (wild blueflax)	X	--	X	--
Erigeron filifolius (threadleaf fleabane)	X	X	X	X
Ambrosia acanthicarpa (bur ragweed)	X	--	X	--

Table A-22. Percent Canopy Cover and Frequency of Occurrence at Horseshoe Landfill and Soil Staging Area in 2010. (2 Pages)

Species	HSLF % Cover	SSA % Cover	HSLF % Freq of Occ	SSA % Freq of Occ
Helianthus cusickii (Cusick's sunflower)	X	--	X	--
Bromus japonicus[a] (Japanese brome)	X	--	X	--
Agoseris heterophylla (mountain dandelion)	X	--	X	--
Astragalus sclerocarpus (stalked pod milkvetch)	X	--	X	--
Balsamorhiza careyana (Carey's balsamroot)	X	X	X	X
Lomatium grayi (Gray's desertparsley)	--	X	--	X
Phlox longifolia (longleaf phlox)	--	X	--	X
Crust	7.5	0.2	100.0	6.7
Soil	74.3	0.3	100.0	13.3
Litter	9.0	24.2	100.0	86.7
Total canopy cover (litter not included)	39.0	57.5		
Total Invasive % Cover	4.3	5.3		
Total Native % Cover	34.7	52.2		
Change in Native % Cover from 2009	-15.4	-10.4		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table A-23. Percent Canopy Cover and Frequency of Occurrence at 600-111 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	10.7	100.0
Poa scabrella (pine bluegrass)	8.7	80.0
Sisymbrium altissimum[a] (tumble mustard)	4.0	93.3
Poa sandbergii (Sandberg's bluegrass)	3.3	100.0
Salsola kali[a] (Russian thistle)	3.2	93.3
Sitanion hystrix (bottlebrush squirreltail)	1.3	53.3
Poa bulbosa[a] (bulbous bluegrass)	1.2	13.3
Holosteum umbellatum[a] (jagged chickweed)	1.0	40.0
Agropyron spicatum (bluebunch wheatgrass)	0.8	33.3
Stipa comata (needle-and-thread grass)	0.7	26.7
Draba verna[a] (spring whitlowgrass)	0.5	20.0

Table A-23. Percent Canopy Cover and Frequency of Occurrence at 600-111 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Achillea millefolium (yarrow)	0.5	20.0
Descurainia pinnata (western tansymustard)	0.5	20.0
Gilia leptomeria (Great Basin gilia)	0.5	20.0
Agropyron dasytachyum (thickspike wheatgrass)	0.3	13.3
Lactuca serriola[a] (prickly lettuce)	0.2	6.7
Oryzopsis hymenoides (Indian ricegrass)	0.2	6.7
Tragopogon dubius[a] (yellow salsify)	0.2	6.7
Lepidium perfoliatum[a] (clasping pepperweed)	0.2	6.7
Agropyron cristatum[a] (crested wheatgrass)	X	X
Vicia cracca[a] (bird vetch)	X	X
Chorispora tenella[a] (blue mustard)	X	X
Machaeranthera canescens (hoary aster)	X	X
Grayia spinosa (spiny hopsage)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Artemisia tridentata (big sagebrush)	X	X
Crust	0.0	0.0
Soil	39.0	100.0
Litter	41.2	100.0
Total canopy cover (litter not included)	37.7	
Total Invasive % Cover	19.5	
Total Native % Cover	18.3	
Change in Native % Cover from 2009	-13.2	

[a] Invasive species
X = species present but not counted in plot frames

Table A-24. Percent Canopy Cover and Frequency of Occurrence at 600-149:2 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Bromus tectorum[a] (cheatgrass)	10.5	100.0
Poa scabrella (pine bluegrass)	8.7	80.0
Poa sandbergii (Sandberg's bluegrass)	5.7	100.0
Sisymbrium altissimum[a] (tumble mustard)	4.0	93.3
Descurainia pinnata (western tansymustard)	2.3	60.0
Draba verna[a] (spring whitlowgrass)	2.0	80.0
Salsola kali[a] (Russian thistle)	1.8	73.3
Agropyron spicatum (bluebunch wheatgrass)	1.5	60.0

Table A-24. Percent Canopy Cover and Frequency of Occurrence at 600-149:2 in 2010. (2 Pages)

Species	% Cover	% Freq of Occ
Sitanion hystrix (bottlebrush squirreltail)	1.5	60.0
Holosteum umbellatum[a] (jagged chickweed)	1.3	53.3
Stipa comata (needle-and-thread grass)	1.3	20.0
Achillea millefolium (yarrow)	0.7	26.7
Artemisia tridentata (big sagebrush)	0.3	13.3
Oryzopsis hymenoides (Indian ricegrass)	0.2	6.7
Hordeum leporinum[a] (hare barley)	0.2	6.7
Poa bulbosa[a] (bulbous bluegrass)	0.2	6.7
Plantago patagonica (Indian wheat)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Grayia spinosa (spiny hopsage)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Eriogonum niveum (snow buckwheat)	X	X
Ambrosia acanthicarpa (bur ragweed)	X	X
Crust	0.0	0.0
Soil	49.8	100.0
Litter	31.0	100.0
Total canopy cover (litter not included)	42.5	
Total Invasive % Cover	20.8	
Total Native % Cover	21.7	
Change in Native % Cover from 2009	-26.7	

[a] Invasive species
X = species present but not counted in plot frames

APPENDIX B

2009 REVEGETATION MONITORING RESULTS

APPENDIX B

2009 REVEGETATION MONITORING RESULTS

Table B-1. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Bromus tectorum [a] (cheatgrass)	48.8	96.0
*Agropyron cristatum (*crested wheatgrass*)*	18.3	96.0
Holosteum umbellatum [a] (jagged chickweed)	2.9	56.0
Poa sandbergii (Sandberg's bluegrass)	2.7	68.0
Salsola kali [a] (Russian thistle)	2.3	72.0
Draba verna [a] (spring whitlow)	1.7	48.0
Festuca octoflora (slender sixweeks)	0.9	16.0
*Machaeranthera canescens (*hoary aster*)*	0.7	8.0
Sisymbrium altissimum [a] (tumble mustard)	0.5	20.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	12.0
Oryzopsis hymenoides (Indian ricegrass)	0.1	4.0
*Epilobium paniculatum (*tall willowherb*)*	0.1	4.0
Erodium cicutarium (storksbill)	0.1	4.0
*Artemisa tridentata (*big sagebrush*)*	0.1	4.0
Tragopogon dubius (yellow salsify)	X	X
Chondrilla juncea (rush skeletonweed)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Hymenopappus filifolius (Columbia cutleaf)	X	X
Oryzopsis hymenoides (Indian ricegrass)	X	X
Chrysothamnus viscidiflorus (green rabbitbrush)	X	X
Petalostemon ornatum (western prairieclover)	X	X
Poa bulbosa (bulbous bluegrass)	X	X
Achillea millefolium (yarrow)	X	X
Centaurea diffusa (diffuse knapweed)	X	X
Oenothera pallida (pale eveningprimrose)	X	X
Balsamorhiza careyana	X	X
Agropyron spicatum (bluebunch wheatgrass)	X	X
Biotic crust	2.1	44.0
Bare soil	52.1	96.0
Litter	42.8	96.0

Table B-1. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Total canopy cover (litter not included)	79.5	
Change in Native Cover from 2009	-1.6	
Total Invasive % Cover	74.5	
Total Native % Cover	+5.0	

[a] Invasive species
X = species present but not counted in plot frames

Table B-2. Percent Canopy Cover at 618-7 Burial Ground North, South, and CTA in 2009. (2 Pages)

Species	% Cover North Cobble	% Cover South Topsoil	% Cover CTA
Salsola kali[a] (Russian thistle)	8.4	19.3	10.0
Poa sandbergii (Sandberg's bluegrass)	3.4	13.2	1.2
Agropyron spicatum (bluebunch wheatgrass)	2.9	7.3	2.1
Bromus tectorum[a] (cheatgrass)	0.3	1.4	0.1
Sisymbrium altissimum[a] (tumble mustard)	0.3	0.3	0.1
Ambrosia acanthicarpa (bur ragweed)	X	0.3	0.2
Erodium cicutarium[a] (storksbill)	--	0.2	X
Triticum aestivum (wheat)	0.1	--	X
Holosteum umbellatum[a] (jagged chickweed)	--	0.1	--
Amsinckia lycopsoides (tarweed fiddleneck)	--	0.1	X
Machaeranthera canescens (hoary aster)	--	0.1	--
Chenopodium album[a] (lamb's quarters)	X	0.1	X
Artemisia tridentata (big sagebrush)	--	X	--
Purshia tridentata (antelope bitterbrush)	--	X	X
Nama densum (purplemat)	--	X	--
Gilia leptomeria (Great Basin gilia)	--	X	--
Mentzelia albicaulis (whitestem stickleaf)	--	X	--
Melilotus alba[a] (white sweetclover)	--	X	--
Descurainia pinnata (western tansymustard)	--	X	--
Vulpia myuros[a] (rattail fescue)	X	X	--
Latuca serriola[a] (prickly lettuce)	X	X	X
Kochia scoparia (kochia)	X	X	X
Chorispora tenella[a] (blue mustard)	X	X	--
Achillea millefolium (yarrow)	--	--	X
Eriogonum niveum (snowbuckwheat)	--	--	X
Biotic crust	0.0	0.0	0.0

Table B-2. Percent Canopy Cover at 618-7 Burial Ground North, South, and CTA in 2009. (2 Pages)

Species	% Cover North Cobble	% Cover South Topsoil	% Cover CTA
Bare soil	66.5	66.5	67.7
Litter	28.4	28.4	30.6
Total canopy cover (litter not included)	15.4	42.4	13.7
Total Invasive % Cover	9.1	21.4	10.2
Total Native % Cover	6.3	21.0	3.5

[a] Invasive species
X = species present but not counted in plot frames

Table B-3. Percent Frequency of Occurrence at 618-7 Burial Ground North, South, and CTA in 2009. (2 Pages)

Species	Freq. of Occ. % North Cobble	Freq. of Occ. % South Topsoil	Freq. of Occ. % CTA
Salsola kali[a] (Russian thistle)	100.0	100.0	80.0
Poa sandbergii (Sandberg's bluegrass)	96.0	100.0	48.0
Agropyron spicatum (bluebunch wheatgrass)	96.0	100.0	64.0
Bromus tectorum[a] (cheatgrass)	12.0	36.0	4.0
Sisymbrium altissimum[a] (tumble mustard)	12.0	12.0	4.0
Ambrosia acanthicarpa (bur ragweed)	X	12.0	8.0
Erodium cicutarium[a] (storksbill)	--	8.0	X
Triticum aestivum (wheat)	4.0	--	X
Holosteum umbellatum[a] (jagged chickweed)	--	4.0	--
Amsinckia lycopsoides (tarweed fiddleneck)	--	4.0	X
Machaeranthera canescens (hoary aster)	--	4.0	--
Chenopodium album[a] (lamb's quarters)	X	4.0	X
Artemisia tridentata (big sagebrush)	--	X	--
Purshia tridentata (antelope bitterbrush)	--	X	X
Nama densum (purplemat)	--	X	--
Gilia leptomeria (Great Basin gilia)	--	X	--
Mentzelia albicaulis (whitestem stickleaf)	--	X	--
Melilotus alba[a] (white sweetclover)	--	X	--
Descurainia pinnata (western tansymustard)	--	X	--
Vulpia myuros[a] (rattail fescue)	X	X	--
Latuca serriola (prickly lettuce)	X	X	X

Table B-3. Percent Frequency of Occurrence at 618-7 Burial Ground North, South, and CTA in 2009. (2 Pages)

Species	Freq. of Occ. % North Cobble	Freq. of Occ. % South Topsoil	Freq. of Occ. % CTA
Kochia scoparia (kochia)	X	X	X
Chrispora tenella[a] (blue mustard)	X	X	--
Achillea millefolium (yarrow)	--	--	X
Erogonum niveum (snowbuckwheat)	--	--	X
Biotic crust	0.0	0.0	0.0
Bare soil	100.0	100.0	100.0
Litter	100.0	100.0	100.0

[a] Invasive species
X = species present but not counted in plot frames

Table B-4. Percent Canopy Cover and Frequency of Occurrence at the Hanford Generating Plant West Cobble and East Topsoil Sites in 2009. (2 Pages)

Species	% Cover E. Topsoil	% Cover W. Cobble	Freq of Occ % E. Topsoil	Freq of Occ % W. Cobble
Poa sandbergii (Sandberg's bluegrass)	51.0	58.9	100.0	96.0
Bromus tectorum[a] (cheatgrass)	43.2	10.7	100.0	100.0
Holosteum umbellatum[a] (jagged chickweed)	41.9	0.9	96.0	32.0
Chorispora tenella[a] (blue mustard)	10.7	--	80.0	--
Sisymbrium altissimum[a] (tumble mustard)	7.4	0.7	76.0	28.0
Draba verna[a] (spring whitlow)	5.8	0.8	28.0	36.0
Salsola kali[a] (Russian thistle)	3.9	2.7	96.0	88.0
Ranunculus testiculatus[a] (bur buttercup)	3.6	0.1	52.0	4.0
Erodium cicutarium[a] (storksbill)	3.0	0.9	28.0	16.0
Festuca octoflora (six-weeks fescue)	1.3	0.9	12.0	40.0
Sitanion hystrix (bottlebrush squirreltail)	1.0	4.5	12.0	44.0
Chondrilla juncea[a] (rush skeletonweed)	0.9	--	4.0	--
Centaurea diffusa[a] (diffuse knapweed)	0.8	0.8	12.0	56.0
Artemesia tridentata (sagebrush)	0.7	0.8	8.0	12.0
Agropyron spicatum (bluebunch wheatgrass)	0.3	6.4	12.0	48.0
Lactuca serriola[a] (prickly lettuce)	0.2	0.4	12.0	0.8
Achillea millefolium (yarrow)	0.1	0.8	4.0	4.0
Chrysothamnus nauseosus (gray rabbitbrush)	X	2.9	X	44.0
Amsinckia lycopsoides (tarweed fiddleneck)	--	2.4	--	8.0

Table B-4. Percent Canopy Cover and Frequency of Occurrence at the Hanford Generating Plant West Cobble and East Topsoil Sites in 2009. (2 Pages)

