South Walnut Creek is interpreted to be insignificant. The uranium isotopic data summarized in Table 113 further support this interpretation. See Section 3.1.5 for additional discussion of groundwater quality in the SPP area.

A third batch of samples was being identified for LBNL analysis as 2013 ended. Some will date to 2013, including just following the heavy precipitation of September. These samples will be selected and submitted to LBNL in 2014, and potentially additional batches will be submitted in 2014. Results will be summarized in the annual report for 2014. The reports from LBNL on the two sample batches summarized above are provided in Appendix G.

3.2 Ecological Monitoring at RFS

3.2.1 Introduction

The Ecology group conducts ecological monitoring of the Site's ecological resources to ensure regulatory compliance and to preserve, protect, and manage those resources. Ecological monitoring is an integral aspect of determining whether the management objectives and goals for the natural resources at the Site are being achieved. This report summarizes the results of the vegetation, revegetation, and wildlife monitoring conducted at the Site during 2013. It also includes a brief summary of the monitoring conducted for Preble's meadow jumping mouse (*Zapus hudsonius preblei*; Preble's mouse) mitigation and wetland mitigation activities; however, the details of those monitoring efforts are summarized in separate regulatory reports provided to the appropriate agencies.

At an elevation of approximately 6,000 feet, the Site contains a unique ecotonal mixture of mountain and prairie plant species resulting from the topography of the area and its proximity to the mountain front. The POU, the area surrounding the COU (the general area where the former IA was once located), is one of the largest remaining undeveloped tracts of its kind along the Colorado Piedmont. A number of plant communities present in the COU and POU have been identified as increasingly rare and unique by the Colorado Natural Heritage Program (CNHP 1994, 1995). These communities include the xeric tallgrass prairie, tall upland shrubland, wetlands, and Great Plains riparian woodland communities. Small inclusions of a number of other increasingly rare plant communities are also found on the Site. Many of these communities support populations of increasingly rare animals as well, including the federally protected Preble's mouse, and other uncommon species such as the grasshopper sparrow (*Ammodramus savannarum*), loggerhead shrike (*Lanius ludovicianus*), Merriam's shrew (*Sorex merriami*), black-crowned night heron (*Nycticorax nycticorax*), hops blue butterfly (*Celastrina* sp.), and Arogos skipper (*Atrytone arogos*).

During 2007, transfer of portions of the POU was made to USFWS to create the Rocky Flats National Wildlife Refuge. As a result, the total acreage managed by LM is now approximately 1,308 acres in the COU. A summary of the ecological monitoring highlights from the 2013 field season is provided in the following sections. Full, detailed summaries, methodology, and analyses for each field monitoring effort are presented as stand-alone reports on the Ecology DVD included with this report.

3.2.2 Vegetation Monitoring

Vegetation monitoring reported here is conducted at the Site to provide information necessary for management of the natural resources. The objectives of the vegetation surveys in 2013 were to:

- Identify new plant species not found at the Site previously.
- Identify and document infestations of selected noxious weeds at the Site to assist with the planning of noxious weed control activities.
- Document and track herbicide applications in 2013.
- Document where revegetation activities were conducted in 2013.
- Conduct photomonitoring for visual documentation of changes in vegetation establishment at the Site.
- Document the establishment and survival rates of shrubs/trees that were planted as part of habitat enhancement projects.
- Document the establishment of volunteer-collected forbs in forb "nurseries."

The methods for these activities may be found in the full vegetation monitoring report on the Ecology DVD included with this report.

3.2.3 Site Flora

The complete list of plant species known to occur or that have been recorded at the Site is available on the ecology DVD. The Site species list includes the complete flora of both the COU and the POU. The vascular flora of the Site consists of 637 species of plants. In 2013, one new record of a vascular plant species was reported for the Site flora. Brassica napus, an agricultural plant commonly known as rape (the source of rapeseed oil or canola oil), was collected near the west boundary fence in a revegetation area in the POU. The following taxonomic name will be used at the Site for the new plant species record:

Family	Scientific Name	Speccode	Common Name
Brassicaceae	*Brassica napus* L.	BRNA1	Rape

Voucher specimens of the species will be deposited at the University of Colorado Herbarium in Boulder, Colorado. No new species of noxious weeds were observed at the Site during 2013.

3.2.4 Weed Mapping and Weed Control

Figure 259 and Figure 260 show the 2013 weed distribution maps for diffuse knapweed (Centaurea diffusa) and Dalmatian toadflax (Linaria dalmatica), respectively. Table 114 shows the estimated total acreage and acreage-by-density categories for each species, based on the mapping data from 2007 through 2013. The total area of the COU is approximately 1,308 acres. In 2013, diffuse knapweed was observed on approximately 78 acres at various levels of infestation, the lowest amount observed since mapping began in the COU in 2007. Dalmatian toadflax was mapped on approximately 110 acres in 2013, the second lowest amount recorded since 2007. A variety of reasons may account for the reduced abundance of these two noxious weeds. Past herbicide applications certainly have reduced their abundance at the Site.

Additionally, biocontrol insects have been released onsite for both species and are known to have spread across the Site, helping to reduce and keep populations lower. In 2013, the dry conditions experienced at the Site from fall 2012 through spring 2013 have probably also contributed to the lower abundance. Observations in spring 2013 revealed very few diffuse knapweed rosettes at the Site. Annual fluctuations in the abundance of many grassland species are not uncommon, as populations respond to changes in temperature, precipitation amounts, timing of precipitation, and other environmental factors.

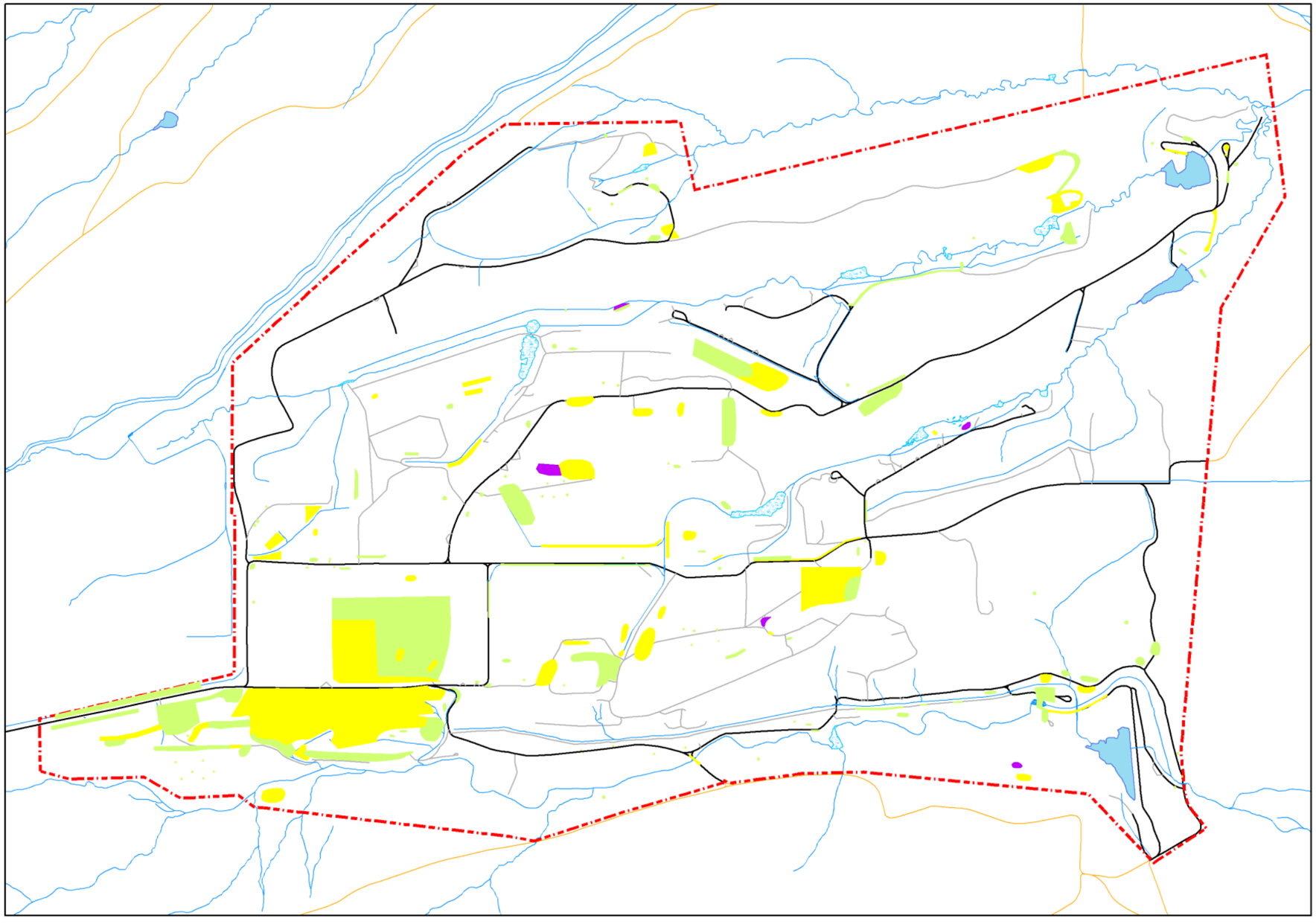
Table 114. COU Noxious Weed Acreage Summary (2007–2013)

Species	Density (acres)				Total	% of Total COU
	High	Medium	Low	Scattered		
Diffuse knapweed						
2007	2.2	41.2	248.8	167.7	459.9	35
2008	1.8	20.6	110.0	147.5	279.9	21
2009	1.6	44.6	231.2	147.5	424.9	32
2010	0.1	10.6	155.0	64.3	230.1	18
2011	0.0	2.8	77.1	77.7	157.6	12
2012	0.0	7.6	109.1	56.4	173.1	13
2013	0.0	0.8	41.1	36.0	77.9	6
Dalmatian toadflax						
2007	77.1	51.0	0.0	109.0	237.1	18
2008	0	0	54.3	151.8	206.1	16
2009	2.1	16.8	56.5	386.7	462.1	35
2010	0.0	2.1	64.2	101.4	167.7	13
2011	0.0	0.0	19.9	29.0	48.9	4
2012	0.0	2.8	53.8	58.9	115.5	9
2013	0	0	75.3	35.1	110.4	8

Notes: The total acreage of the COU is 1,308 acres.

For the first time in over a decade, no herbicide applications were made in spring 2013. Reconnaissance efforts during late winter/early spring in the COU revealed no areas that required chemical control efforts. In the fall, approximately 62 acres were treated with herbicides at the Site via ground application (Figure 261), with most of this along the gravel roads. Table 115 lists the target species, treatment (herbicides) used, application rates, acreage treated, and approximate timing of the application during the year. (**Note:** Multiple herbicides are listed at some locations. Depending on site-specific characteristics such as target weed species, the locations of water bodies, soil types, and professional judgment of the licensed herbicide applicator, different herbicides were used within that location to provide the control needed.)

Hand control and weed-whacking were also used to control some small patches of Scotch thistle (*Onopordum acanthium*) and whitetop (*Cardaria draba*) in 2013.



2013 Diffuse Knapweed (Centaurea diffusa) Distribution

Legend

Diffuse Knapweed

Density

- Scattered
- Low
- Medium

Site Features

- RFS COU Boundary
- Lakes; Ponds
- Wetland/Marsh
- Stream, ditch, or other drainage feature

Road Type

- Open
- ATV Only
- Truck By Permission

N

SCALE IN FEET

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U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
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Figure 259. 2013 Diffuse Knapweed (Centaurea diffusa) Distribution at Rocky Flats

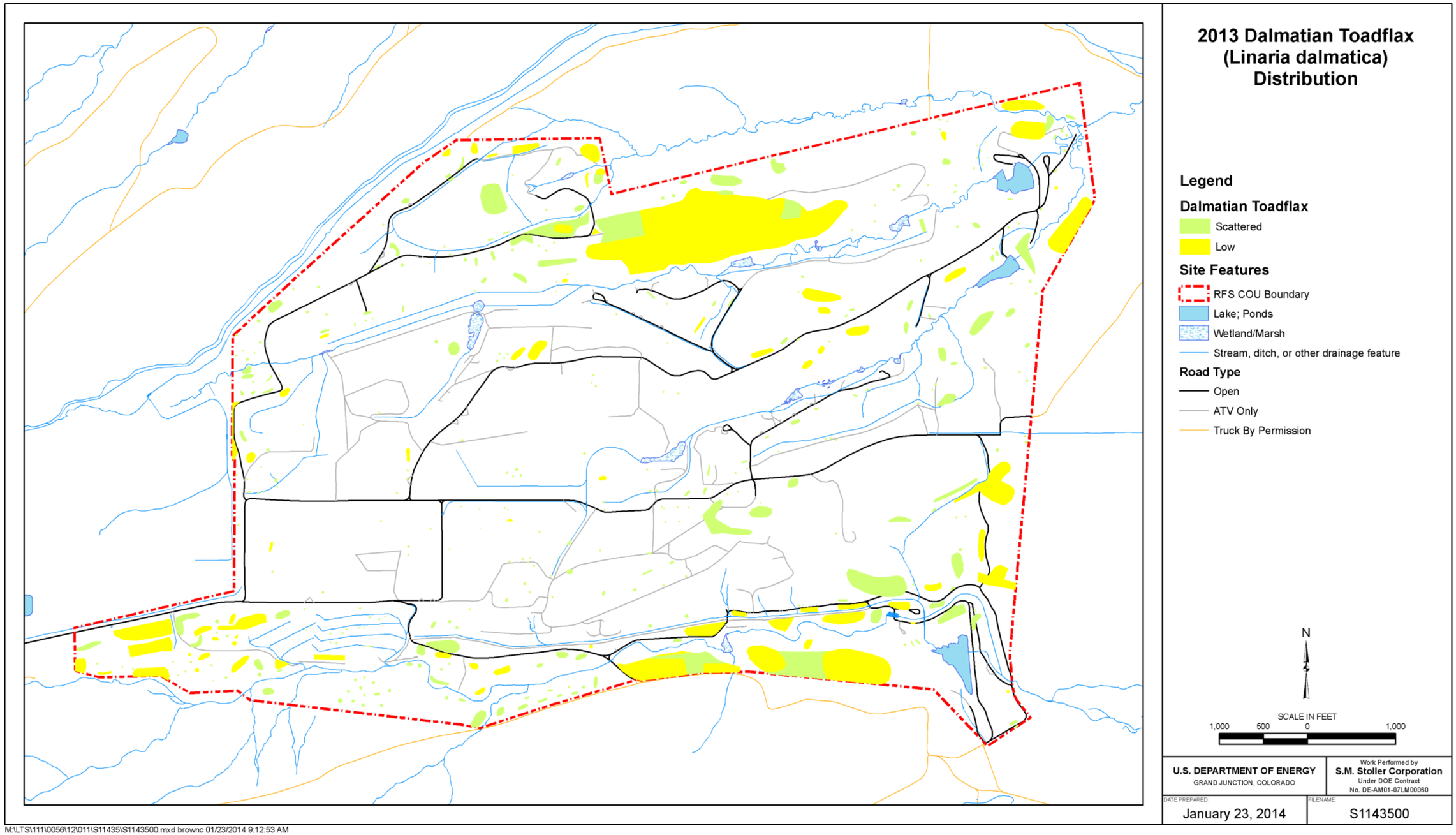


Figure 260. 2013 Dalmation Toadflax (Linaria dalmatica) Distribution at Rocky Flats

Table 115. FY 2013 Herbicide Application Summary

Location	Target Species[a]	Treatment[b] (Rate/Acre)	Actual Acreage Treated[c]	Time of Year Treated
1	CEDI1, VETH1, DACA1	7 oz Milestone + 1 oz Escort	5.60	Fall 2013
2	CEDI1, VETH1	7 oz Milestone + 1 oz Escort	12.00	Fall 2013
3	Total Kill	96 oz Rodeo	0.84	Fall 2013
4	Total Kill	96 oz Rodeo	0.54	Fall 2013
5	Total Kill	96 oz Rodeo	0.67	Fall 2013
All Roads	BRTE1, AECY1, CEDI1	7 oz Milestone + 8 oz Plateau	42.00	Fall 2013
		Annual Total Acreage Treated	61.65	

Notes:
[a] Species Codes: AECY1 = Jointed Goatgrass, BRTE1 = Downy Brome, CEDI1 = Diffuse Knapweed, DACA1 = Wild Carrot, VETH1 = Common Mullein
[b] Depending on location specific environmental conditions and which target species were present, one of more of the listed herbicides were mixed together and used in that area.
[c] Acreages based on billing statements, not GIS footprints on map.