Species	% Cover E. Topsoil	% Cover W. Cobble	Freq of Occ % E. Topsoil	Freq of Occ % W. Cobble
Epilobium paniculatum (tall willowherb)	--	0.3	--	20.0
Melilotus alba[a] (white sweetclover)	--	X	--	X
Descurainia pinnata (western tansymustard)	--	X	--	X
Machaeranthera canescens (hoary aster)	--	X	--	X
Eriogonum niveum (snow buckwheat)	--	X	--	X
Verbascum thapsus [a] (common mullein)	--	X	--	X
Biotic Crust	15.9	25.8	96.0	84.0
Bare Soil	15.4	39.9	100.0	100.0
Litter	75.0	38.0	100.0	100.0
Total canopy cover (litter not included)	175.8	95.9		
Total Invasive % Cover	121.4	18.0		
Total Native % Cover	54.2	77.9		
Change in Native % Cover from 2008 to 2009	+5.2	+19.7		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table B-5. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	36.1	96.0
Agropyron spicatum (bluebunch wheatgrass)	9.8	84.0
Bromus tectorum[a] (cheatgrass)	9.2	96.0
Sisymbrium altissimum[a] (tumble mustard)	2.4	76.0
Artemisia tridentata (big sagebrush)	1.7	28.0
Salsola kali[a] (Russian thistle)	1.1	44.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.7	8.0
Lactuca serriola[a] (prickly lettuce)	0.3	12.0
Holosteum umbellatum[a] (jagged chickweed)	0.1	4.0
Draba verna[a] (spring whitlow)	0.1	4.0
Oryzopsis hymenoides (Indian ricegrass)	0.1	4.0
Epilobium paniculatum (tall willowherb)	0.1	4.0
Achillea millefolium (yarrow)	X	X
Erigeron poliospermus (cushion fleabane)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X

Table B-5. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Grayia spinosa (spiny hopsage)	X	X
Agropyron cristatum[a] (crested wheatgrass)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Biotic crust	0.0	0.0
Bare soil	45.2	96.0
Litter	60.5	100.0
Total canopy cover (litter not included)	61.7	
Total Invasive % Cover	13.2	
Total Native % Cover	48.5	
Change in Native Cover from 2008	-0.6	

[a] Invasive species
X = species present but not counted in plot frames

Table B-6. Percent Canopy Cover and Frequency of Occurrence at 118-F-1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	26.8	100.0
Agropyron spicatum (bluebunch wheatgrass)	12.7	84.0
Poa sandbergii (Sandberg's bluegrass)	10.3	100.0
Sisymbrium altissimum[a] (tumble mustard)	0.6	24.0
Bromus tectorum[a] (cheatgrass)	0.5	20.0
Holosteum umbellatum[a] (jagged chickweed)	0.3	12.0
Draba verna[a] (spring whitlow)	0.3	12.0
Sitanion hystrix (bottlebrush squirreltail)	0.2	8.0
Descurainia pinnata (western tansymustard)	0.1	4.0
Lactuca serriola[a] (prickly lettuce)	0.1	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4.0
Erodium cicutarium[a] (storksbill)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Grayia spinosa (spiny hopsage)	X	X
Achillea millefolium (yarrow)	X	X
Artemisia tridentata (big sagebrush)	X	X
Biotic crust	0.0	0.0
Bare soil	50.3	100.0
Litter	52.3	100.0
Total canopy cover (litter not included)	52.0	

Table B-6. Percent Canopy Cover and Frequency of Occurrence at 118-F-1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Total Invasive % Cover	28.7	
Total Native % Cover	23.3	
Change in Native % Cover from 2008	+19.6	

[a] Invasive species
X = species present but not counted in plot frames

Table B-7. Percent Canopy Cover and Frequency of Occurrence at 118-F-2 in 2009.

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	28.1	96.0
Poa sandbergii (Sandberg's bluegrass)	22.8	100.0
Agropyron spicatum (bluebunch wheatgrass)	6.7	92.0
Sisymbrium altissimum[a] (tumble mustard)	5.6	52.0
Bromus tectorum[a] (cheatgrass)	4.8	40.0
Sitanion hystrix (bottlebrush squirreltail)	2.4	20.0
Holosteum umbellatum[a] (jagged chickweed)	0.4	16.0
Draba verna[a] (spring whitlow)	0.4	16.0
Lactuca serriola[a] (prickly lettuce)	0.2	8.0
Phacelia linearis (threadleaf scorpionweed)	0.1	4.0
Oryzopsis hymenoides (Indian ricegrass)	0.1	4.0
Descurainia pinnata (western tansymustard)	0.1	4.0
Poa bulbosa (bulbous bluegrass)	X	X
Machaeranthera canescens (hoary aster)	X	X
Lepidium perfoliatum (clasping pepperweed)	X	X
Grayia spinosa (spiny hopsage)	X	X
Cardaria draba[a] (whitetop)	X	X
Phacelia linearis (threadleaf scorpionweed)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Biotic crust	0.0	0.0
Bare soil	49.3	92.0
Litter	42.1	100.0
Total canopy cover (litter not included)	71.7	
Total Invasive % Cover	39.5	
Total Native % Cover	32.2	
Change in Native cover from 2008	+13.0	

[a] Invasive species
X = species present but not counted in plot frames

Table B-8. Percent Canopy Cover and Frequency of Occurrence at 182-F North and South in 2009.

Species	% Cover North	% Cover South	Freq of Occ % North	Freq of Occ % South
Bromus tectorum[a] (cheatgrass)	44.5	49.3	100.0	88.0
Agropyron spicatum (bluebunch wheatgrass)	32.5	5.6	100.0	72.0
Poa sandbergii (Sandberg's bluegrass)	24.0	19.8	73.3	92.0
Poa bulbosa[a] (bulbous bluegrass)	10.3	5.9	60.0	24.0
Salsola kali[a] (Russian thistle)	2.2	6.2	86.7	92.0
Sporobolus cryptandrus (sanddrop seed)	1.0	4.1	6.7	32.0
Erodium cicutarium[a] (storksbill)	0.3	1.2	13.3	28.0
Sisymbrium altissimum[a] (tumble mustard)	0.7	0.8	26.7	32.0
Festuca octoflora (slender sixweeks)	0.7	0.3	26.7	12.0
Draba verna[a] (spring whitlow)	0.5	0.5	20.0	20.0
Artemesia tridentata (sagebrush)	0.5	X	20.0	X
Holosteum umbellatum[a] (jagged chickweed)	--	0.4	--	16.0
Oryzopsis hymenoides (Indian ricegrass)	0.3	--	13.3	--
Centaurea diffusa[a] (diffuse knapweed)	X	0.3	X	12.0
Artemesia campestris (pacific sage)	0.2	X	6.7	X
Descurainia pinnata (western tansymustard)	--	0.1	--	4.0
Verbena bracteata[a] (big-bract verbena)	--	X	--	X
Lactuca serriola[a] (prickly lettuce)	--	X	--	X
Achillea millefolium (yarrow)	X	X	X	X
Astragalus succumbens (crouching milkvetch)	X	X	X	X
Vicia cracca[a] (bird vetch)	X	X	X	X
Sphaeralcea munroana (Munro's globemallow)	X	X	X	X
Machaeranthera canescens (hoary aster)	X	--	X	--
Chrysothamnus nauseosus(gray rabbitbrush)	X	--	X	--
Biotic crust	1.0	0.3	40.0	12.0
Bare soil	41.8	17.7	93.3	96.0
Litter	57.8	77.0	100.0	100.0
Total canopy cover (litter not included)	117.7	94.5		
Total Invasive % Cover	58.5	64.6		
Total Native % Cover	59.2	29.9		
Change in Native % Cover from 2008	+11.9	-6.1		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table B-9. Percent Canopy Cover and Frequency of Occurrence at 183-F East in 2009.

Species	% Cover	Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	34.8	93.3
Salsola kali[a] (Russian thistle)	17.8	100.0
Agropyron spicatum (bluebunch wheatgrass)	16.8	93.3
Bromus tectorum[a] (cheatgrass)	10.3	60.0
Ranunculus testiculatus[a] (bur buttercup)	1.7	33.3
Festuca octoflora (slender sixweeks)	1.3	20.0
Artemisia tridentata (big sagebrush)	1.2	13.3
Sisymbrium altissimum[a] (tumble mustard)	1.0	40.0
Erodium cicutarium[a] (storksbill)	0.5	20.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.5	20.0
Draba verna[a] (spring whitlow)	0.3	13.3
Poa bulbosa[a] (bulbous bluegrass)	0.3	13.3
Holosteum umbellatum[a] (jagged chickweed)	0.2	6.7
Achillea millefolium (yarrow)	0.2	6.7
Machaeranthera canescens (hoary aster)	0.2	6.7
Chorispora tenella[a] (blue mustard)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Melilotus alba[a] (white sweetclover)	X	X
Astragalus sclerocarpus (stalked-pod milkvetch)	X	X
Plantago patagonica (Indian wheat)	X	X
Ambrosia acanthicarpa (bur ragweed)	X	X
Grayia spinosa (spiny hospage)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Lepidium perfoliatum (clasping pepperweed)	X	X
Sphaeralcea munroana (Munro's globemallow)	X	X
Biotic crust	0.0	0.0
Bare soil	48.5	100.0
Litter	46.7	100.0
Total canopy cover (litter not included)	87.3	
Total Invasive % Cover	32.3	
Total Native % Cover	55.0	
Change in Native % Cover from 2008	+1.5	

[a] Invasive species
X = species present but not counted in plot frames

Table B-10. Percent Canopy Cover and Frequency of Occurrence at 100-F-26 in 2009.

Species	% Cover	Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	39.5	93.3
Bromus tectorum[a] (cheatgrass)	35.5	93.3
Salsola kali[a] (Russian thistle)	34.7	86.7
Agropyron spicatum (bluebunch wheatgrass)	11.0	93.3
Sisymbrium altissimum[a] (tumble mustard)	8.5	53.3
Sitanion hystrix (bottlebrush squirreltail)	3.0	53.3
Poa bulbosa[a] (bulbous bluegrass)	2.5	6.7
Oryzopsis hymenoides (Indian ricegrass)	0.3	13.3
Holosteum umbellatum[a] (jagged chickweed)	0.2	6.7
Draba verna[a] (spring whitlow)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	6.7
Artemisia tridentata (big sagebrush)	0.2	6.7
Ranunculus testiculatus[a] (bur buttercup)	0.2	6.7
Descurainia pinnata (western tansymustard)	0.2	6.7
Lactuca serriola[a] (prickly lettuce)	0.2	6.7
Machaeranthera canescens (hoary aster)	X	X
Chenopodium album (lamb's quarters)	X	X
Erodium cicutarium[a] (storksbill)	X	X
Melilotus alba (white sweetclover)	X	X
Grayia spinosa (spiny hopsage)	X	X
Biotic crust	3.0	20.0
Bare soil	37.8	86.7
Litter	62.5	100.0
Total canopy cover (litter not included)	136.2	
Total Invasive % Cover	81.9	
Total Native % Cover	54.3	
Change in Native % Cover from 2008	+31.2	

[a] Invasive species
X = species present but not counted in plot frames

Table B-11. Percent Canopy Cover and Frequency of Occurrence at 118-F-5 Soil Staging Area and Burial Ground in 2009. (2 Pages)

Species	% Cover SSA	% Cover BG	Freq of Occ % SSA	Freq of Occ % BG
Bromus tectorum[a] (cheatgrass)	75.0	46.3	100.0	93.3
Salsola kali[a] (Russian thistle)	28.5	21.8	93.3	100.0
Draba verna[a] (spring whitlow)	7.8	--	26.7	--

Table B-11. Percent Canopy Cover and Frequency of Occurrence at 118-F-5 Soil Staging Area and Burial Ground in 2009. (2 Pages)

Species	% Cover SSA	% Cover BG	Freq of Occ % SSA	Freq of Occ % BG
Holosteum umbellatum[a] (jagged chickweed)	2.7	--	13.3	--
Agropyron spicatum (bluebunch wheatgrass)	1.8	2.5	40.0	100.0
Poa sandbergii (Sandberg's bluegrass)	0.3	1.5	13.3	26.7
Sisymbrium altissimum[a] (tumble mustard)	1.3	0.2	53.3	6.7
Microsteris gracilis (pink microsteris)	1.3	--	20.0	--
Poa bulbosa[a] (bulbous bluegrass)	0.7	0.5	26.7	20.0
Oryzopsis hymenoides (Indian ricegrass)	--	0.5	--	20.0
Plantago patagonica (Indian wheat)	0.5	--	20.0	--
Chrysothamnus nauseosus (gray rabbitbrush)	X	0.3	X	13.3
Artemisia tridentata (big sagebrush)	0.2	0.3	6.7	13.3
Achillea millefolium (common yarrow)	0.3	X	13.3	X
Ambrosia acanthicarpa (bur ragweed)	0.3	--	13.3	--
Amsinckia lycopsoides (tarweed fiddleneck)	0.3	--	13.3	--
Epilobium paniculatum (tall willowherb)	--	0.2	--	6.7
Machaeranthera canescens (hoary aster)	--	X	--	X
Hordeum leporinum[a] (hare barley)	--	X	--	X
Grayia spinosa (spiny hopsage)	X	--	X	--
Biotic crust	2.3	2.2	93.3	86.7
Bare soil	27.7	55.3	93.3	100.0
Litter	61.0	39.7	100.0	100.0
Total Canopy Cover (litter not included)	121.2	74.2		
Total Introduced % Cover	116.0	68.8		
Total Native % Cover	5.2	5.3		
Change in Native % Cover from 2008	-13.3	+0.3		

[a] Introduced species.
X = species present but not counted in a plot frame
-- species not observed on site

Table B-12. Percent Canopy Cover and Frequency of Occurrence at 118-F-6 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	30.9	92.0
Agropyron spicatum (bluebunch wheatgrass)	10.4	72.0
Poa sandbergii (Sandberg's bluegrass)	8.7	92.0
Bromus tectorum[a] (cheatgrass)	1.6	44.0
Sisymbrium altissimum[a] (tumble mustard)	1.5	40.0

Table B-12. Percent Canopy Cover and Frequency of Occurrence at 118-F-6 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Artemisia tridentata (big sagebrush)	0.1	4.0
Lactuca serriola[a] (prickly lettuce)	0.1	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4.0
Sitanion hystrix (bottlebrush squirreltail)	0.1	4.0
Cardaria draba[a] (whitetop)	X	X
Grayia spinosa (spiny hopsage)	X	X
Purshia tridentata (antelope bitterbrush)	X	X
Biotic crust	0.0	0.0
Bare soil	65.6	100.0
Litter	31.3	96.0
Total canopy cover (litter not included)	53.5	
Total Invasive % Cover	34.2	
Total Native % Cover	19.3	