A test to evaluate the effectiveness of mechanical control on common mullein (*Verbascum thapsus*) was conducted by mowing and cutting off flower stalks at some small patches in the COU. Reexamination of the patches after a few weeks showed the plants had regrown new flower stalks (often multiple flower stalks per plant where previously there had been one) at the point where the stem had been cut off. These stalks were removed; but resprouted again. Therefore, without continued mechanical control throughout the growing season, mechanical control is not very effective on this species and requires considerable labor. However, at one location (Location 1 on Figure 261), the removal of the flower stalks provided clear access to the rosettes for chemical control that was applied to these plants later in the summer. The combination of mowing plus herbicide applications seems to have been very effective at this location. Mowing and removing the flower stalk may weaken the plant (because it has expended a lot of energy to produce the flower stalk), making it more susceptible to the herbicide application. This could be an effective technique in a situation where chemical control cannot be or was not applied in the early spring when only rosettes are present.

Biocontrol insects continue to be used at the Site. In 2013, no additional releases of biocontrol insects were made since most of the biocontrols released in the past have now largely spread across the Site. Collections and transplants from other established populations of various biocontrols at the Site may be conducted if needed. Additional biocontrol insects for different weed species may be released as they become available.

3.2.5 Revegetation Activities

3.2.5.1 Interseeding/Revegetation Activities

During 2013, interseeding and revegetation activities were conducted to increase vegetation cover or diversity at several locations (Table 116 and Figure 262). An old mining road in the D-2A mine parcel on the western edge of the POU was revegetated in preparation for transfer of the mine parcel to the Rocky Flats National Wildlife Refuge (Figure 263). At three other locations (B371 Revegetation Area, East Trenches Revegetation Area, and Mound Revegetation Area) compost was disced to add organic matter to the soil. Other areas were interseeded to increase vegetation cover.

Table 116. 2013 Revegetation Location Summary

Project Name	Seeding/ Installation Date	Acres	Seed Mix[a] or Plants Installed	Seeding/Planting Method
2013 Shrub Planting	4/4/2013	1.2	Four-wing Saltbush, Buffaloberry	10 cu. in. plants, Hand Installed
A-3 Interseeding	11/14/2013	1.8	Mesic seed mix	Hand Broadcasting
B371 Revegetation Area	6/6/2013	0.5	Mesic seed mix	Compost added, ATV Broadcasting and Harrowed
D-2 Parcel Road Revegetation Area	4/8/2013	4.7	Xeric seed mix	Sustane Fertilizer, Broadcast seeding and Harrowed
East Trenches Revegetation Area	6/6/2013	0.2	Xeric seed mix	Compost added, ATV Broadcasting and Harrowed
East Trenches Solar Project Interseeding	10/17/2013	0.04	Mesic seed mix	Hand Broadcasting
FC-1 Road Crossing Interseeding	12/19/2013	0.03	Mesic seed mix	Hand Broadcasting
Volunteer Graminoid Seed	11/27/2013	1.6	Volunteer collected seed	Hand Broadcasting
Forb Nurseries	12/18/2013	0.7	Volunteer collected seed	Hand Broadcasting
Mound Revegetation Area	6/6/2013	1.7	Mesic seed mix	Compost added, ATV Broadcasting and Harrowed
PLF Interseeding	11/14/2013	1.3	Mesic seed mix, coyote willow stake installation	Hand Broadcasting and Planting of Willow stakes
WALPOC Interseeding	10/17/2013	0.2	Mesic seed mix	Hand Broadcasting
WOMPOC Interseeding	11/26/2013	0.2	Mesic seed mix	Hand Broadcasting
	Total	14.2		

Notes:
[a] Seed mixes are listed in the *Rocky Flats, Colorado, Site Revegetation Plan* (DOE 2009b).

3.2.5.2 Habitat Enhancement Project Evaluations

In 2012 and 2013, projects were begun to enhance onsite habitat for wildlife and to increase vegetation diversity. In spring 2012, five different shrub and tree species were planted on a hillside in the north-central COU (north of the 2013 Shrub Planting Location on Figure 262). The species included buffaloberry (*Shepherdia argentea*), fourwing saltbush (*Atriplex canescens*), coyote willow (*Salix exigua*), chokecherry (*Prunus virginiana*), and plains cottonwood (*Populus deltoides*). These plants were irrigated for only the first growing season (2012) using a gravity-fed irrigation system. Although several plains cottonwood and chokecherry plants had been repeatedly browsed (some to the ground) by mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*), all plants were alive in fall 2012. As of fall 2013, all of the chokecherry, buffaloberry, and fourwing saltbush were still alive. One coyote willow and three plains cottonwood trees died in 2013. The death of the coyote willow was likely due to a lack of water, while the plains cottonwoods died from continued browsing by mule deer and elk. To protect the remaining chokecherry and plains cottonwood plants from future browse damage, welded-wire fencing attached to three t-posts was installed around each of the remaining chokecherry and plains cottonwood plants in the fall of 2013.

In spring 2013, 72 buffaloberry and 72 fourwing saltbush were planted near the location of the former Solar Ponds in the COU as a habitat enhancement project (Figure 262). These two species were selected based on the lessons learned from the 2012 habitat enhancement project. They were watered weekly through the first growing season. As of fall 2013, 33 of 72 (approximately

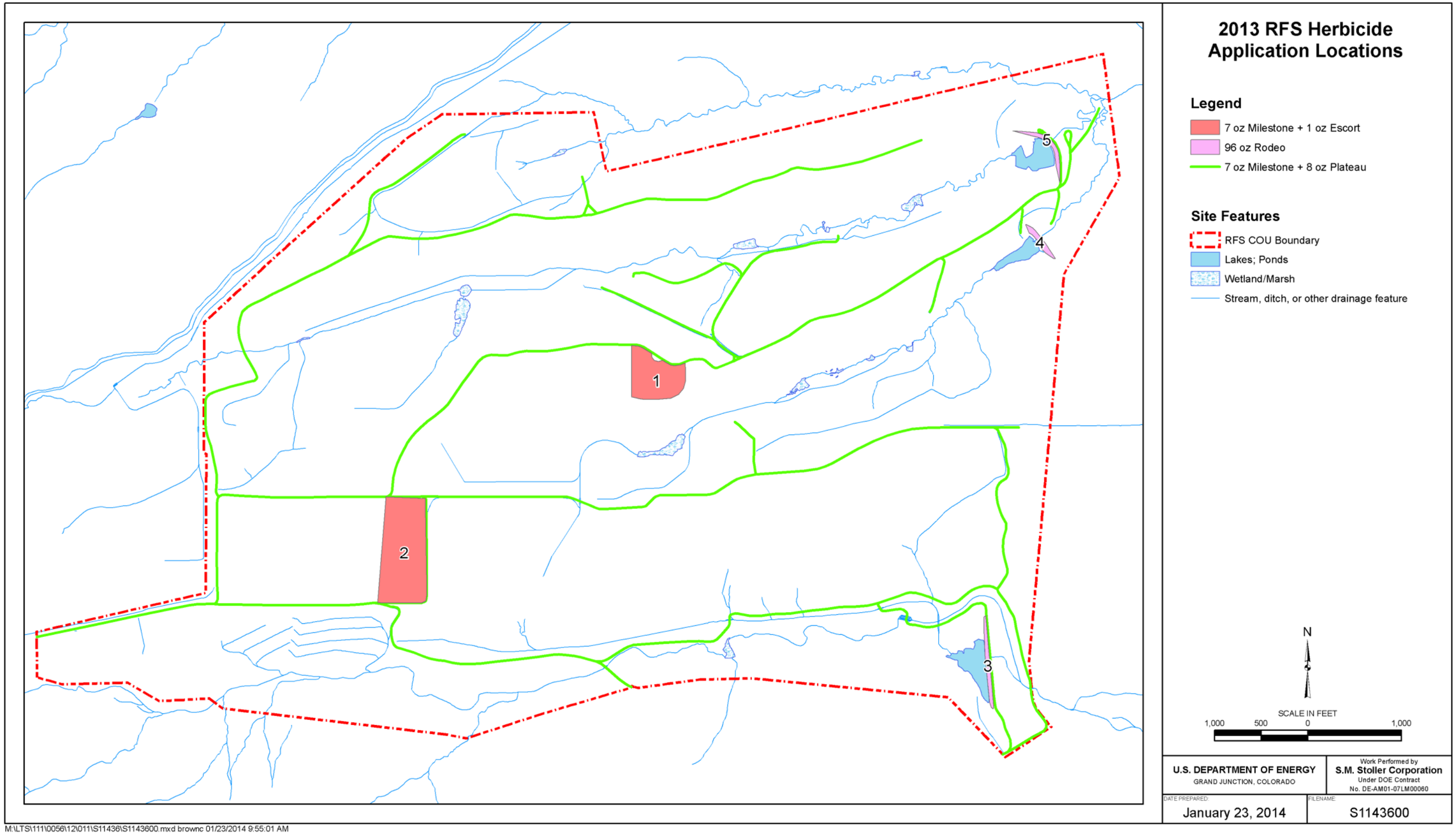


Figure 261. 2013 Herbicide Application Locations at the Rocky Flats Site

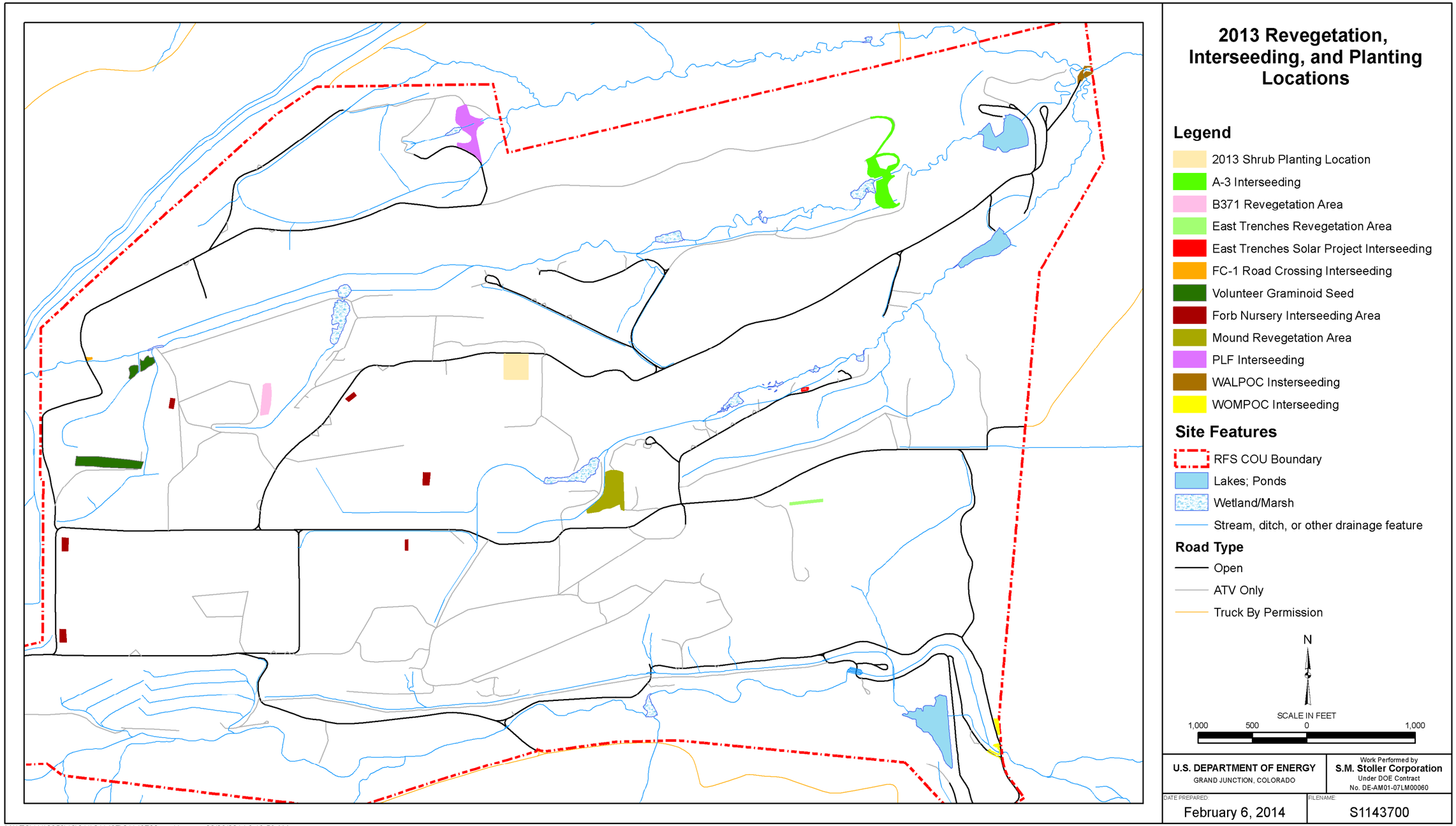
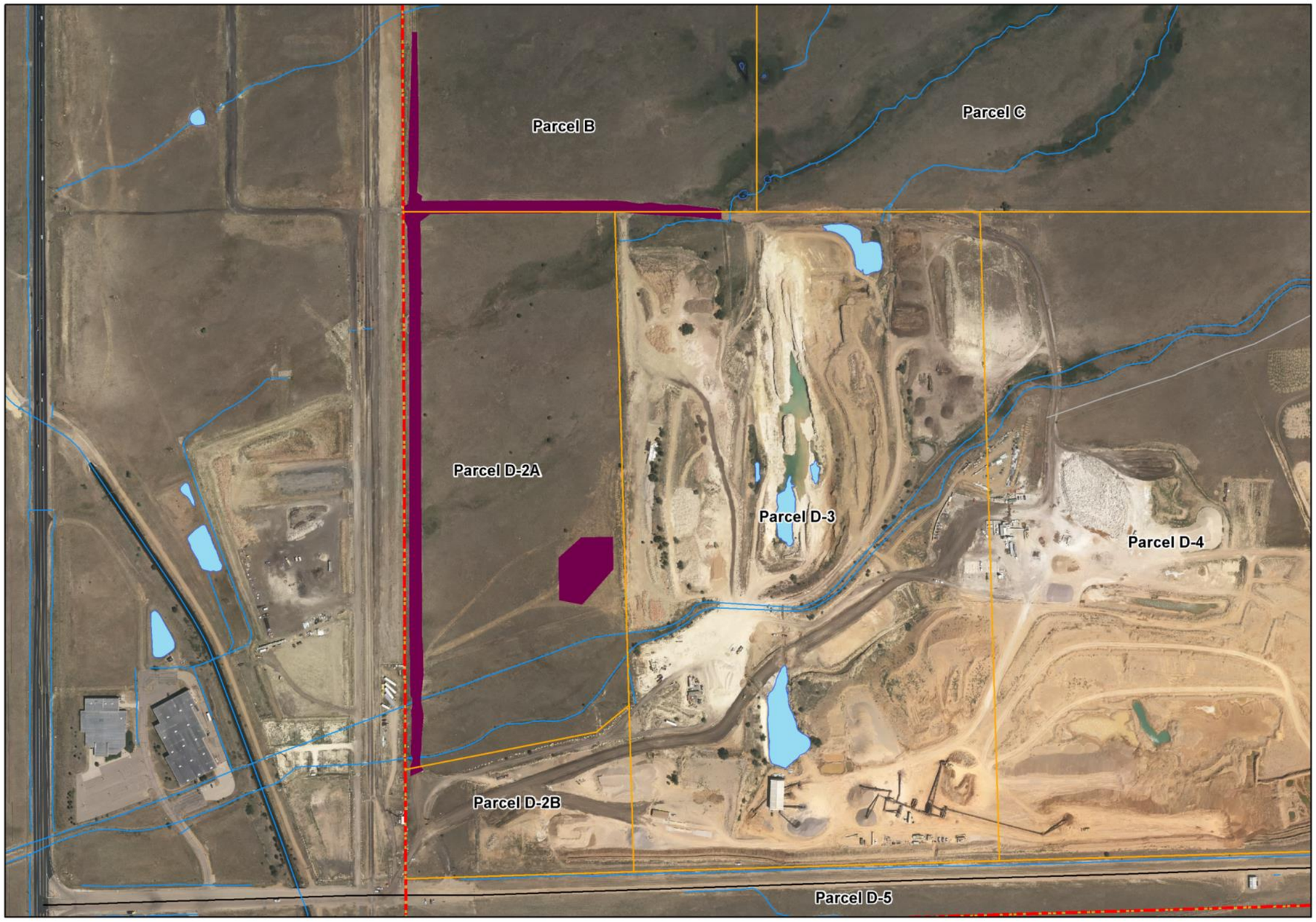