[a] Invasive species
X = species present but not counted in plot frames

Table B-13. Percent Canopy Cover and Frequency of Occurrence at 120-F-1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	40.5	100.0
Bromus tectorum[a] (cheatgrass)	11.8	86.7
Poa sandbergii (Sandberg's bluegrass)	9.7	93.3
Holosteum umbellatum[a] (jagged chickweed)	6.3	66.7
Agropyron spicatum (bluebunch wheatgrass)	4.0	93.3
Sisymbrium altissimum[a] (tumble mustard)	2.5	66.7
Draba verna[a] (spring whitlow)	1.5	60.0
Amsinckia lycopsoides (tarweed fiddleneck)	1.2	13.3
Chenopodium leptophyllum[a] (slimleaf goosefoot)	0.7	26.7
Artemisia tridentata (big sagebrush)	0.5	20.0
Ambrosia acanthicarpa (bur ragweed)	0.3	13.3
Plantago patagonica (Indian wheat)	0.3	13.3
Achillea millefolium (yarrow)	0.2	6.7
Sphaeralcea munroana (Munro's globemallow)	0.2	6.7
Oryzopsis hymenoides (Indian ricegrass)	0.2	6.7
Polemonium micranthum (annual Jacob's ladder)	X	X
Balsamorhiza careyana (Carey's balsamroot)	X	X

Table B-13. Percent Canopy Cover and Frequency of Occurrence at 120-F-1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Astragalus sclerocarpus (stalked-pod milkvetch)	X	X
Chrysothamnus viscidiflorus (green rabbitbrush)	X	X
Phlox longifolia (longleaf phlox)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Microsteris gracilis (pink microsteris)	X	X
Stipa comata (needle-and-thread grass)	X	X
Phacelia linearis (threadleaf scorpionweed)	X	X
Oenothera pallida (pale eveningprimrose)	X	X
Biotic crust	0.0	0.0
Bare soil	64.2	100.0
Litter	35.8	100.0
Total canopy cover (litter not included)	79.8	
Total Invasive % Cover	63.3	
Total Native % Cover	16.5	

[a] Invasive species
X = species present but not counted in plot frames

Table B-14. Percent Canopy Cover and Frequency of Occurrence at 1607-F1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	60.2	100.0
Poa sandbergii (Sandberg's bluegrass)	13.8	100.0
Sisymbrium altissimum[a] (tumble mustard)	5.7	93.3
Bromus tectorum[a] (cheatgrass)	4.3	73.3
Agropyron spicatum (bluebunch wheatgrass)	2.0	80.0
Erodium cicutarium[a] (storksbill)	0.5	20.0
Draba verna[a] (spring whitlow)	0.3	13.3
Sitanion hystrix (bottlebrush squirreltail)	0.3	13.3
Festuca octoflora (slender sixweeks)	0.3	13.3
Conyza canadensis[a] (horseweed)	X	X
Sporobolus cryptandrus (sand dropseed)	X	X
Holosteum umbellatum[a] (jagged chickweed)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Artemisia tridentata (big sagebrush)	X	X
Grayia spinosa (spiny hospage)	X	X
Sphaeralcea munroana (Munrow's globemallow)	X	X

Table B-14. Percent Canopy Cover and Frequency of Occurrence at 1607-F1 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Verbena bracteata[a] (big-bract verbena)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Poa scabrella (pine bluegrass)	X	X
Biotic crust	0.0	0.0
Bare soil	62.2	100.0
Litter	42.3	100.0
Total canopy cover (litter not included)	87.5	
Total Invasive % Cover	71.0	
Total Native % Cover	16.5	

[a] Invasive species
X = species present but not counted in plot frames

Table B-15. Percent Canopy Cover and Frequency of Occurrence at 100-B-1 and 128-C-1 in 2009. (2 Pages)

Species	% Cover 100-B-1	% Cover 128-C-1	100-B-1 Freq of Occ %	128-C-1 Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	46.1	34.2	100.0	100.0
Bromus tectorum[a] (cheatgrass)	22.9	33.3	100.0	93.3
Salsola kali[a] (Russian thistle)	4.1	7.2	88.0	86.7
Sisymbrium altissimum[a] (tumble mustard)	3.6	1.5	48.0	60.0
Agropyron spicatum (bluebunch wheatgrass)	3.5	0.3	24.0	40.0
Draba verna[a] (spring whitlow)	--	3.5	--	13.3
Artemisia tridentata (big sagebrush)	3.5	1.3	8.0	20.0
Erodium cicutarium[a] (storksbill)	0.0	X	4.0	X
Amsinckia lycopsoides (tarweed fiddleneck)	0.2	--	8.0	--
Sitanion hystrix (bottlebrush squirreltail)	0.1	3.3	4.0	33.3
Microsteris gracilis (pink microsteris)	0.3	--	12.0	--
Oryzopsis hymenoides (Indian ricegrass)	--	0.3	--	13.3
Machaeranthera canescens (hoary aster)	--	0.2	--	6.7
Lactuca serriola[a] (prickly lettuce)	0.1	X	4.0	X
Grayia spinosa (spiny hopsage)	0.1	--	4.0	--
Tragopogon dubius (yellow salsify)	X	X	X	X
Balsamorhiza careyana (Carey's balsamroot)	X	--	X	--
Lomatium macrocarpum (bigseed desertparsley)	X	--	X	--
Poa scabrella (pine bluegrass)	X	--	X	--
Sphaeralcea munroana (Munro's	X	X	X	X

Table B-15. Percent Canopy Cover and Frequency of Occurrence at 100-B-1 and 128-C-1 in 2009. (2 Pages)

Species	% Cover 100-B-1	% Cover 128-C-1	100-B-1 Freq of Occ %	128-C-1 Freq of Occ %
globemallow)				
Astragalus succumbens (crouching milkvetch)	X	--	X	--
Chrysothamnus nauseosus (gray rabbitbrush)	--	X	--	X
Verbena bracteata[a] (big-bract verbena)	--	X	--	X
Chondrilla juncea[a] (rush skeletonweed)	--	X	--	X
Biotic crust	15.8	0.0	100.0	0.0
Bare soil	46.3	27.7	100.0	100.0
Litter	43.4	61.0	100.0	100.0
Total canopy cover (litter not included)	84.5	85.2		
Total Invasive % Cover	30.7	45.5		
Total Native % Cover	53.8	39.7		
Total Change in Native Cover from 2007	+6.5	0.0		

[a] Invasive species
X = species present but not counted in plot frames
-- species not observed on site

Table B-16. Percent Canopy Cover and Frequency of Occurrence at 100-C-9 in 2009. (2 Pages)

Species	T1 % Cover	T2 % Cover	T3 % Cover	T1 Freq of Occ.	T2 Freq of Occ.	T3 Freq of Occ.
Bromus tectorum[a] (cheatgrass)	11.7	43.2	39.7	86.7	100.0	100.0
Poa sandbergii (Sandberg's bluegrass)	30.3	10.0	15.0	93.3	100.0	93.3
Agropyron spicatum (bluebunch wheatgrass)	5.2	0.8	1.5	80.0	33.3	60.0
Sisymbrium altissimum[a] (tumble mustard)	0.3	1.2	4.7	13.3	46.7	86.7
Salsola kali[a] (Russian thistle)	2.0	3.3	3.0	80.0	100.0	86.7
Holosteum umbellatum[a] (jagged chickweed)	0.5	3.2	1.7	20.0	33.3	33.3
Artemisia tridentata (big sagebrush)	2.5	0.2	2.0	33.3	6.7	13.3
Oryzopsis hymenoides (Indian ricegrass)	1.3	0.5	0.5	53.3	20.0	20.0
Sitanion hystrix (bottlebrush squirreltail)	--	0.7	1.3	--	26.7	20.0
Centaurea diffusa[a] (tumble knapweed)	--	0.2	1.3	--	6.7	20.0
Draba verna[a] (spring whitlow)	0.3	0.7	0.8	13.3	26.7	33.3
Amsinckia lycopsoides (tarweed fiddleneck)	--	0.5	--	--	20.0	--
Erodium cicutarium[a] (storksbill)	--	0.3	0.5	--	13.3	20.0
Lactuca serriola[a] (prickly lettuce)	--	--	0.5	--	--	20.0
Descurainia pinnata (western tansymustard)	0.2	--	0.3	6.7	--	13.3
Eriogonum vimineum (broom buckwheat)	--	0.3	--	--	13.3	--

Table B-16. Percent Canopy Cover and Frequency of Occurrence at 100-C-9 in 2009. (2 Pages)

Species	T1 % Cover	T2 % Cover	T3 % Cover	T1 Freq of Occ.	T2 Freq of Occ.	T3 Freq of Occ.
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	0.2	--	6.7	6.7	--
Sporobolus cryptandrus (sand dropseed)	--	0.2	--	--	6.7	--
Poa bulbosa[a] (bulbous bluegrass)	--	0.2	--	--	6.7	--
Epilobium paniculatum (tall willowherb)	--	0.2	--	--	6.7	--
Biotic crust	0.0	0.0	0.0	0.0	0.0	0.0
Bare soil	62.7	57.0	55.5	100.0	100.0	100.0
Litter	34.7	36.7	39.8	93.3	100.0	100.0
Total canopy cover (litter not included)	54.5	65.7	72.8			
Total Invasive % Cover	14.8	52.2	52.2			
Total Native % Cover	39.7	13.5	20.7			
Change in Native % Cover from 2008	+15.9	+4.7	-6.5			

[a] Invasive species
X = species present but not counted in plot frames

Table B-17. Percent Canopy Cover and Frequency of Occurrence at 118-B-2 and 118-B-3 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Bromus tectorum[a] (cheatgrass)	43.2	100.0
Poa sandbergii (Sandberg's bluegrass)	10.0	100.0
Salsola kali[a] (Russian thistle)	3.3	100.0
Holosteum umbellatum[a] (jagged chickweed)	3.2	33.3
Sisymbrium altissimum[a] (tumble mustard)	1.2	46.7
Agropyron spicatum (bluebunch wheatgrass)	0.8	33.3
Draba verna[a] (spring whitlow)	0.7	26.7
Achillea millefolium (yarrow)	0.5	20.0
Lactuca serriola[a] (prickly lettuce)	0.5	20.0
Erodium cicutarium[a] (storksbill)	0.3	13.3
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	6.7
Centaurea diffusa[a] (tumble knapweed)	0.2	6.7
Amsinckia lycopsoides (tarweed fiddleneck)	0.2	6.7
Artemisia tridentata (big sagebrush)	0.2	6.7
Oryzopsis hymenoides (Indian ricegrass)	0.2	6.7
Sitanion hystrix (bottlebrush squirreltail)	0.2	6.7
Chaenactis douglasii (hoary falseyarrow)	X	X
Biotic crust	0.5	20.0

Table B-17. Percent Canopy Cover and Frequency of Occurrence at 118-B-2 and 118-B-3 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Bare soil	57.7	100.0
Litter	56.2	100.0
Total canopy cover (litter not included)	64.5	
Total Invasive % Cover	52.5	
Total Native % Cover	12.2	
Change in Native % Cover from 2008	-14.5	

[a] Invasive species
X = species present but not counted in plot frames

Table B-18. Percent Canopy Cover and Frequency of Occurrence at 100-B-14 in 2009.

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	15.8	100.0
Agropyron spicatum (bluebunch wheatgrass)	10.6	96.0
Sisymbrium altissimum[a] (tumble mustard)	4.3	76.0
Poa sandbergii (Sandberg's bluegrass)	2.4	96.0
Bromus tectorum[a] (cheatgrass)	2.3	72.0
Oryzopsis hymenoides (Indian ricegrass)	1.6	64.0
Holosteum umbellatum[a] (jagged chickweed)	1.5	40.0
Draba verna[a] (spring whitlow)	0.7	28.0
Lactuca serriola[a] (prickly lettuce)	0.3	12.0
Chorispora tenella (blue mustard)	0.2	8.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	4.0
Centaurea diffusa[a] (tumble knapweed)	0.1	4.0
Artemisia tridentata (big sagebrush)	0.1	4.0
Epilobium paniculatum (tall willowherb)	0.1	4.0
Tragopogon dubius[a] (yellow salsify)	0.1	4.0
Festuca octoflora (slender sixweeks)	0.1	4.0
Sitanion hystrix (bottlebrush squirreltail)	0.1	4.0
Biotic crust	0.0	0.0
Bare soil	59.8	96.0
Litter	36.5	96.0
Total canopy cover (litter not included)	40.4	
Total Invasive % Cover	25.1	
Total Native % Cover	15.3	
Change in Native % Cover from 2008	+7.5	

[a] Invasive species
X = species present but not counted in plot frames

Table B-19. Percent Canopy Cover and Frequency of Occurrence at the 118-B-1 Burial Ground and Soil Staging Area 2009. (2 Pages)

Species	% Cover BG	% Cover SSA	Freq of Occ % BG	Freq of Occ % SSA
Salsola kali[a] (Russian thistle)	33.3	31.1	96.0	96.0
Poa sandbergii (Sandberg's bluegrass)	10.6	6.4	96.0	96.0
Agropyron spicatum (bluebunch wheatgrass)	7.4	8.6	68.0	76.0
Bromus tectorum[a] (cheatgrass)	6.3	7.3	60.0	60.0
Festuca octoflora (slender sixweeks)	1.7	0.3	12.0	12.0
Sisymbrium altissimum[a] (tumble mustard)	1.0	2.4	40.0	56.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.8	0.1	12.0	4.0
Draba verna[a] (spring whitlow)	0.7	0.1	8.0	4.0
Vulpia myuros[a] (rattail fescue)	0.1	0.7	4.0	8.0
Melilotus alba[a] (white sweetclover)	X	0.6	X	4.0
Poa bulbosa[a] (bulbous bluegrass)	0.3	--	12.0	--
Lactuca serriola[a] (prickly lettuce)	0.3	0.2	12.0	8.0
Holosteum umbellatum[a] (jagged chickweed)	0.1	0.3	4.0	12.0
Erodium cicutarium[a] (storksbill)	--	0.2	--	8.0
Koeleria cristata (prairie junegrass)	0.1	0.1	4.0	4.0
Artemisia tridentata (big sagebrush)	X	0.1	X	4.0
Epilobium paniculatum (tall willowherb)	0.1	--	4.0	--
Centaurea diffusa[a] (tumble knapweed)	--	0.1	--	4.0
Eriogonum niveum (snow buckwheat)	--	0.1	--	4.0
Lepidium perfoliatum (clasping pepperweed)	--	0.1	--	4.0
Agoseris heterophylla (annual mountain dandelion)	--	0.1	--	4.0
Oryzopsis hymenoides (Indian ricegrass)	X	--	X	--
Machaeranthera canescens (hoary aster)	X	--	X	--
Achillea millefolium (yarrow)	X	X	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	--	X	--
Erodium cicutarium[a] (storksbill)	X	--	X	--
Verbena bracteata[a] (big-bract verbena)	--	X	--	X
Biotic crust	0.0	0.0	0.0	0.0
Bare soil	45.9	64.6	96.0	100.0
Litter	50.4	30.4	100.0	92.0
Total canopy cover (litter not included)	62.8	58.9		

Table B-19. Percent Canopy Cover and Frequency of Occurrence at the 118-B-1 Burial Ground and Soil Staging Area 2009. (2 Pages)

Species	% Cover BG	% Cover SSA	Freq of Occ % BG	Freq of Occ % SSA
Total Invasive % Cover	42.1	43		
Total Native % Cover	20.7	15.9		
Change in Native % Cover from 2008	+9.4	+1.0		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table B-20. Percent Canopy Cover and Frequency of Occurrence at 118-C-1 in 2009.

Species	% Cover	Freq of Occ %
Agropyron spicatum (bluebunch wheatgrass)	9.2	100.0
Salsola kali[a] (Russian thistle)	7.6	96.0
Poa sandbergii (Sandberg's bluegrass)	3.8	92.0
Bromus tectorum[a] (cheatgrass)	3.5	80.0
Sisymbrium altissimum[a] (tumble mustard)	0.8	32.0
Holosteum umbellatum[a] (jagged chickweed)	0.6	24.0
Lactuca serriola[a] (prickly lettuce)	0.6	24.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.3	12.0
Draba verna[a] (spring whitlow)	0.2	8.0
Epilobium paniculatum (tall willowherb)	0.2	8.0
Erodium cicutarium[a] (storksbill)	0.1	4.0
Artemisia tridentata (big sagebrush)	0.1	4.0
Sitanion hystrix (bottlebrush squirreltail)	0.1	4.0
Tragopogon dubius[a] (yellow salsify)	0.1	4.0
Hordeum leporinum (hare barley)	X	X
Achillea millefolium (yarrow)	X	X
Biotic crust	0.0	100.0
Bare soil	50.3	100.0
Litter	52.3	100.0
Total canopy cover (litter not included)	27.2	
Total Invasive % Cover	13.5	
Total Native % Cover	13.7	
Change in Native % Cover from 2008	+3.8	

[a] Invasive species
X = species present but not counted in plot frames

Table B-21. Percent Canopy Cover at the Horseshoe Landfill and Soil Staging Area in 2009.

Species	HSLF % cover	SSA% cover	HSLF Freq of Occ	SSA Freq of Occ
Poa sandbergii (Sandberg's bluegrass)	42.7	45.1	96.0	100.0
Artemisia tridentata (big sagebrush)	2.3	12.3	32.0	56.0
Bromus tectorum[a] (cheatgrass)	10.5	11.2	92.0	96.0
Sisymbrium altissimum[a] (tumble mustard)	0.3	5.6	12.0	68.0
Lupinus leucophyllus (velvet lupine)	X	1.9	X	20.0
Oryzopsis hymenoides (Indian ricegrass)	1.8	--	32.0	--
Crepis artrabarba (slender hawksbeard)	--	1.5	--	4.0
Agropyron spicatum (bluebunch wheatgrass)	1.3	0.8	32.0	12.0
Salsola kali[a] (Russian thistle)	1.1	1.3	44.0	52.0
Sitanion hystrix (bottlebrush squirreltail)	1.1	X	24.0	X
Amsinckia lycopsoides (tarweed fiddleneck)	--	0.5	--	20.0
Machaeranthera canescens (hoary aster)	0.4	--	16.0	--
Lactuca serriola[a] (prickly lettuce)	0.2	--	8.0	--
Epilobium paniculatum (tall willowherb)	0.1	0.2	4.0	8.0
Festuca octoflora (slender sixweeks)	--	0.2	--	8.0
Agropyron cristatum (crested wheatgrass)	0.1	--	4.0	--
Tragopogon dubius (yellow salsify)	0.1	X	4.0	X
Chondrilla juncea (rush skeletonweed)	X	--	X	--
Erigeron filifolius (threadleaf fleabane)	X	--	X	--
Bromus japonicus (Japanese brome)	X	--	X	--
Erigeron piperianus (piper's daisy)	X	--	X	--
Chrysothamnus nauseosus (gray rabbitbrush)	X	--	X	--
Phlox longifolia (longleaf phlox)	--	X	--	X
Achillea millefolium (yarrow)	--	X	--	X
Balsamorhiza careyana (Carey's balsamroot)	--	X	--	X
Biotic crust	0.0	31.0	0.0	96.0
Bare soil	75.8	39.7	100.0	100.0
Litter	14.1	38.2	100.0	100.0
Total canopy cover (litter not included)	62.0	80.6		
Total Invasive % Cover	12.1	18.1		
Total Native % Cover	49.9	62.5		
Change in Native % Cover from 2008	-11.2	+0.2		

[a] Invasive species
X = species present but not counted in plot frames

Table B-22. Percent Canopy Cover and Frequency of Occurrence at 600-111 in 2009.

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	34.0	100.0
Agropyron spicatum (bluebunch wheatgrass)	15.3	100.0
Poa sandbergii (Sandberg's bluegrass)	13.8	100.0
Sisymbrium altissimum[a] (tumble mustard)	8.2	100.0
Bromus tectorum[a] (cheatgrass)	7.8	86.7
Draba verna[a] (spring whitlow)	0.7	26.7
Holosteum umbellatum[a] (jagged chickweed)	0.3	13.3
Poa bulbosa[a] (bulbous bluegrass)	0.3	13.3
Sitanion hystrix (bottlebrush squirreltail)	0.3	13.3
Achillea millefolium (yarrow)	0.2	6.7
Artemisia tridentata (big sagebrush)	0.2	6.7
Ambrosia acanthicarpa (bur ragweed)	0.2	6.7
Polemonium micranthum (annual Jacob's ladder)	X	X
Chenopodium leptophyllum[a] (slimleaf goosefoot)	X	X
Melilotus alba[a] (white sweetclover)	X	X
Descurainia pinnata (western tansymustard)	X	X
Lepidium perfoliatum[a] (clasping pepperweed)	X	X
Triticum aestivum[a] (wheat)	X	X
Stipa comata (needle-and-thread grass)	X	X
Biotic crust	0.0	0.0
Bare soil	56.8	100.0
Litter	41.5	100.0
Total canopy cover (litter not included)	81.3	
Total Invasive % Cover	51.3	
Total Native % Cover	30.0	

[a] Invasive species
X = species present but not counted in plot frames

Table B-23. Percent Canopy Cover and Frequency of Occurrence at 600-149 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Agropyron spicatum (bluebunch wheatgrass)	29.5	100.0
Poa sandbergii (Sandberg's bluegrass)	17.8	100.0
Salsola kali[a] (Russian thistle)	13.7	93.3
Sisymbrium altissimum[a] (tumble mustard)	4.3	73.3
Sitanion hystrix (bottlebrush squirreltail)	1.5	60.0

Table B-23. Percent Canopy Cover and Frequency of Occurrence at 600-149 in 2009. (2 Pages)

Species	% Cover	Freq of Occ %
Bromus tectorum[a] (cheatgrass)	1.2	46.7
Draba verna[a] (spring whitlow)	1.2	46.7
Chenopodium album[a] (lamb's quarters)	0.3	13.3
Melilotus alba[a] (white sweetclover)	0.3	13.3
Plantago patagonica (Indian wheat)	0.2	6.7
Lactuca serriola[a] (prickly lettuce)	0.2	6.7
Chorispora tenella[a] (blue mustard)	X	X
Descurainia pinnata (western tansymustard)	X	X
Vulpia myuros[a] (rattail fescue)	X	X
Artemisia tridentata (big sagebrush)	X	X
Grayia spinosa (spiny hopsage)	X	X
Biotic crust	0.0	0.0
Bare soil	45.8	100.0
Litter	50.7	100.0
Total canopy cover (litter not included)	70.2	
Total Invasive % Cover	21.2	
Total Native % Cover	49.0	

[a] Invasive species
X = species present but not counted in plot frames

APPENDIX C

2008 REVEGETATION MONITORING RESULTS

APPENDIX C

2008 REVEGETATION MONITORING RESULTS

Table C-1. Percent Canopy Cover and Frequency of Occurrence at the 300-FF-1 Process Ponds in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Bromus tectorum[a] (cheatgrass)	37.6	94.3
Agropyron spicatum (bluebunch wheatgrass)	26.9	82.9
Poa sandbergii (Sandberg's bluegrass)	18.1	82.9
Agropyron cristatum[a] (Crested Wheatgrass)	11.4	48.6
Salsola kali[a] (Russian thistle)	4.0	91.4
Vulpia myuros[a] (rattail fescue)	2.2	20.0
Erodium cicutarium[a] (storksbill)	1.9	62.9
Descurainia pinnata (western tansymustard)	1.1	5.7
Centaurea diffusa[a] (diffuse knapweed)	0.6	11.4
Holosteum umbellatum[a] (jagged chickweed)	0.3	11.4
Epilobium paniculatum (tall willowherb)	0.3	11.4
Machaeranthera canescens (hoary aster)	0.2	8.6
Sisymbrium altissimum[a] (tumble mustard)	0.1	5.7
Amsinckia lycopsoides (tarweed fiddleneck)	0.1	2.9
Agropyron dasytachyum (thickspike wheatgrass)	0.1	2.9
Hordeum leporinum[a] (hare barley)	0.1	2.9
Lactuca serriola[a] (prickly lettuce)	0.1	2.9
Chondrilla juncea[a] (rush skeletonweed)	0.1	2.9
Melilotus officinalis[a] (sweetclover)	0.1	2.9
Tragopogon dubius[a] (yellow salsify)	0.1	2.9
Malva neglecta[a] (cheeseweed)	0.1	2.9
Petalostemon ornatum (prairie clover)	X	X
Taraxacum officinale[a] (common dandelion)	X	X
Erigeron filifolius (threadleaf fleabane)	X	X
Lepidium perfoliatum (clasping pepperweed)	X	X
Achillea millefolium (yarrow)	X	X
Oryzopsis hymenoides (Indian ricegrass)	X	X
Sphaeralcea munroana (globemallow)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Cardaria draba [a] (whitetop)	X	X
Hymenopappus filifolius (Columbia cutleaf)	X	X

Table C-1. Percent Canopy Cover and Frequency of Occurrence at the 300-FF-1 Process Ponds in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Biotic crust	10.8	60.0
Bare Soil	46.9	97.1
Litter	42.6	100.0
Total canopy cover (litter not included)	105.4	
Total Introduced % Cover 2008	58.6	
Total Native % Cover 2008	46.7	
Change in Native Plant % Cover from 2007 to 2008	+12.3	

[a] Introduced species.
X = species present but not counted in plot frames

Table C-2. Percent Canopy Cover and Frequency of Occurrence at 618-2 and 618-3 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Agropyron cristatum[a] (crested wheatgrass)	21.7	100.0
Bromus tectorum[a] (cheatgrass)	15.3	93.3
Agropyron spicatum (bluebunch wheatgrass)	4.7	86.7
Poa sandbergii (Sandberg's bluegrass)	3.2	93.3
Salsola kali[a] (Russian thistle)	2.2	86.7
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	6.7
Oryzopsis hymenoides (Indian ricegrass)	0.2	6.7
Centaurea diffusa[a] (diffuse knapweed)	0.2	6.7
Sisymbrium altissimum[a] (tumble mustard)	0.2	6.7
Epilobium paniculatum (tall willowherb)	0.2	6.7
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Ambrosia acanthicarpa (bur ragweed)	X	X
Lactuca serriola[a] (prickly lettuce)	X	X
Machaeranthera canescens (hoary aster)	X	X
Agropyron dasytachyum (thickspike wheatgrass)	X	X
Eriogonum niveum (snow buckwheat)	X	X
Achillea millefolium (yarrow)	X	X
Biotic crust	0.0	0.0
Bare Soil	46.7	93.3
Litter	46.8	100.0
Total canopy cover (litter not included)	47.8	
Total Invasive % Cover	39.5	
Total Native % Cover	8.3	

Table C-2. Percent Canopy Cover and Frequency of Occurrence at 618-2 and 618-3 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Total Change in Native Cover from 2007	-3.4	

[a] Invasive species
X = species present but not counted in plot frames

Table C-3. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2008.

Species	% Cover	Freq of Occ %
Bromus tectorum[a] (cheatgrass)	37.6	96.0
Agropyron cristatum[a] (crested wheatgrass)	16.4	96.0
Salsola kali[a] (Russian thistle)	3.9	96.0
Holosteum umbellatum[a] (jagged chickweed)	2.3	52.0
Festuca octoflora (slender sixweeks)	1.9	20.0
Oenothera pallida (evening primrose)	1.5	4.0
Poa sandbergii (Sandberg's bluegrass)	1.4	56.0
Chrysothamnus nauseosus (gray rabbitbrush)	1.0	20.0
Draba verna[a] (spring whitlowgrass)	0.9	36.0
Machaeranthera canescens (hoary aster)	0.4	16.0
Erodium cicutarium[a] (storksbill)	0.3	12.0
Oryzopsis hymenoides (Indian ricegrass)	0.2	8.0
Agropyron spicatum (bluebunch wheatgrass)	0.2	8.0
Poa bulbosa[a] (bulbous bluegrass)	0.1	4.0
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Chondrilla juncea[a] (rush skeletonweed)	X	X
Crepis atrabarba (slender hawksbeard)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Sisymbrium altissimum[a] (tumble mustard)	X	X
Stipa comata (needle-and-thread grass)	X	X
Artemisia tridentata (sagebrush)	X	X
Biotic crust	0.0	0.0
Bare Soil	58.5	96.0
Litter	34.9	100.0
Total canopy cover (litter not included)	68.1	
Total Invasive % Cover	61.5	
Total Native % Cover	6.6	
Change in Native Cover from 2007	-33.5	

[a] Invasive species
X = species present but not counted in plot frames

Table C-4. Percent Canopy Cover and Frequency of Occurrence at the Hanford Generating Plant West Cobble and East Topsoil Sites in 2008. (2 Pages)

Species	% Cover E. Topsoil	% Cover W. Cobble	Freq of Occ % E. Topsoil	Freq of Occ % W. Cobble
Poa sandbergii (Sandberg's bluegrass)	47.3	47.0	88.0	100.0
Bromus tectorum[a] (cheatgrass)	45.2	15.8	100.0	80.0
Holosteum umbellatum[a] (jagged chickweed)	43.2	8.6	92.0	40.0
Chorispora tenella[a] (blue mustard)	6.1	--	56.0	--
Agropyron Spp.	--	4.7	--	36.0
Ranunculus testiculatus[a] (bur buttercup)	3.4	--	40.0	--
Sisymbrium altissimum[a] (tumble mustard)	1.1	0.7	44.0	28.0
Centaurea diffusa[a] (diffuse knapweed)	0.9	0.5	16.0	20.0
Sitanion hystrix (bottlebrush squirreltail)	0.2	3.4	8.0	40.0
Salsola kali[a] (Russian thistle)	0.4	1.6	16.0	64.0
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	1.6	4.0	8.0
Draba verna[a] (spring whitlow)	X	1.5	X	20.0
Agropyron spicatum (bluebunch wheatgrass)	0.8	--	12.0	--
Amsinckia lycopsoides (tarweed fiddleneck)	0.5	--	20.0	--
Erodium cicutarium[a] (storksbill)	--	0.4	--	16.0
Festuca octoflora (six-weeks fescue)	--	0.4	--	16.0
Microsteris gracilis (annual phlox)	--	0.4	--	16.0
Artemesia tridentata (sagebrush)	0.2	0.3	8.0	12.0
Descurainia pinnata (western tansymustard)	--	0.2	--	8.0
Achillea millefolium (yarrow)	0.1	0.2	4.0	8.0
Chorispora tenella[a] (blue mustard)	--	0.1	--	4.0
Poa bulbosa[a] (bulbous bluegrass)	--	0.1	--	4.0
Machaeranthera canescens (hoary aster)	--	X	--	X
Agropyron dasytachyum (thickspike wheatgrass)	--	X	--	X
Verbascum thapsus [a] (common mullein)	--	X	--	X
Biotic Crust	0.0	0.0	0.0	0.0
Bare Soil	19.2	45.9	84.0	96.0
Litter	84.5	53.6	100.0	100.0
Total canopy cover (litter not included)	149.5	87.5		

Table C-4. Percent Canopy Cover and Frequency of Occurrence at the Hanford Generating Plant West Cobble and East Topsoil Sites in 2008. (2 Pages)

Species	% Cover E. Topsoil	% Cover W. Cobble	Freq of Occ % E. Topsoil	Freq of Occ % W. Cobble
Total Invasive % Cover	100.3	29.3		
Total Native % Cover	49.2	58.2		
Change in Native Cover % from 2007 to 2008	-36.6	+20.2		

[a] Invasive species
X = species present but not counted in plot frames

Table C-5. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2008.