Figure 262. 2013 Revegetation, Interseeding, and Planting Locations



D-2 Parcel Road Revegetation Project

Legend

- D-2 Parcel Road Revegetation Area
- Mine Parcel Boundaries
- RFS POU Boundary
- Lakes; Ponds
- Wetland/Marsh
- Stream, ditch, or other drainage feature

Roads

- Open
- ATV Only
- Truck By Permission

N

SCALE IN FEET

400 200 0 400

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
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Figure 263. D-2 Parcel Road Revegetation Project

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46 percent) buffaloberry and 57 of 72 (approximately 79 percent) fourwing saltbush plants were still alive. Some of the loss of buffaloberry plants can be attributed to a heavy frost in the late spring. Initial damage was noted to the buffaloberry after the frost occurred, and many of the small plants never recovered. The fourwing saltbush plants were more tolerant of the frost. No browse damage was noted on any of the plants. Survival monitoring will continue at both of these locations for the next several years.

3.2.5.3 Volunteer Seed Collections/Forb Nursery Evaluations

For the past several years, the Jefferson County Nature Association has sponsored volunteer seed-picking days to provide local ecotype seed and local species, which are not available commercially, for inclusion in the revegetation efforts at the Site and other nearby projects. Sixteen forb "nurseries" have been established in the COU (Figure 264). Four were established in 2010 (F1, F2, F3, and F4), four in 2011 (F9, F11, F12, and F13), and eight in 2013 (F5, F6, F7, F8, F10, F14, GF1, and GF2). The forb nursery areas are locations where the forb seed was interseeded into a delineated "patch" that is not treated with herbicides. As the forbs establish in these areas, the seed from these plants is expected to spread downwind and further increase the forb diversity in the revegetation areas. In 2013, approximately 6 pounds of graminoid seed and 5 pounds of forb seed were collected by volunteers. The graminoid seed was interseeded on the hillsides at FC-1 (Figure 262). The forb seed was interseeded into the forb "nursery" locations that were established in early 2013 (Figure 262).

Table 117 summarizes the data collected in 2013. Rows highlighted in yellow are those species that were most likely to be in the volunteer-collected forb seed. Prior to 2013, presence/absence data was collected at the nurseries that were established in 2010, but no abundance data was associated with many species. If no abundance data were collected for a specific species, this is indicated by an "ND" in the table.

Evaluation of the data reveals a succession of native forb establishment over time. For this evaluation species classified as "infrequent" or "abundant/common" are included and those classified as "rare" are not included. In the nurseries planted in early 2013, Porter's aster (*Aster porteri*), hairy false golden aster (*Chrysopsis villosa*), and rockyscree false goldenaster (*Chysopsis fulcrata*), established readily in the first year. At the nurseries planted in 2011, these three species were the only infrequent or abundant species present after three growing seasons. It should be noted that at several 2013 locations and at one 2011 location (F12), these species were also present in the reference locations in similar abundance. This suggests that the seeds of these species which are easily wind-dispersed, blew in from the seeded areas or were already present.

At the locations seeded in 2010, several more native forb species have become established. Porter's aster, golden aster, western sagewort (*Artemesia campestris*), silky wormwood (*Artemesia dracunculus*), silver sage (*Artemesia frigida*), snakeweed (*Gutierrezia sarothrae*), blazing star (*Liatris punctata*), and soft goldenrod (*Solidago mollis*) have all become established and are doing well. In the reference areas at these locations, the abundance of these species is mostly rare, if they occur at all. This suggests that the seeding has influenced the abundance of these species at these locations and, although it may take several years before the some of these species appear, seeding is effective.

Interestingly all of the volunteer-collected species are in the composite (Asteraceae) plant family and they flower and set seed in late summer and early fall. Since the volunteer seed collection typically occurs from early September through November, this is not unexpected. If spring or mid-summer forbs are desired in the revegetation areas, seed collection would need to be done at other times of the year to collect those species when they have set seed.

3.2.6 Revegetation Monitoring

Revegetation monitoring is conducted to determine if new revegetation locations have met or are establishing to the point where they will meet success criteria. However, as part of the long-term stewardship of the Site, the various revegetation locations (which have already met the success criteria) are also monitored every few years to evaluate the long-term sustainability of the vegetation and the potential successional changes in plant community composition. Each of the revegetation units monitored in 2013 had previously met the success criteria. The methods are not presented here but may be found in the full revegetation report on the Ecology DVD included with this report.

The success criteria, as stated in the Rocky Flats, Colorado, Site Revegetation Plan (Revegetation Plan; DOE 2009b), are as follows:

- A minimum of 50 percent of the seeded native species will be present at the revegetation site.
- The revegetation site will have a minimum of 70 percent total ground cover that comprises litter cover, current-year live vegetation basal cover, and rock cover.
- The revegetation site will have a minimum of 30 percent relative foliar cover of live desired species (seeded or nonseeded native species). Relative cover is defined as the percentage of cover of a given species divided by the total amount of vegetation cover present. Example: Species A has 20 percent absolute cover, and total vegetation cover (all individual species cover values summed) is 80 percent:

Relative cover of Species A = (20 / 80) × 100 = 25 percent

- No single species will contribute more than 45 percent of the relative foliar cover (except in areas where dominance by a single species is appropriate for long-term wildlife and habitat management objectives).

Semi-quantitative revegetation monitoring was conducted during the summer 2013. The monitoring method provided in the Revegetation Plan, with some modification, was used. The revegetation areas were divided into units on the basis of geographic features (e.g., roads, streams) or previous building areas (e.g., 700 Area, 400 Area). The unit boundaries were the same as had been used for previous sampling efforts. Thirteen revegetation units were sampled in 2013 (Figure 265[20]).

[20] Although the text refers to the revegetation units with a prefix of "L," (e.g., L1), the revegetation unit numbers area shown on Figure 259 without the "L."

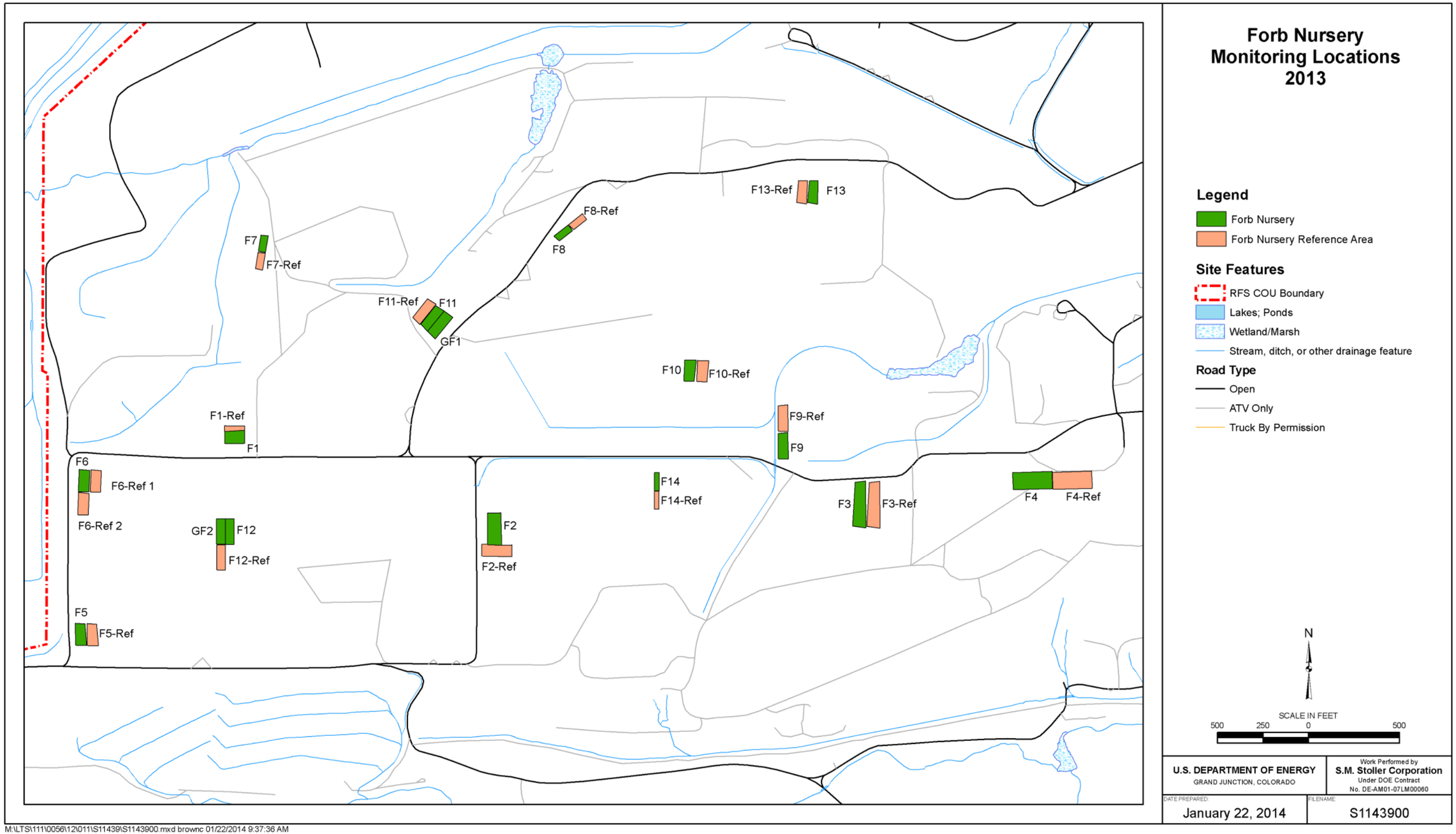

Figure 264. Forb Nursery Monitoring Locations

Table 117. Forb Nursery Abundance Summary 2010–2013

					F1					F2					F3					F4					F9		F11		F12		F13		F5		F6			F7		F8		F10		GF1		GF2		F14	
		Year Forbs Seeded			2010/2012					2010/2012					2010/2012					2010/2012					2011/2013		2011		2011		2011		2013		2013			2013		2013		2013		2013		2013		2013	
		Nursery (N) or Reference (Ref) Area			N	N	N	N	REF	N	N	N	N	REF	N	N	N	N	REF	N	N	N	N	REF	N	REF	N	REF	N	REF	N	REF	N	REF	N	REF	REF	N	REF	N	REF	N	REF	N	REF	N	REF	N	REF
Scientific Name	Speccode	Growth Form	Native	Noxious Weed	2010	2011	2012	2013		2010	2011	2012	2013		2010	2011	2012	2013		2010	2011	2012	2013		2013						2013		2013		2013			2013		2013		2013		2013		2013		2013	
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y										R																I																				
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N			ND	ND					ND				ND	ND				ND	ND																										
Amaranthus retroflexus L.	AMRE1	F	Y															R																															
Ambrosia artemisiifolia L.	AMAR1	F	Y					R																	R		R	R			R		R	R	R		R								R				
Ambrosia psilostachya DC.	AMPS1	F	Y														ND	R															R	I															
Antennaria sp.	ANT1	F	Y										R																																				
Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	F	Y								R	I	I				R				R	R	I		R				R																R				
Artemisia dracunculus L.	ARDR1	F	Y										I										I										R											R						
Artemisia frigida Willd.	ARFR1	F	Y										R					R				R	I																											
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y										R									R			R												R													
Asclepias speciosa Torr.	ASSP1	F	Y											R													R		R	R					R												R			
Asclepias viridiflora Raf.	ASVI1	F	Y																					R																										
Aster falcatus Lindl.	ASFA1	F	Y																											R																	R			
Aster fendleri A. Gray	ASFE1	F	Y											R																							R													
Aster porteri Gray	ASPO1	F	Y				R	I	R		I	I	A	R				R				R	I	R	I	R			A	A	R		A	A	A	A	A	I				A		R		A	A		R
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N	X												ND	ND																																
Castilleja integra A. Gray	CAIN2	F	Y									R																																					
Centaurea diffusa Lam.	CEDI1	F	N	X			ND	R	R		ND	ND	I	R		ND	ND	A	R		ND	A	A	A	I	I		R	I	I	A	I	I	I	R	R		R	R	R			R	R	R	R	I	R	
Chenopodium fremontii S. Wats.	CHFR1	F	Y																R																														
Chrysopsis fulcrata Greene	CHFU1	F	Y			R	R	A	R		I	A	A			R	R	A			R	R	A	I	A	R	I	R	I	I	I	R	A	A	I	I	I	R	R	R				A	R	A	I		
Chrysopsis villosa Pursh.	CHVI1	F	Y		R	R	R	I		R	I	R	A	R		R	R		R	I	R	A	A	A	R		I	R	A	A				R	A	R	I	I				R		R	R	I	A		
Cirsium arvense (L.) Scop.	CIAR1	F	N	X										R																																			
Convolvulus arvensis L.	COAR1	F	N	X		ND	ND	R	R					R		ND	ND	R			ND	ND	I								A	A	R	R														
Conyza canadensis (L.) Cronq.	COCA1	F	Y																											R										R							R		
Dalea purpurea Vent	DAPU1	F	Y									R											R																											
Dyssodia papposa (Vent) Hitchc.	DYPA1	F	N					R													ND			R		R			A	I					I	R	I										I	I		
Erigeron divergens T. & G.	ERDI1	F	Y									R																																					
Erigeron strigosus Muhl. ex Willd.	ERST1	F	Y																										R							R			R							R			
Eriogonum alatum Torr.	ERAL1	F	Y										R																																				
Erodium cicutarium (L.) L'Her.	ERCI1	F	N	X		ND	ND	R	A							ND	ND	I	R									R	R				R	I								R	R	R				R
Euphorbia serpyllifolia Pers.	EUSE1	F	Y			ND			I		ND														R	R	R	R	R		I	R	R					I	I			I	R	I	R				R
Gaillardia aristata Pursh.	GAAR1	F	Y				R					R	R					R							R																									
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y			ND	A	I	R		ND	A	A	R		ND	ND	I			ND	A	A	R	A	I			I	I	I	R	I	R	I	I	I	R				A	R	I		A	I		R
Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	F	Y				R	R			R		R								ND	R	I	R					R																				
Hackelia floribunda (Lehm.) I. M. Johnst.	HAFL1	F	Y																										R	R					R	R											R		
Helianthus annuus L.	HEAN1	F	Y						R							ND									I	I	R				A	A							R	I				R					
Helianthus pumilus Nutt.	HEPU1	F	Y										R																																				
Hypericum perforatum L.	HYPE1	F	N	X									R	R																																			
Kochia scoparia (L.) Schrad.	KOSC1	F	N			ND										ND	ND	I	I													R	R	R	I		R	R	R	A	R	R	I						R
Kuhnia eupatorioides L.	KUEU1	F	Y																																								R						
Lactuca serriola L.	LASE1	F	N				ND					ND				ND	ND									R		R				R	R			R							R	R				
Liatris punctata Hook.	LIPU1	F	Y					I	R				R							R	R	R	I	I									R		R			R	R					R					
Linaria dalmatica (L.) Mill.	LIDA1	F	N	X								ND	R	R		ND	ND	I				ND	R	I			R	R				R					R						R	R				
Marrubium vulgare L.	MAVU1	F	N						R							ND																																	
Medicago lupulina L.	MELU1	F	N								ND	ND									ND	ND																											R
Melilotus alba Medic.	MEAL1	F	N											R									R		R	R			I								R									I			R
Melilotus officinalis (L.) Pall.	MEOF1	F	N					R	R		ND		I	I								ND	I	I	I	R	R	I	A	A	I	A		R	I	R	I	I	I		I	R	R	R	I	A	A	R	R
Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	F	Y														ND								I	R			R	R						R	R				R	R			R	R			R
Plantago lanceolata L.	PLLA1	F	N				ND	R	I			ND		R		ND	ND	I	R			ND	R	R		R			I	I			I	I	I	A	A									I	I		
Psoralea tenuiflora Pursh.	PSTE1	F	Y											R							ND																												
Rumex salicifolius Weinm. ssp. triangulivalvis Danser	RUME1	F	Y						R																																								
Salsola iberica Senn. & Pau.	SAIB1	F	N																														R							I	R			R					
Scorzonera laciniata L.	SCLA1	F	N				ND										ND								R																								
Senecio spartioides T. & G.	SESP1	F	Y											R								R	R						R						R		R	R					R		R				
Sisymbrium altissimum L.	SIAL1	F	N													ND	ND		R																														
Solidago missouriensis Nutt.	SOMI1	F	Y											R																																			
Solidago mollis Bart.	SOMO1	F	Y					R					A																R																	R			
Solidago rigida L.	SORI1	F	Y					R																																									
Sonchus arvensis L. ssp. arvensis L.	SOAR1	F	N	X																																							R						
Spergularia media (L.) Presl.	SPME1	F	Y																																							R						
Taraxacum officinale Weber	TAOF1	F	N				ND	R										R			ND	ND							R							R			R	R	R	R						
Tragopogon dubius Scop.	TRDU1	F	N									ND				ND	ND	R				ND									I	I	R	R	R	R	R	R											R
Unknown Species	UNKN	F																																				R											
Verbascum blattaria L.	VEBL1	F	N	X												ND	ND				ND																												
Verbascum thapsus L.	VETH1	F	N	X								ND	R	R		ND	ND	A	I		ND	A	I	A				R		R	R	R		R			R		R			R	R	R	R		R		R
Verbena bracteata Lag. & Rodr.	VEBR1	F	Y											R														I			R			R								R		R	I				
Xanthium strumarium L.	XAST1	F	Y																																					R	R								