Species	% Cover	Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	40.5	**96**
Agropyron spicatum (bluebunch wheatgrass)	6.5	68
Salsola kali[a] (Russian thistle)	5	84
Sisymbrium altissimum[a] (tumble mustard)	1.9	76
Bromus tectorum[a] (cheatgrass)	1.9	76
Artemesia tridentata (sagebrush)	1.2	28
Oryzopsis hymenoides (Indian ricegrass)	0.3	12
Descurainia pinnata (western tansymustard)	0.3	12
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	4
Epilobium paniculatum (tall willowherb)	0.1	4
Achillea millefolium (yarrow)	0.1	4
Lactuca seriola[a] (prickly lettuce)	0.1	4
Centaurea diffusa [a] (diffuse knapweed)	X	X
Tragopogon dubius [a] (yellow salsify)	X	X
Biotic crust	0	0
Bare Soil	38.5	92
Litter	64.1	100
Total canopy cover (litter not included)	58.0	
Total Invasive % Cover	8.9	
Total Native % Cover	49.1	
Change in Native Cover % from 2007	+16.43	

[a] Invasive species
X = species present but not counted in plot frames

Table C-6. Percent Canopy Cover and Frequency of Occurrence at 116-N-3 in 2008.

Species	% Cover	Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	33.0	88.0
Bromus tectorum[a] (cheatgrass)	20.3	84.0
Agropyron spicatum (bluebunch wheatgrass)	9.9	52.0
Salsola kali[a] (Russian thistle)	4.2	92.0
Holosteum umbellatum[a] (jagged chickweed)	1.5	20.0
Sitanion hystrix (bottlebrush squirreltail)	1.5	4.0
Sisymbrium altissimum[a] (tumblemustard)	1.0	40.0
Lactuca serriola[a] (prickly lettuce)	0.4	16.0
Centaurea diffusa[a] (diffuse knapweed)	0.3	12.0
Amsinckia lycopsoides (tarweed fiddleneck)	0.2	8.0
Draba verna[a] (spring whitlowgrass)	0.1	4.0
Epilobium paniculatum (tall willowherb)	0.1	4.0
Oryzopsis hymenoides (Indian ricegrass)	X	X
Melilotus alba[a] (sweetclover)	X	X
Artemisia tridentata (big sagebrush)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Machaeranthera canescens (hoary aster)	X	X
Biotic crust	0.0	0.0
Bare soil	53.3	100.0
Litter	31.9	92.0
Total canopy cover (litter not included)	72.5	
Total Invasive % Cover	27.8	
Total Native % Cover	44.7	
Change in Native Cover from 2007	+6.7	

[a] Invasive species
X = species present but not counted in plot frames

Table C-7. Percent Canopy Cover and Frequency of Occurrence at 100-F Area Sites in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Bromus tectorum[a] (cheatgrass)	53.9	100.0
Poa sandbergii (Sandberg's bluegrass)	28.9	94.3
Agropyron spicatum (bluebunch wheatgrass)	11.8	71.4
Salsola kali[a] (Russian thistle)	2.4	82.9
Achillea millefolium (yarrow)	2.3	8.6
Oryzopsis hymenoides (Indian ricegrass)	1.4	17.1

Table C-7. Percent Canopy Cover and Frequency of Occurrence at 100-F Area Sites in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Chrysothamnus nauseosus (gray rabbitbrush)	1.1	5.7
Holosteum umbellatum[a] (jagged chickweed)	0.7	14.3
Artemesia tridentata (sagebrush)	0.5	5.7
Agropyron dasytachyum (thickspike wheatgrass)	0.4	2.9
Erodium cicutarium[a] (storksbill)	0.3	11.4
Draba verna[a] (spring whitlow)	0.3	11.4
Sitanion hystrix (bottlebrush squirreltail)	0.1	2.9
Sisymbrium altissimum[a] (tumble mustard)	0.1	2.9
Lepidium perfoliatum[a] (clasping pepperweed)	0.1	2.9
Centaurea diffusa [a] (diffuse knapweed)	X	X
Chrysothamnus viscidiflorus (green rabbitbrush)	X	X
Agoseris heterophylla (mountain dandelion)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Sporobolus cryptandrus (sanddrop seed)	X	X
Machaeranthera canescens (hoary aster)	X	X
Astragalus sclerocarpus (stalk-pod milkvetch)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Astragalus succumbens (crouching milkvetch)	X	X
Lactuca seriola[a] (prickly lettuce)	X	X
Vicia cracca[a] (bird vetch)	X	X
Koeleria cristata (prairie junegrass)	X	X
Tragopogon dubius [a] (yellow salsify)	X	X
Poa bulbosa[a] (bulbous bluegrass)	X	X
Ambrosia acanthicarpa (bur ragweed)	X	X
Biotic crust	1.4	28.6
Bare Soil	28.5	94.3
Litter	64.4	100.0
Total canopy cover (litter not included)	104.3	
Total Introduced % Cover 2008	57.43	
Total Native % Cover 2008	46.57	
Change in Native Plant % Cover from 2007 to 2008	+8.9	

[a] Introduced species.
X = species present but not counted in plot frames

Table C-8. Percent Canopy Cover and Frequency of Occurrence at the 118-F-1 Burial Ground in 2008.

Species	% Cover	Freq of Occ %
Native Grasses [a]	3.5	100.0
Salsola kali[b] (Russian thistle)	2.8	56.0
Artemesia tridentata (sagebrush)	0.2	8.0
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Erodium cicutarium[b] (storksbill)	X	X
Bromus tectorum[b] (cheatgrass)	X	X
Lactuca serriola [b] *(prickly lettuce)*	X	X
Grayia spinosa (hopsage)	X	X
Sisymbrium altissimum[b] (tumble mustard)	X	X
Poa bulbosa[b] (bulbous bluegrass)	X	X
Biotic crust	0	0.0
Bare soil	40.8	100.0
Litter	57	100.0
Total canopy cover (litter not included)	6.5	
Total Invasive % Cover	2.8	
Total Native % Cover	3.7	

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Invasive species
X = species present but not counted in plot frames

Table C-9. Percent Canopy Cover and Frequency of Occurrence at 118-F-2 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Native Grasses[a]	18.7	96.0
Salsola kali[b] (Russian thistle)	9.5	88.0
Nama densum (purplemat)	0.1	4.0
Amsinckia lycopsoides (tarweed fiddleneck)	0.1	4.0
Sisymbrium altissimum[b] (tumble mustard)	2.6	28.0
Lactuca serriola[b] (prickly lettuce)	0.1	4.0
Bromus tectorum[b] (cheatgrass)	4.2	16.0
Poa bulbosa[b] (bulbous bluegrass)	0.2	8.0
Artemesia tridentata (sagebrush)	0.1	4.0
Descurainia pinnata (western tansymustard)	0.1	4.0
Grayia spinosa (Spiny hopsage)	0.1	4.0
Draba verna[b] (spring whitlow)	0.1	4.0

Table C-9. Percent Canopy Cover and Frequency of Occurrence at 118-F-2 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Holosteum umbellatum[b] (jagged chickweed)	X	X
Cardaria draba[b] (whitetop)	X	X
Vicia cracca[b] (bird vetch)	X	X
Lepidium perfoliatum (clasping pepperweed)	X	X
Biotic Crust	0	0.0
Bare Soil	52.9	100.0
Litter	41.9	100.0
Total canopy cover (litter not included)	35.9	
Total Invasive % Cover	16.7	
Total Native % Cover	19.2	

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Invasive species
X = species present but not counted in plot frames

Table C-10. Percent Canopy Cover and Frequency of Occurrence at 182-F North and South in 2008. (2 Pages)

Species	% Cover North	% Cover South	Freq of Occ % North	Freq of Occ % South
Native Grasses[a]	47.2	35.2	100.0	100.0
Bromus tectorum[b] (cheatgrass)	17.7	33.8	73.3	96.0
Salsola kali[b] (Russian thistle)	1.2	29.4	46.7	92.0
Sisymbrium altissimum[b] (tumble mustard)	0.3	2.4	13.3	56.0
Poa bulbosa[b] (Bulbous bluegrass)	1.3	1.2	20.0	28.0
Draba verna[b] (spring whitlowgrass)	0.2	0.4	6.7	16.0
Artemesia tridentata (sagebrush)	0.2	0.1	6.7	4.0
Erodium cicutarium[b] (storksbill)	--	0.9	--	16.0
Sporobolus cryptandrus (sanddrop seed)	X	0.6	X	4.0
Verbena bracteata (big-bract verbena)	--	0.1	--	4.0
Vicia cracca[b] (bird vetch)	--	0.1	--	4.0
Achillea millefolium (yarrow)	--	X	--	X
Triticum aestivum[b] (wheat)	--	X	--	X
Artemisia ludoviciana (white sagebrush)	X	X	X	X
Centaurea diffusa[b] (diffuse knapweed)	X	X	X	X
Chrysothamnus nauseosus (gray	X	X	X	X

Table C-10. Percent Canopy Cover and Frequency of Occurrence at 182-F North and South in 2008. (2 Pages)

Species	% Cover North	% Cover South	Freq of Occ % North	Freq of Occ % South
rabbitbrush)				
Sphaeralcea munroana (globemallow)	--	X	--	X
Astragalus succumbens (Columbia milk-vetch)	--	X	--	X
Lactuca seriola[b] (prickly lettuce)	--	X	--	X
Machaeranthera canescens (hoary aster)	X	X	X	X
Astragalus spp.	X	X	X	X
Melilotus alba [b] (sweetclover)	X	--	X	--
Biotic crust	0.0	0.0	0.0	0.0
Bare soil	20.5	16.8	80.0	80.0
Litter	75.8	75.9	100.0	100.0
Total canopy cover (litter not included)	68.0	104.2		
Total Invasive % Cover	20.7	68.2		
Total Native % Cover	47.3	36.0		

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table C-11. Percent Canopy Cover and Frequency of Occurrence at the 183-F East Clearwell in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Native grasses[a]	52.3	100.0
Bromus tectorum[b] (cheatgrass)	1.3	20.0
Salsola kali[b] (Russian thistle)	6.7	100.0
Ranunculus testiculatus[b] (bur buttercup)	1.5	26.7
Grayia spinosa (hopsage)	0.2	6.7
Festuca octoflora (slender sixweeks)	0.2	6.7
Astragalus succumbens (Columbia milk-vetch)	0.2	6.7
Erodium cicutarium[b] (storksbill)	0.2	6.7
Poa bulbosa[b] (bulbous bluegrass)	0.2	6.7
Nama densum (purplemat)	0.2	6.7
Cryptantha circumscissa (matted cryptantha)	0.2	6.7
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	6.7
Sisymbrium altissimum[b] (tumble mustard)	0.3	13.3

Table C-11. Percent Canopy Cover and Frequency of Occurrence at the 183-F East Clearwell in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Artemisia tridentata (big sagebrush)	0.2	6.7
Lactuca serriola[b] (prickly lettuce)	0.2	6.7
Chorispora tenella[b] (blue mustard)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Biotic crust	0.0	0.0
Bare soil	45.2	100.0
Litter	46.0	100.0
Total canopy cover (litter not included)	63.8	
Total Invasive % Cover	10.3	
Total Native % Cover	53.5	

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Invasive species
X = species present but not counted in plot frames

Table C-12. Percent Canopy Cover and Frequency of Occurrence at 100-F-26 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Native grasses[a]	22.7	86.7
Bromus tectorum[b] (cheatgrass)	16.2	73.3
Salsola kali[b] (Russian thistle)	16.3	100.0
Festuca octoflora (slender sixweeks)	0.2	6.7
Sisymbrium altissimum[b] (tumble mustard)	0.7	26.7
Chenopodium album (lambsquarters)	0.3	13.3
Artemisia tridentata (big sagebrush)	0.2	6.7
Erodium cicutarium[b] (storksbill)	0.2	6.7
Chorispora tenella[b] (blue mustard)	0.2	6.7
Lepidium perfoliatum (clasping pepperweed)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Poa bulbosa[b] (bulbous bluegrass)	X	X
Ranunculus testiculatus[b] (bur buttercup)	X	X
Achillea millefolium (yarrow)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Sphaeralcea munroana (Munro's globemallow)	X	X
Grayia spinosa (hopsage)	X	X
Centaurea diffusa[b] (diffuse knapweed)	X	X

Table C-12. Percent Canopy Cover and Frequency of Occurrence at 100-F-26 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Biotic crust	0.0	0.0
Bare soil	41.3	100.0
Litter	53.0	100.0
Total canopy cover (litter not included)	56.8	
Total Invasive % Cover	33.5	
Total Native % Cover	23.3	

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Invasive species
X = species present but not counted in plot frames

Table C-13. Percent Canopy Cover and Frequency of Occurrence at 118-F-5 Soil Staging Area and Burial Ground in 2008. (2 Pages)

Species	% Cover SSA	% Cover BG	Freq of Occ % SSA	Freq of Occ % BG
Bromus tectorum[a] (cheatgrass)	49.2	13.5	100.0	93.3
Native Grasses[b]	16.0	4.2	100.0	100.0
Salsola kali[a] (Russian thistle)	3.5	3.8	73.3	86.7
Ambrosia acanthicarpa (bur ragweed)	1.2	--	13.3	--
Sisymbrium altissimum[a] (tumble mustard)	0.5	0.2	20.0	6.7
Chenopodium leptophyllum (slimeleaf goosefoot)	0.3	--	13.3	--
Triticum aestivum[a] (common wheat)	0.3	--	13.3	--
Plantago patagonica (Indian wheat)	0.3	--	13.3	--
Amsinckia lycopsoides (tarweed fiddleneck)	0.2	0.2	6.7	6.7
Holosteum umbellatum[a] (jagged chickweed)	0.2	--	6.7	--
Draba verna[a] (spring whitlow)	0.2	--	6.7	--
Astragalus spp.	0.2	--	6.7	--
Microsteris gracilis (annual phlox)	0.2	--	6.7	--
Achillea millefolium (yarrow)	0.2	X	6.7	X
Grayia spinosa (hopsage)	X	X	X	X
Machaeranthera canescens (hoary aster)	X	--	X	--
Hackelia diffusa (sagebrush stickseed)	X	--	X	--
Chondrilla juncea[a] (rush skeletonweed)	X	--	X	--
Artemesia tridentata (sagebrush)	X	0.3	X	13.3
Chenopodium album (lambsquarters)	X	--	X	--
Lactuca seriola[a] (prickly lettuce)	X	X	X	X

Table C-13. Percent Canopy Cover and Frequency of Occurrence at 118-F-5 Soil Staging Area and Burial Ground in 2008. (2 Pages)

Species	% Cover SSA	% Cover BG	Freq of Occ % SSA	Freq of Occ % BG
Hordeum leporinum[a] (hare barley)	X	--	X	--
Chrysothamnus nauseosus (gray rabbitbrush)	--	0.3	--	13.3
Poa bulbosa[a] (bulbous bluegrass)	--	X	--	X
Agoseris heterophylla (mountain-dandelion)	--	X	--	X
Machaeranthera canescens (hoary aster)	--	X	--	X
Triticum aestivum[a] (common wheat)	--	X	--	X
Biotic crust	0.0	0.0	0.0	0.0
Bare Soil	46.3	37.2	100.0	100.0
Litter	45.2	50.7	100.0	100.0
Total Canopy Cover (litter not included)	72.3	22.5		
Total Introduced % Cover 2008	53.8	17.5		
Total Native % Cover 2008	18.5	5.0		

[a] Introduced species.
[b] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
X = species present but not counted in a plot frame
-- = species not observed on site

Table C-14. Percent Canopy Cover and Frequency of Occurrence at 100-B-1 and 128-C-1 in 2008. (2 Pages)

Species	% Cover 100-B-1	% Cover 128-C-1	Freq of Occ %	Freq of Occ %
Poa sandbergii (Sandberg's bluegrass)	43.9	15.3	100.0	100.0
Bromus tectorum[a] (cheatgrass)	23.6	24.8	100.0	100.0
Salsola kali[a] (Russian thistle)	5.9	5.2	100.0	80.0
Agropyron spicatum (bluebunch wheatgrass)	2.5	2.7	40.0	40.0
Sisymbrium altissimum[a] (tumble mustard)	1.7	0.7	28.0	26.7
Artemesia tridentata (sagebrush)	0.1	5.7	4.0	6.7
Oryzopsis hymenoides (Indian ricegrass)	0.6	1.2	4.0	13.3
Sitanion hystrix	--	14.7	--	73.3
Microsteris gracilis (annual phlox)	0.1	--	4.0	--
Lomatium macrocarpum (bigseed desertparsley)	0.1	--	4.0	--
Sitanion hystrix (bottlebrush squirreltail)	X	--	X	--
Grayia spinosa (hopsage)	X	--	X	--
Tragopogon dubius (yellow salsify)	X	--	X	--

Table C-14. Percent Canopy Cover and Frequency of Occurrence at 100-B-1 and 128-C-1 in 2008. (2 Pages)

Species	% Cover 100-B-1	% Cover 128-C-1	Freq of Occ %	Freq of Occ %
Sphaeralcea munroana (Munro's globemallow)	X	--	X	--
Koeleria cristata (prairie junegrass)	X	--	X	--
Hordeum leporinum [a] (hare barley)	X	--	X	--
Amsinckia lycopsoides (tarweed fiddleneck)	X	--	X	--
Descurainia pinnata (western tansymustard)	X	--	X	--
Astragalus purshii (wolly-pod milkvetch)	X	--	X	--
Machaeranthera canescens (hoary aster)	X	--	X	--
Lactuca seriola[a] (prickly lettuce)	--	0.5	--	20.0
Chrysothamnus nauseosus (gray rabbitbrush)	--	0.2	--	6.7
Draba verna[a] (spring whitlowgrass)	--	1.3	--	20.0
Erodium cicutarium[a] (storksbill)	--	X	--	X
Tragopogon dubius[a] (yellow salsify)	--	X	--	X
Biotic crust	29.2	0.0	96.0	0.0
Bare Soil	49.5	37.5	100.0	100.0
Litter	43.2	57.8	100.0	100.0
Total canopy cover (litter not included)	34.6	56.8		
Total Invasive % Cover	31.2	32.5		
Total Native % Cover	47.3	39.7		
Total Change in Native Cover from 2007	+1.9	+14.7		

[a] Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table C-15. Percent Canopy Cover at 100-C-9 in 2008. (2 Pages)

Species	T1	T2	T3
Poa sandbergii (Sandberg's bluegrass)	12.0	5.0	17.0
Agropyron spicatum (bluebunch wheatgrass)	9.5	1.3	9.2
Bromus tectorum[a] (cheatgrass)	4.8	11.3	33.0
Salsola kali[a] (Russian thistle)	2.5	2.3	4.2
Draba verna[a] (spring whitlowgrass)	0.3	0.2	0.5
Festuca octoflora (slender sixweeks)	0.3	1.0	--
Sisymbrium altissimum[a] (tumble mustard)	0.5	1.8	11.5
Descurainia pinnata (western tansymustard)	0.3	0.7	0.5
Oryzopsis hymenoides (Indian ricegrass)	1.5	--	0.2

Table C-15. Percent Canopy Cover at 100-C-9 in 2008. (2 Pages)

Species	T1	T2	T3
Artemesia tridentata (sagebrush)	0.2	X	0.2
Lactuca seriola[a] (prickly lettuce)	0.2		0.2
Holosteum umbellatum[a] (jagged chickweed)	X	0.2	2.8
Poa bulbosa[a] (bulbous bluegrass)	X	0.3	--
Chrysothamnus nauseosus (gray rabbitbrush)	X	--	--
Machaeranthera canescens (hoary aster)	X	--	--
Erodium cicutarium[a] (storksbill)	--	0.2	0.2
Amsinckia lycopsoides (tarweed fiddleneck)	--	--	0.2
Centaurea diffusa[a] (diffuse knapweed)	--	X	0.5
Verbena bracteata[a] (big-bract verbena)	--		X
Erigonum vimineum (broom buckwheat)	--	0.7	--
Sitanion hystrix (bottlebrush squirreltail)	--	0.2	--
Sphaeralcea munroana (Munro's globemallow)	--	X	--
Chaenactis douglasii (hoary falseyarrow)	--	X	--
Chorispora tenella [a] (blue mustard)	--	X	--
Biotic crust	0.0	0.0	0.0
Bare Soil	54.8	42.0	34.2
Litter	43.5	57.8	64.2
Total canopy cover (litter not included)	32.2	25.2	80.0
Total Invasive % Cover	8.3	16.3	52.8
Total Native % Cover	23.8	8.8	27.2
Change in Native Cover % from 2007	-30.8	-9.7	-15.5

[a] = Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table C-16. Frequency of Occurrence at 100-C-9 in 2008. (2 Pages)

Species	T1	T2	T3
Salsola kali[a] (Russian thistle)	100.0	93.3	100.0
Poa sandbergii (Sandberg's bluegrass)	100.0	100.0	100.0
Agropyron spicatum (bluebunch wheatgrass)	60.0	53.3	73.3
Bromus tectorum[a] (cheatgrass)	66.7	100.0	86.7
Sisymbrium altissimum[a] (tumble mustard)	20.0	73.3	100.0
Descurainia pinnata (western tansymustard)	13.3	26.7	20.0
Draba verna[a] (spring whitlowgrass)	13.3	6.7	20.0
Festuca octoflora (slender sixweeks)	13.3	40.0	--

Table C-16. Frequency of Occurrence at 100-C-9 in 2008. (2 Pages)

Species	T1	T2	T3
Oryzopsis hymenoides (Indian ricegrass)	26.7	--	6.7
Artemesia tridentata (sagebrush)	6.7	X	6.7
Lactuca seriola[a] (prickly lettuce)	6.7	--	6.7
Holosteum umbellatum[a] (jagged chickweed)	X	6.7	20.0
Poa bulbosa[a] (bulbous bluegrass)	X	13.3	--
Chrysothamnus nauseosus (gray rabbitbrush)	X	--	--
Machaeranthera canescens (hoary aster)	X	--	--
Erodium cicutarium[a] (storksbill)	--	6.7	6.7
Amsinckia lycopsoides (tarweed fiddleneck)	--	--	6.7
Centaurea diffusa[a] (diffuse knapweed)	--	X	20.0
Verbena bracteata (big-bract verbena)	--		X
Erigonum vimineum (broom buckwheat)	--	26.7	--
Sitanion hystrix (bottlebrush squirreltail)	--	6.7	--
Sphaeralcea munroana (Munro's globemallow)	--	X	--
Chaenactis douglasii (hoary falseyarrow)	--	X	--
Chorispora tenella[a] (blue mustard)	--	X	--
Biotic crust	0.0	0.0	0.0
Bare Soil	100.0	100.0	100.0
Litter	100.0	100.0	100.0

[a] = Invasive species
X = species present but not counted in plot frames
-- = species not observed on site

Table C-17. Percent Canopy Cover and Frequency of Occurrence at 100-B-14 South in 2008. (2 Pages)

Species	% Cover	Freq. of Occ.
Salsola kali[a] (Russian thistle)	31.4	100
Sisymbrium altissimum[a] (tumble mustard)	7.3	76
Native Grasses[b]	6.7	76
Artemesia tridentata (sagebrush)	0.1	4
Bromus tectorum[a] (cheatgrass)	1.1	24
Chrysothamnus nauseosus (gray rabbitbrush)	0.9	16
Melilotus alba[a] (sweetclover)	0.6	4
Chorispora tenella[a] (blue mustard)	0.1	4
Festuca octoflora (slender sixweeks)	0.1	4
Poa bulbosa[a] (Bulbous bluegrass)	X	X
Epilobium paniculatum (tall willowherb)	X	X

Table C-17. Percent Canopy Cover and Frequency of Occurrence at 100-B-14 South in 2008. (2 Pages)

Species	% Cover	Freq. of Occ.
Lactuca serriola [a] (prickly lettuce)	X	X
Centaurea diffusa [a] (diffuse knapweed)	X	X
Ranunculus testiculatus[a] (bur buttercup)	X	X
Biotic Crust	0	0
Bare Soil	50.8	96
Litter	46.8	88
Total canopy cover (litter not included)	48.3	
Total Invasive % Cover	40.5	
Total Native % Cover	7.8	

[a] Invasive species
[b] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
X = species present but not counted in plot frames

Table C-18. Percent Canopy Cover and Frequency of Occurrence at the 118-B-1 Burial Ground and Soil Staging Area 2008. (2 Pages)

Species	% Cover SSA	% Cover BG	Freq of Occ % SSA	Freq of Occ % BG
Native Grasses[a]	11.0	13.6	76.0	84.0
Salsola kali[b] (Russian thistle)	4.5	3.8	64.0	72.0
Bromus tectorum[b] (cheatgrass)	1.2	2.0	28.0	24.0
Lactuca seriola[b] (prickly lettuce)	0.1	--	4.0	--
Sisymbrium altissimum[b] (tumble mustard)	0.3	0.6	12.0	24.0
Poa bulbosa[b] (Bulbous bluegrass)	0.2	X	8.0	X
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	0.4	4.0	16.0
Festuca octoflora (slender sixweeks)	0.1	0.6	4.0	4.0
Ambrosia acanthicarpa (bur ragweed)	0.1	--	4.0	--
Melilotus alba[b] (sweetclover)	0.1	X	4.0	X
Microsteris gracilis (pink microsteris)	X	--	X	--
Chenopodium leptophyllum (slimleaf goosefoot)	X	X	X	X
Erodium cicutarium[b] (storksbill)	X	0.2	X	8.0
Lactuca serriola[b] (prickly lettuce)	X	0.1	X	4.0
Artemesia tridentata (sagebrush)	X	0.3	X	12.0
Amsinckia lycopsoides (fiddleneck)	X	X	X	X
Achillea millefolium (yarrow)	X	--	X	--

Table C-18. Percent Canopy Cover and Frequency of Occurrence at the 118-B-1 Burial Ground and Soil Staging Area 2008. (2 Pages)

Species	% Cover SSA	% Cover BG	Freq of Occ % SSA	Freq of Occ % BG
Centaurea diffusa [b] (diffuse knapweed)	--	0.2	--	8.0
Descurainia pinnata (western tansymustard)	--	X	--	X
Chorispora tenella[b] (blue mustard)	--	X	--	X
Hordeum leporinum [b] (hare barley)	--	X	--	X
Biotic crust	0.0	0.0	0.0	0.0
Bare soil	48.8	38.7	92.0	92.0
Litter	50.0	58.6	100.0	100.0
Total canopy cover (litter not included)	17.7	21.8		
Total Invasive % Cover	6.4	6.9		
Total Native % Cover	11.3	14.9		

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Invasive species
X = species present but not counted in plot frames
-- = species not observed in area

Table C-19. Percent Canopy Cover and Frequency of Occurrence at 118-C-1 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Salsola kali[a] (Russian thistle)	21.2	100
Native Grasses[b]	9.7	100
Sisymbrium altissimum[a] (tumble mustard)	1.6	44
Bromus tectorum[a] (cheatgrass)	0.6	24
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	8
Lactuca seriola[a] (prickly lettuce)	0.2	8
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Kochia scopari[a] (kochia)	X	X
Melilotus alba[a] (sweetclover)	X	X
Sisymbrium altissimum[a] (tumble mustard)	X	X
Biotic crust	0	0
Bare soil	33.2	92
Litter	62.6	100
Total canopy cover (litter not included)	33.5	

Table C-19. Percent Canopy Cover and Frequency of Occurrence at 118-C-1 in 2008. (2 Pages)

Species	% Cover	Freq of Occ %
Total Invasive % Cover	23.6	
Total Native % Cover	9.9	

[a] Invasive species
[b] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
X = species present but not counted in plot frames

Table C-20. Percent Canopy Cover at the Horseshoe Landfill and Soil Staging Area in 2008. (2 Pages)