Nursery Area = N, Reference Area = R
Growth Form: F = Forb
Native: Y = Yes, N = No
Noxious: CO Listed Noxious Weed (2013 List)
Abundance Code: R = Rare, I = Infrequent, A = Abundant/Common, ND = No Data (Indicates that species was present, but no abundance data was collected in that year)
Blank Cells = Species was not observed that year.
Yellow rows indicate species that were likely in the volunteer collected seed.

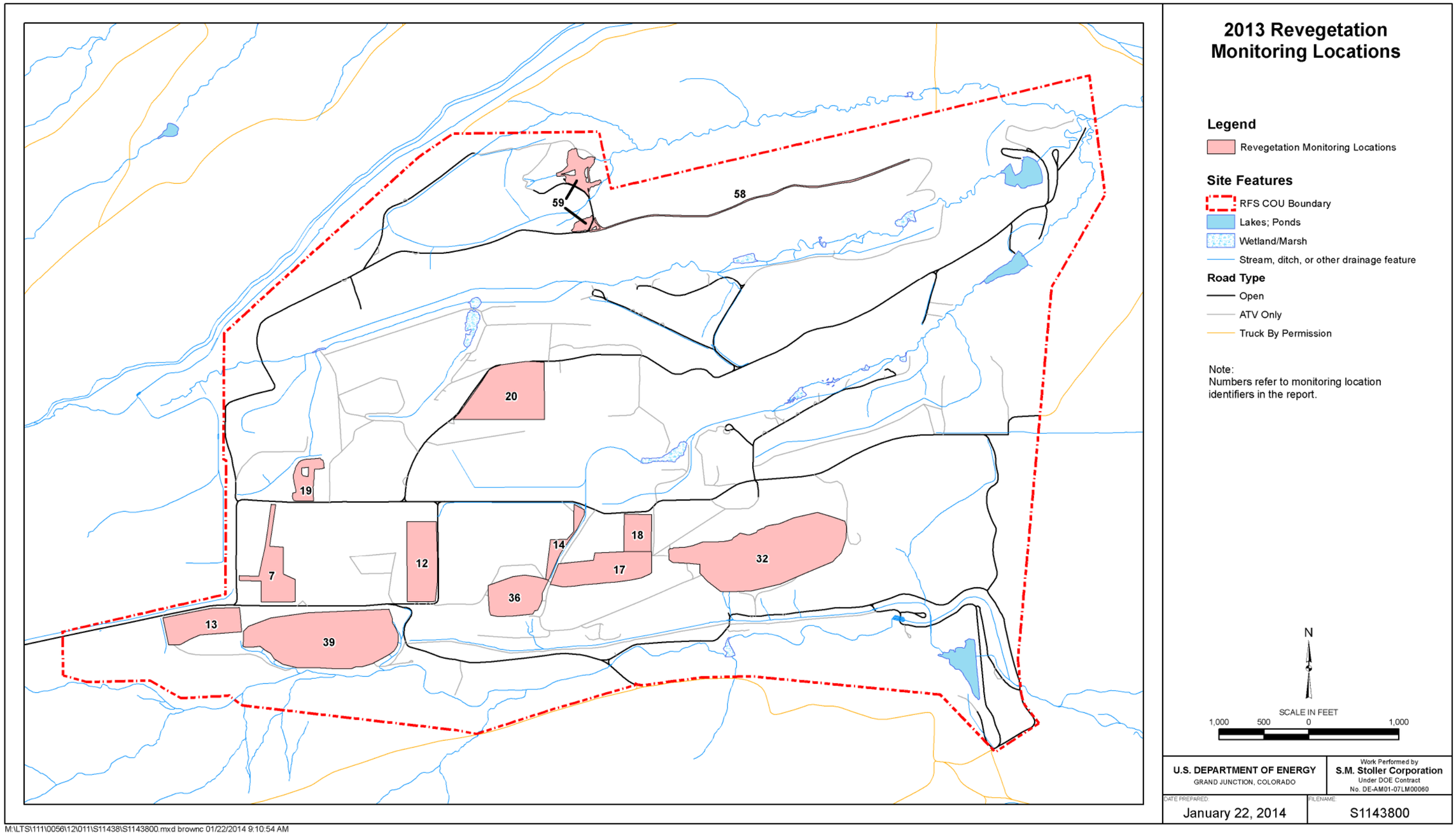

Figure 265. 2013 Revegetation Monitoring Locations

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The Revegetation Plan states that at least 50 percent of the seeded species must be present in an area for it to be considered successful. All 13 locations met this criterion in 2013. Ten different seeded graminoid species had become established and were growing at some locations in 2013. These included slender wheatgrass (*Agropyron caninum = Agropyron trachycaulum*), western wheatgrass (*Agropyron smithii*), big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), buffalograss (*Buchloe dactyloides*), Indian grass (*Sorghastrum nutans*), sand dropseed (*Sporobolus cryptandrus*), and green needlegrass (*Stipa viridula*). Four species were established at all 13 locations in 2013: western wheatgrass, sideoats grama, blue grama, and buffalograss. Several noxious weeds were also found at the locations monitored in 2013. These included quackgrass (*Agropyron repens*), downy brome (*Bromus tectorum*), jointed goatgrass (*Aegilops cylindrica*), filaree (*Erodium cicutarium*), diffuse knapweed, bindweed (*Convolvulus arvensis*), Dalmatian toadflax, moth mullein (*Verbascum blattaria*), common mullein, musk thistle (*Carduus nutans*), and field sow thistle (*Sonchus arvensis*). Total mean absolute foliar cover of noxious weeds at the various locations ranged from 0.9 percent to 8.4 percent. Weeds will continue to be managed as needed to reduce noxious weed populations in the revegetation areas and to enable the desired seeded species to become established more quickly and compete with the weeds.