Species	HSLF	SSA
Poa sandbergii (Sandberg's bluegrass)	60.0	46.0
Agropyron spicatum (bluebunch wheatgrass)	7.2	3.7
Bromus tectorum[a] (cheatgrass)	2.5	13.5
Salsola kali[a] (Russian thistle)	0.8	17.0
Artemesia tridentata (sagebrush)	2.2	4.8
Sitanion hystrix (bottlebrush squireltail)	3.7	1.3
Lupinus leucophyllus (velvet lupine)	1.0	0.7
Epilobium paniculatum (tall willowherb)	0.8	0.2
Agropyron cristatum[a] (crested wheatgrass)	0.2	0.2
Lactuca seriola[a] (prickly lettuce)	0.3	0.2
Crepis atrabarba (slender hawksbeard)	--	3.7
Sisymbrium altissimum[a] (tumble mustard)	X	2.3
Oryzopsis hymenoides (Indian ricegrass)	1.7	X
Amsinckia lycopsoides (tarweed fiddleneck)	--	1.5
Festuca octoflora (slender sixweeks)	--	0.3
Kochia scoparia[a] (kochia)	--	0.3
Machaeranthera canescens (hoary aster)	0.3	X
Draba verna[a] (spring whitlowgrass)	--	0.2
Descurainia pinnata (western tansymustard)	--	0.2
Chrysothamnus nauseosus (gray rabbitbrush)	0.2	--
Lomatium macrocarpum(bigseed desertparsley)	--	X
Phlox longifolia (longleaf phlox)	--	X
Erodium cicutarium[a] (storksbill)	--	X
Achillea millefolium (yarrow)	--	X
Tragopogon dubius[a] (yellow salsify)	--	X
Biotic crust	43.3	42.0

Table C-20. Percent Canopy Cover at the Horseshoe Landfill and Soil Staging Area in 2008. (2 Pages)

Species	HSLF	SSA
Bare Soil	52.2	42.0
Litter	45.2	45.3
Total Canopy Cover (excludes litter)	80.8	96.0
Total Invasive % Cover	3.8	33.7
Total Native % Cover	77.0	62.3
Change in Native Cover from 2007	^41.7	^27.0

[a] Invasive species
HLSF = Horseshoe Landfill
SSA = soil staging area
X = species present but not counted in plot frames
-- = species not observed on site

Table C-21. Frequency of Occurrence at the Horseshoe Landfill and Soil Staging Area in 2008. (2 Pages)

Species	HSLF	SSA
Sisymbrium altissimum[a] (tumble mustard)	X	93.3
Bromus tectorum[a] (cheatgrass)	100.0	93.3
Poa sandbergii (Sandberg's bluegrass)	100.0	100.0
Agropyron spicatum (bluebunch wheatgrass)	60.0	20.0
Sitanion hystrix (bottlebrush squireltail)	46.7	20.0
Salsola kali[a] (Russian thistle)	33.3	80.0
Lupinus leucophyllus (velvet lupine)	--	26.7
Festuca octoflora (slender sixweeks)		13.3
Kochia scoparia[a] (kochia)	--	13.3
Artemesia tridentata (sagebrush)	20.0	33.3
Lactuca seriola[a] (prickly lettuce)	13.3	6.7
Amsinckia lycopsoides (tarweed fiddleneck)	--	26.7
Draba verna[a] (spring whitlowgrass)	--	6.7
Crepis atrabarba (slender hawksbeard)	--	20.0
Descurainia pinnata (western tansymustard)	--	6.7
Epilobium paniculatum (tall willowherb)	33.3	6.7
Agropyron cristatum[a] (crested wheatgrass)	6.7	6.7
Oryzopsis hymenoides (Indian ricegrass)	33.3	X
Lomatium macrocarpum(bigseed desertparsley)	--	X
Phlox longifolia (longleaf phlox)	--	X
Erodium cicutarium[a] (storksbill)	--	X
Machaeranthera canescens (hoary aster)	13.3	X

Table C-21. Frequency of Occurrence at the Horseshoe Landfill and Soil Staging Area in 2008. (2 Pages)

Species	HSLF	SSA
Achillea millefolium (yarrow)	--	X
Tragopogon dubius[a] (yellow salsify)	--	X
Chrysothamnus nauseosus (gray rabbitbrush)	6.7	--
Biotic crust	100.0	100.0
Bare Soil	100.0	100.0
Litter	100.0	100.0

[a] Invasive species
HLSF = Horseshoe Landfill
SSA = soil staging area
X = species present but not counted in plot frames
-- = species not observed on site

APPENDIX D

2007 REVEGETATION MONITORING RESULTS

APPENDIX D

2007 REVEGETATION MONITORING RESULTS

Table D-1. Percent Canopy Cover and Frequency of Occurrence at the 300-FF-1 Process Ponds and Burial Grounds in 2007. (2 Pages)

Species	% Cover	% Frequency
Poa sandbergii (Sandberg's bluegrass)	7.9	57
Bromus tectorum[a] (cheatgrass)	32.0	97
Salsola kali[a] (Russian thistle)	3.4	80
Ag. Spp.(Wheatgrasses)	20.4	74
Oryzopsis hymenoides (Indian ricegrass)	0.1	3
Vulpia myuros[a] (rattail fescue)	3.7	51
Lactuca serriola[a] (prickly lettuce)	0.9	37
Centaurea diffusa[a] (diffuse knapweed)	0.8	17
Festuca octoflora (six-weeks fescue)	0.4	17
Erodium cicutarium[a] (storksbill)	5.3	51
Sisymbrium altissimum[a] (tumble mustard)	0.8	31
Epilobium paniculatum (tall willowherb)	0.2	9
Agropyron cristatum[a] (Crested Wheatgrass)	3.1	40
Senecio vulgaris (common groundsel)	0.1	6
Amsinckia lycopsoides (tarweed fiddleneck)	0.3	11
Lepidium perfoliatum (clasping pepperweed)	4.7	11
Descurainia pinnata (western tansymustard)	0.1	6
Tragopogon dubius[a] (yellow salsify)	0.1	3
Hordeum leporinum(hare barley)	0.1	3
Holosteum umbellatum (jagged chickweed)	0.0	0
Petalostemon ornatum (prairie clover)	X	X
Melilotus alba [a] (sweetclover)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Artemisia tridentata (sagebrush)	X	X
Tragopogon dubius (yellow salsify)	X	X
Achillea millefolium (yarrow)	X	X
Cardaria draba[a] (whitetop)	X	X
Machaeranthera canescens (hoary aster)	X	X
Descurainia pinnata (western tansymustard)	X	X
Agoseris heterophylla (mountain dandelion)	X	X
Malva neglecta[a] (cheeseweed)	X	X
Centaurea repens[a] (Russian knapweed)	X	X

Table D-1. Percent Canopy Cover and Frequency of Occurrence at the 300-FF-1 Process Ponds and Burial Grounds in 2007. (2 Pages)

Species	% Cover	% Frequency
Biotic crust	7.2	31
Bare Soil	34.5	100
Litter	62.0	100
Total canopy cover (Biotic crust and litter not included)	**84.4**	
Total Introduced species % Cover 2007	50.0	
Total Native % Cover 2007	34.4	
Change in Native Plant % Cover from 2006 to 2007	+15.7	

[a] Introduced species.
X = species present but not counted in plot frames

Table D-2. Percent Canopy Cover and Frequency of Occurrence at 618-2 and 618-3 in 2007.

Species	% Cover	% Freq
Salsola kali[a] (Russian thistle)	11.8	100
Sisymbrium altissimum[a] (tumble mustard)	7.6	88
Bromus tectorum[a] (cheatgrass)	4.6	84
Agropyron spp. (wheatgrasses)	11.2	100
Ambrosia acanthicarpa (bur ragweed)	0.3	12
Amsinckia lycopsoides (tarweed fiddleneck)	0.1	4
Epilobium paniculatum (tall willowherb)	0.1	4
Erodium cicutarium[a] (storksbill)	0.1	4
Bare Soil	58.9	100
Litter	35.5	96
Total canopy cover (Litter not included)	**35.8**	
Total Introduced Species % Cover 2007	24.1	
Total Native % Cover 2007	11.7	

[a] Introduced species
X = species present but not counted in plot frames

Table D-3. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2007. (2 Pages)

Species	% Cover	% Freq
Salsola kali[a] (Russian thistle)	12.6	100
Sisymbrium altissimum[a] (tumble mustard)	12.6	96
Bromus tectorum[a] (cheatgrass)	16.2	88
Ambrosia acanthicarpa (bur ragweed)	0.3	12

Table D-3. Percent Canopy Cover and Frequency of Occurrence at 300-8 in 2007. (2 Pages)

Species	% Cover	% Freq
Agropyron spp. (wheatgrasses)	36.2	100
Holosteum umbellatum[a] (jagged chickweed)	0.2	8
Machaeranthera canescens (hoary aster)	0.3	12
Plantago patagonica (Indian wheat)	0.1	4
Vulpia myuros (rattail fescue)	1.2	8
Draba verna[a] (spring whitlowgrass)	0.4	16
Artemisia tridentata (sagebrush)	0.3	12
Oenothera pallida (primerose)	1.5	4
Erodium cicutarium[a] (storksbill)	0.1	4
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Lactuca serriola[a] *(prickly lettuce)*	X	X
Conyza canadensis[a] (horseweed)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Bare Soil	54.2	100
Litter	45.9	100
Total canopy cover (Litter not included)	**82.0**	
Total Introduced Species % Cover 2007	41.9	
Total Native % Cover 2007	40.1	

[a] Introduced species
X = species present but not counted in plot frames

Table D-4. Percent Canopy Cover on the 120-N-1 and 120-N-2 Sites in 2007. (2 Pages)

Species	Biosol and Straw Mulch	Biosol and Hydromulch	Triple-16 and Straw Mulch	Triple-16 and Hydromulch
Bromus tectorum[a] (cheatgrass)	83.7	71.3	34.3	16.2
Poa sandbergii (Sandberg's bluegrass)	11.7	1.2	29.3	23.2
Agropyron spicatum (bluebunch wheatgrass)	5.2	2.7	33.7	3.3
Agropyron dasytachyum (thickspike wheatgrass)	--	--	0.2	--
Centaurea diffusa[a] (diffuse knapweed)	0.2	0.3	0.8	1.5
Poa bulbosa[a] (bulbous bluegrass)	--	1.0	0.3	--
Artemisia tridentata (sagebrush)	--	0.0	0.2	--
Salsola kali[a] (Russian thistle)	1.5	1.3	0.2	3.0

Table D-4. Percent Canopy Cover on the 120-N-1 and 120-N-2 Sites in 2007. (2 Pages)

Species	Biosol and Straw Mulch	Biosol and Hydromulch	Triple-16 and Straw Mulch	Triple-16 and Hydromulch
Achillea millefolium (yarrow)	0.2	--	0.3	6.2
Holosteum umbellatum[a] (jagged chickweed)	--	0.2	0.2	0.7
Erysimum asperum (wallflower)	--	0.0	--	0.0
Chrysothamnus nauseosus (gray rabbitbrush)	--	0.2	--	4.5
Oryzopsis hymenoides (Indian ricegrass)	--	2.0	--	2.0
Sisymbrium altissimum[a] (tumble mustard)	0.2	1.0	X	0.2
Tragopogon dubius[a] (yellow salsify)	--	--	--	0.2
Erigeron poliospermus (cushion fleabane)	--	--	X	1.0
Draba verna[a] (spring whitlow)	--	0.2	--	--
Lactuca serriola[a] (prickly lettuce)	--	--	X	0.2
Penstemon acuminatus (sand beardtongue)	--	--	--	X
Chaenactis douglasii (hoary falseyarrow)	--	--	--	X
Erysimum asperum (rough wallflower)	--	--	X	--
Hordeum leporinum[a] (hare barley)	--	--	X	--
Biotic crust	--	--	3.00	2.33
Bare soil	23.83	39.17	24.00	78.83
Litter	76.50	54.17	59.50	11.33
Total canopy cover (Biotic crust or Litter not included)	**102.5**	**81.3**	**99.5**	**62.0**
% Cover Introduced Species	85.5	75.3	35.8	21.8
% Cover Native	17.0	6.0	63.7	40.2
Change in Native Plant % Cover from 2006 to 2007	-18.3	+0.7	+38.5	+15.0

[a] Introduced species.
X = species present but not counted in plot frames
-- = species not observed on site.

Table D-5. Percent Frequency on the 120-N-1 and 120-N-2 Sites in 2007.

Species	Biosol and Straw Mulch	Biosol and Hydromulch	Triple-16 and Straw Mulch	Triple-16 and Hydromulch
Bromus tectorum[a] (cheatgrass)	100	100	100	100
Poa sandbergii (Sandberg's bluegrass)	87	100	80	47
Salsola kali[a] (Russian thistle)	7	87	60	53
Achillea millefolium (yarrow)	13	80	7	--
Agropyron spicatum (bluebunch wheatgrass)	87	67	47	13
Centaurea diffusa[a] (diffuse knapweed)	33	27	7	13
Holosteum umbellatum[a] (jagged chickweed)	7	27	--	7
Chrysothamnus nauseosus (gray rabbitbrush)	X	20	--	7
Oryzopsis hymenoides (Indian ricegrass)	--	13	--	13
Erigeron poliospermus (cushion fleabane)	X	7	--	--
Lactuca serriola[a] (prickly lettuce)	X	7	--	--
Sisymbrium altissimum[a] (tumble mustard)	X	7	7	40
Tragopogon dubius[a] (yellow salsify)	--	7	--	--
Agropyron dasytachyum (thickspike wheatgrass)	7	--	--	--
Artemisia tridentata (sagebrush)	7	--	--	--
Draba verna[a] (spring whitlow)	--	--	--	7
Erysimum asperum (wallflower)	--	--	--	--
Poa bulbosa[a] (bulbous bluegrass)	13	--	--	7
Penstemon acuminatus (sand beardtongue)	--	X	--	--
Chaenactis douglasii (hoary falseyarrow)	--	X	--	--
Erysimum asperum (rough wallflower)	X	--		--
Hordeum leporinum[a] (hare barley)	X	--	--	--
Biotic crust	53	60	--	--
Bare soil	80	100	100	100
Litter	100	100	100	100

[a] Introduced species.
X = species present but not counted in a plot frame
-- = species not observed on site.

Table D-6. Percent Canopy Cover at the Hanford Generating Plant in 2007. (2 Pages)

Species	Topsoil	Cobble
Poa sandbergii (Sandberg's bluegrass)	21.1	26
Native Grasses [a]	2.6	9
Bromus tectorum[b] (cheatgrass)	73.5	15
Sisymbrium altissimum[b] (tumble mustard)	3.1	3
Salsola kali[b] (Russian thistle)	1.1	27
Erodium cicutarium[b] (storksbill)	0.3	0
Lactuca serriola[b] (prickly lettuce)	0.3	1
Chrysothamnus nauseosus (gray rabbitbrush)	X	0
Draba verna[b] (spring whitlow)	0.3	1
Holosteum umbellatum[b] (jagged chickweed)	22.1	1
Vulpia myuros[b] (rattail fescue)	0.1	1
Artemisia tridentata (sagebrush)	0.3	0
Centaurea diffusa[b] (diffuse knapweed)	X	0
Achillea millefolium (yarrow)	--	0
Chorispora tenella[b] (blue mustard)	5.4	0
Amsinckia lycopsoides (tarweed fiddleneck)	0.3	0
Descurainia pinnata (western tansymustard)	--	0
Ranunculus testiculatus[b] (bur buttercup)	1.3	X
Poa bulbosa[b] (Bulbous bluegrass)	X	X
Hordeum leporinum[b] (hare barley)	X	--
Machaeranthera canescens (hoary aster)	--	X
Sphaeralcea munroana (Munro's globemallow)	--	X
Bare Soil	3.6	38
Litter	85.9	56
Total canopy cover (Biotic crust or Litter not included)	**131.6**	**85**
Total Introduced % Cover 2007	3.63	56
Total Native % Cover 2007	85.88	38
Change in Native Plant % Cover from 2006 to 2007	+64.68	+2.7

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Introduced species.
X = species present but not counted in plot frames
-- = species not observed on site.

Table D-7. Frequency of Occurrence at the Hanford Generating Plant in 2007.

Species	Topsoil	Cobble
Poa sandbergii (Sandberg's bluegrass)	65	92
Native Grasses[a]	35	72
Bromus tectorum[b] (cheatgrass)	100	96
Sisymbrium altissimum[b] (tumble mustard)	75	80
Salsola kali[b] (Russian thistle)	45	92
Erodium cicutarium[b] (storksbill)	10	12
Lactuca serriola[b] (prickly lettuce)	10	28
Chrysothamnus nauseosus (gray rabbitbrush)	X	4
Draba verna[b] (spring whitlow)	10	20
Holosteum umbellatum[b] (jagged chickweed)	80	28
Vulpia myuros[b] (rattail fescue)	5	28
Artemisia tridentata (sagebrush)	10	4
Centaurea diffusa[b] (diffuse knapweed)	X	12
Achillea millefolium (yarrow)	X	8
Chorispora tenella[b] (blue mustard)	50	4
Amsinckia lycopsoides (tarweed fiddleneck)	10	4
Descurainia pinnata (western tansymustard)	X	4
Ranunculus testiculatus[b] (bur buttercup)	25	X
Poa bulbosa[b] (Bulbous bluegrass)	X	X
Hordeum leporinum[b] (hare barley)	X	--
Machaeranthera canescens (hoary aster)	--	X
Sphaeralcea munroana (Munro's globemallow)	--	X
Bare Soil	70	92
Litter	100	100

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Introduced species.
X = species present but not counted in plot frames
-- = species not observed on site.

Table D-8. Percent Canopy Cover and Frequency of Occurrence at 116-N-3 in 2007.

Species	% Cover	% Freq
Agropyron spicatum (bluebunch wheatgrass)	5.1	43
Bromus tectorum [a] (cheatgrass)	16.8	97
Salsola kali [a] (Russian thistle)	14.8	100
Lactuca serriola [a] (prickly lettuce)	1.8	23
Sisymbrium altissimum [a] (tumble mustard)	1.5	60
Poa sandbergii (Sandberg's bluegrass)	30.8	90
Holosteum umbellatum [a] (jagged chickweed)	0.8	30
Draba verna [a] (spring whitlow)	0.3	10
Agoseris heterophylla (mountain-dandelion)	0.3	13
Erodium cicutarium [a] (storksbill)	0.5	3
Amsinckia lycopsoides (tarweed fiddleneck)	0.2	7
Vulpia myuros [a] (Rattail fescue)	0.1	3
Oryzopsis hymenoides (Indian ricegrass)	0.1	3
Sitanion hystrix (bottlebrush squirreltail)	1.5	13
Centaurea diffusa [a] (diffuse knapweed)	0.5	3
Koeleria cristata (prairie Junegrass)	X	X
Machaeranthera canescens (hoary aster)	X	X
Bare Soil	53.9	93
Litter	35.8	100
Total canopy cover (Litter not included)	**74.9**	
Total Introduced % Cover 2007	36.17	
Total Native % Cover 2007	38.00	
Change in Native Plant % Cover from 2006 to 2007	+21.1	

[a] Introduced species.
X = species present but not counted in plot frames

Table D-9. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2007. (2 Pages)

Species	% Cover	Freq. of Occ.
Native Grasses [a]	31.8	100
Sisymbrium altissimum [b] (tumble mustard)	17.7	87
Lactuca serriola [b] (prickly lettuce)	0.8	30
Bromus tectorum [b] (cheatgrass)	0.9	37
Salsola kali [b] (Russian thistle)	4.4	93
Artemisia tridentata (sagebrush)	0.8	30
Poa sandbergii (Sandberg's bluegrass)	0.1	3

Table D-9. Percent Canopy Cover and Frequency of Occurrence at 116-N-1 in 2007. (2 Pages)

Species	% Cover	Freq. of Occ.
Chrysothamnus nauseosus (gray rabbitbrush)	0.1	3
Kochia scopari [b] (kochia)	0.2	7
Descurainia pinnata (western tansymustard)	X	X
Conyza canadensis [b] (horseweed)	X	X
Epilobium paniculatum (tall willowherb)	X	X
Achillea millefolium (yarrow)	X	X
Amsinckia lycopsoides (tarweed fiddleneck)	X	X
Oryzopsis hymenoides (Indian ricegrass)	X	X
Agropyron spicatum (bluebunch wheatgrass)	X	X
Poa sandbergii (Sandberg's bluegrass)	X	X
Bare Soil	31.3	97
Litter	63.7	100
Total canopy cover (Litter not included)	**56.6**	
Total Introduced % Cover	23.92	
Total Native % Cover	32.67	

[a] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
[b] Introduced species
X = species present but not counted in plot frames

Table D-10. Percent Canopy Cover and Frequency of Occurrence at 100-F Area Sites in 2007. (2 Pages)

Species	% Cover	% Freq
Agropyron spicatum (bluebunch wheatgrass)	11.6	69
Bromus tectorum[a] (cheatgrass)	45.6	97
Salsola kali[a] (Russian thistle)	4.4	94
Sisymbrium altissimum[a] (tumble mustard)	0.3	11
Artemisia tridentata (sagebrush)	0.1	3
Poa sandbergii (Sandberg's bluegrass)	18.7	94
Sitanion hystrix (bottlebrush squirreltail)	0.1	3
Achillea millefolium (yarrow)	0.1	6
Holosteum umbellatum[a] (jagged chickweed)	5.4	26
Draba verna[a] (spring whitlow)	0.3	11
Poa bulbosa[a] (bulbous bluegrass)	0.4	14
Sporobolus cryptandrus (sanddrop seed)	0.1	3
Erodium cicutarium[a] (storksbill)	0.3	11

Table D-10. Percent Canopy Cover and Frequency of Occurrence at 100-F Area Sites in 2007. (2 Pages)

Species	% Cover	% Freq
Vicia cracca[a] (bird vetch)	1.1	3
Festuca octoflora (slender sixweeks)	0.1	3
Oryzopsis hymenoides (Indian ricegrass)	0.4	3
Astragalus sclerocarpus (stalk-pod milkvetch)	0.4	3
Lepidium perfoliatum (clasping pepperweed)	0.1	3
Astragalus succumbens (crouching milkvetch)	X	X
Phacelia linearis (threadleaf scorpionweed)	X	X
Koeleria cristata (prairie junegrass)	X	X
Centaurea diffusa[a] (diffuse knapweed)	X	X
Agoseris heterophylla (mountain dandelion)	X	X
Machaeranthera canescens (hoary aster)	X	X
Chrysothamnus nauseosus (gray rabbitbrush)	X	X
Tragopogon dubius[a] (yellow salsify)	X	X
Astragalus caricinus (buckwheat milkvetch)	X	X
Chrysothamnus viscidiflorus (green rabbitbrush)	X	X
Bare Soil	28.3	80
Litter	69.0	100
Total canopy cover (Litter not included)	**89.4**	
Total Introduced % Cover 2007	57.71	
Total Native % Cover 2007	31.71	
Change in Native Plant % Cover from 2006 to 2007	+15.4	

[a] Introduced species.
X = species present but not counted in plot frames
-- = species not observed on site.

Table D-11. Percent Canopy Cover and Frequency on the 100-B-1 and 128-C-1 Sites in 2007.

Species	% Cover on 100-B-1	% Cover on 128-C-1	% Frequency on 100-B-1	% Frequency on 100-C-1
Sisymbrium altissimum[a] (tumble mustard)	6.1	1.2	84	47
Salsola kali[a] (Russian thistle)	17.8	19.2	100	100
Poa sandbergii (Sandberg's bluegrass)	41.6	8.8	100	67
Agropyron spp.(Wheatgrasses)	2.7	1.5	68	60
Bromus tectorum[a] (cheatgrass)	18.5	17.7	84	100
Poa bulbosa (Bulbous bluegrass)	0.1	--	4	--
Hordeum leporinum[a] (hare barley)	0.2	--	8	--
Amsinckia lycopsoides (tarweed fiddleneck)	0.7	--	8	--
Agoseris heterophylla (mountain dandelion)	0.1	0.2	4	7
Vulpia myuros[a] (rattail fescue)	0.1	--	4	--
Artemisia tridentata (sagebrush)	0.1	1.0	4	7
Grayia spinosa (hopsage)	X	--	X	--
Descurainia pinnata (western tansymustard)	X	--	X	--
Hordeum leporinum[a] (hare barley)	X	--	X	--
Kochia scoparia[a] (kochia)	X	--	X	--
Amsinckia lycopsoides (fiddleneck)	X	--	X	--
Lactuca serriola[a] (prickly lettuce)	--	0.7	--	27
Sitanion hystrix (bottlebrush squirreltail)	--	12.2	--	73
Draba verna (spring whitlowgrass)	--	0.5	--	20
Oryzopsis hymenoides (Indian ricegrass)	--	1.3	--	20
Bare Soil	30.5	34.2	96	100
Litter	57.2	55.2	100	100
Total Canopy Cover (litter not included)	**88.0**	**64.2**		
Total Introduced % Cover 2007	42.6	39.2		
Total Native % Cover 2007	45.4	25.0		
Difference in % Cover of Native Plants from 2006 to 2007	+31.2	+20.8		

[a] Introduced species.
X = species present but not counted in plot frames
-- = species not observed on site

Table D-12. Percent Canopy Cover at 100-C-9 Transects 1, 2, 3, and 4 in 2007.

Species	T-1 % Cover	T-2 % Cover	T-3 % Cover	T-4 % Cover
Salsola kali[a] (Russian thistle)	12.3	24.7	25.7	39.8
Bromus tectorum[a] (cheatgrass)	0.2	5.7	10.0	3.0
Native Grasses[b]	61.7	47.0	18.0	42.2
Sisymbrium altissimum[a] (tumble mustard)	1.3	1.5	13.2	25.5
Artemisia tridentata (sagebrush)	0.2	0.5	0.2	0.2
Lactuca serriola[a] (prickly lettuce)	0.5	0.2	1.0	0.3
Holosteum umbellatum[a] (jagged chickweed)	--	1.0	--	--
Poa bulbosa[a] (bulbous bluegrass)	X	X	0.2	--
Draba verna (spring whitlowgrass)	--	--	0.5	0.2
Epilobium paniculatum (tall willowherb)	--	--	0.2	--
Eriogonum niveum (snow buckwheat)	--	--	0.3	--
Centaurea diffusa[a] (diffuse knapweed)	--	--	X	0.7
Festuca octoflora (slender sixweeks)	X	--	--	0.2
Agropyron spp. (wheatgrasses)	--	--	--	0.2
Erodium cicutarium[a] (storksbill)	--	--	X	0.2
Tragopogon dubius[a] (yellow salsify)	--	X	--	--
Amsinckia lycopsoides (tarweed fiddleneck)	--	X	--	--
Agastache occidentalis (western horsemint)	--	--	--	X
Chrysothamnus nauseosus (gray rabbitbrush)	--	X	X	--
Chaenactis douglasii (hoary falseyarrow)	--	--	X	--
Machaeranthera canescens (hoary aster)	--	--	X	--
Gnaphalium chilense (cottonbatting cudweed)	--	--		X
Melilotus officinalis[a] (sweetclover)	--	--	--	--
Bare Soil	48.5	32.2	40.5	37.2
Litter	52.8	70.5	60.8	60.8
Total canopy cover (Litter not included)	**76.2**	**80.5**	**69.2**	**112.3**
Total Introduced % Cover 2007	14.33	33	50.5	69.7
Total Native % Cover 2007	61.83	47.5	18.7	42.7

[a] Introduced species
[b] Includes Sandberg's bluegrass, bluebunch wheatgrass, thickspike wheatgrass, Indian ricegrass, needle-and-thread grass, and prairie junegrass seedlings.
X = present but not counted in plot frames
-- = Not present on site.

APPENDIX E

NAME CHANGES INCLUDED IN INTEGRATED TAXONOMIC INFORMATION SYSTEM

APPENDIX E

NAME CHANGES INCLUDED IN INTEGRATED TAXONOMIC INFORMATION SYSTEM

Name changes included in Integrated Taxonomic Information System.

The following list are recent name changes for species mentioned in this report. The first name is that used in Hitchcock and Cronquist (1973) and the second is the more recent version.

Agropyron cristatum = Agropyron desertorum
Agropyron dasytachyum = Elymus lanceolatus var lanceolatus
Agropyron spicatum = Pseudoroegneria spicata ssp. spicata
Chrysothamnus nauseosus = Ericameria nauseosa ssp. *nauseosa* var. *nauseosa*
Cymopterus terebinthinus = Pteryxia terebinthina var. *terebinthina*
Epilobium paniculatum = Epilobium brachycarpum
Erysimum asperum = Erysimum capitatum var capitatum
Festuca octoflora = Vulpia octoflora var. *octoflora*
Koeleria cristata = Koeleria macrantha
Microsteris gracilis = Phlox gracilis ssp. *gracilis*
Oryzopsis hymenoides = Achnatherum hymenoides
Poa sandbergii = Poa secunda
Poa scabrella = Poa secunda
Psoralea lanceolata = Psoralidium lanceolatum
Ranunculus testiculatus = Ceratocephala testiculata
Salsola kali = Salsola tragus
Sitanion hystrix = Elymus elymoides ssp. *elymoides*
Stipa comata = Hesperostipa comata ssp. *comata*

References

Hitchcock, C. L., and A. Cronquist, 1973, *Flora of the Pacific Northwest*, University of Washington Press, Seattle, Washington.

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