Ground cover protection from rock, litter, and current-year live vegetation varied from 80 percent to over 100 percent at the revegetation locations in 2013. The Revegetation Plan states that a minimum of 70 percent total ground cover comprising litter cover, current-year live vegetation basal cover, and rock cover is to be present to help prevent erosion. All 13 locations met this criterion in 2013.

The third success criterion states that a minimum of 30 percent relative cover of desired species must be present. Total relative vegetation cover of desired (native) species was greater than 50 percent at all 13 of the locations monitored in 2013.

The fourth criterion states that no single species should constitute more than 45 percent of the total relative cover. Five of the 13 monitored revegetation locations (38 percent) had a single species that constituted greater than 45 percent of the relative cover in 2013. All five of these locations were dominated by western wheatgrass (one of the seeded native species) and the five locations that failed to meet all four success criteria failed solely because they each had a single species that covered greater than 45 percent of the area. Western wheatgrass is a desirable species. Previous reports (and the full revegetation summary found on the Ecology DVD included with this report) have provided many reasons for accepting areas dominated by species such as western wheatgrass. For reasons outlined in these reports, all areas in 2013 are still considered to have passed this criterion.

In summary, all 13 locations (approximately 97 acres) continued to meet all four criteria in 2013. This continues to demonstrate that the vegetation has become well established and that the vegetation should be sustainable in the long-term. Supporting data for each criteria are presented in summary tables found in the revegetation report on the Ecology DVD included with this report.

To evaluate potential successional change and trajectories in plant community composition, a comparison of past monitoring data was made with the 2013 data for each location (Table 118). Some locations have no data for a specific year because no monitoring was conducted at those locations in that year.

Changes in species richness from 2008 to 2013 varied by location. Of the 11 locations that had been previously monitored, three showed an increase in species richness from the first year of monitoring to 2013 (ranging from 1 to 10 species) while the other eight locations showed declines (ranging from a loss of 1 to 10 species). The declines are likely due to a decrease in weedy species, with two primary causes. Initially most revegetation locations tend to have a flush of weedy species at the beginning of a project, and as the seeded perennial graminoids begin to establish, some of the early successional weedy species are outcompeted and disappear from the area. An additional factor is the application of herbicides to remove the weedy competition and allow the seeded native graminoid species a better chance to establish.

The percentage of seeded species that are present has increased at 8 of the 11 previously monitored locations since 2008, remained the same at 2 locations, and declined at 1 location.

Total absolute foliar cover has increased at all 13 locations from 2008 to 2013. This means the abundance of vegetation is continuing to increase across these areas and therefore providing additional soil protection and reducing the potential for surface erosion. The total relative native cover increased at 12 of 13 locations. At the one location where it decreased, it only declined by two percent, which is insignificant. These two measures suggest that a “native” prairie is establishing and is not merely weedy vegetation.

The seeded native species continue to increase in dominance at each of these revegetation locations. Table 118 lists the species that contributed more than 5 percent cover at each location from 2008 through 2013 (where data are available). The early dominance by the native, short-lived, cool-season, perennial, slender wheatgrass has given way to an increase in western wheatgrass (a long-lived, native, cool-season species). Slender wheatgrass, which is used in the seed mixes at the Site because it is a good early native colonizer, is expected to decline over time. It provides good vegetation cover for other slower establishing species such as many of the warm-season species. Examination of the dominant species listed for 2013 shows the continuing increase in warm-season, native graminoid cover as time progresses. The mix of both cool-season and warm-season graminoids is desirable for long-term sustainability.

In general, the successional trajectory of the revegetation areas is on track and should result in long-term sustainable native grassland communities in the COU. Continued proactive management of noxious weeds using an integrated vegetation management program will aid in that process. Future monitoring will to evaluate the sustainability of the grassland communities and successional changes.

3.2.7 Photopoint Monitoring Results

Photomonitoring results are presented on the Ecology DVD included with this report.

Table 118. Evaluation of Successional Changes in Plant Community Composition at Revegetation Locations

		Location												
		L7	**L12**	**L13**	**L14**	**L17**	**L18**	**L19**	**L20**	**L32**	**L36**	**L39**	**L58**	**L59**
Species Richness	2008	17	26	23	26	22	23	26	17	45	25	30	ND	ND
	2009	21	25	32	27	22	23	23	13	38	20	30	ND	ND
	2010	13	19	26	ND	17	ND	25	23	ND	ND	23	ND	ND
	2011	ND	ND	ND	ND	ND	ND	ND	ND	49	ND	ND	ND	ND
	2012	ND	ND	ND	ND	ND	ND	ND	ND	24	ND	ND	ND	ND
	2013	15	27	26	19	18	14	16	16	37	21	40	24	33
Percent Seeded Species Present	2008	36	36	55	55	45	45	64	18	86	43	86	ND	ND
	2009	45	45	45	55	45	55	45	36	86	71	100	ND	ND
	2010	55	91	73	ND	73	ND	82	64	ND	ND	86	ND	ND
	2011	ND	ND	ND	ND	ND	ND	ND	ND	86	ND	ND	ND	ND
	2012	ND	ND	ND	ND	ND	ND	ND	ND	86	ND	ND	ND	ND
	2013	73	91	64	73	73	64	64	64	86	71	71	73	86
Total Absolute Foliar Cover	2008	35.6	38.6	42.9	45.3	30.3	28.2	33.8	30.6	44.5	37.3	23.7	ND	ND
	2009	54.4	47.3	65.9	71.5	49.8	48.8	71.9	69.8	71.1	36.0	45.0	ND	ND
	2010	60.3	59.6	57.9	ND	48.2	ND	60.0	63.1	ND	ND	36.4	ND	ND
	2011	ND	ND	ND	ND	ND	ND	ND	ND	76.1	ND	ND	ND	ND
	2012	ND	ND	ND	ND	ND	ND	ND	ND	63.3	ND	ND	ND	ND
	2013	54.4	53.5	70.5	62.8	56.7	53.8	54.9	48.5	64.7	65.0	59.4	27.3	40.8
Total Relative Native Foliar Cover	2008	45.3	31.7	65.3	44.1	35.2	39.6	36.7	26.9	50.2	61.7	84.9	ND	ND
	2009	71.1	56.6	70.8	74.6	71.6	61.1	49.0	57.3	53.6	70.8	82.0	ND	ND
	2010	92.5	74.2	75.4	ND	82.0	ND	66.3	65.3	ND	ND	88.1	ND	ND
	2011	ND	ND	ND	ND	ND	ND	ND	ND	58.9	ND	ND	ND	ND
	2012	ND	ND	ND	ND	ND	ND	ND	ND	71.8	ND	ND	ND	ND
	2013	91.0	80.4	83.7	89.7	85.3	80.5	85.0	95.1	68.9	66.9	82.9	82.1	50.9
Total Absolute Ground Cover * (Basal Veg, Litter, Rock)	2008	51.8	63.5	76.6	55.2	62.0	76.7	70.3	69.6	84.6	60.3	82.7	ND	ND
	2009	82.9	76.4	93.9	69.5	76.5	86.0	101.0	71.9	88.3	82.5	78.9	ND	ND
	2010	89.0	93.3	92.4	ND	87.3	ND	93.3	91.4	ND	ND	83.8	ND	ND
	2011	ND	ND	ND	ND	ND	ND	ND	ND	90.3	ND	ND	ND	ND
	2012	ND	ND	ND	ND	ND	ND	ND	ND	94.4	ND	ND	ND	ND
	2013	91.3	93.0	100.4	97.8	93.8	102.0	96.9	88.0	92.1	80.3	89.7	84.8	85.5
Species with greater than 5 percent relative foliar cover	2008	Kochia scoparia (33.7%) Agroypron caninum (22.5%) Agropyron smithii (19.6%) Polygonum arenastrum (10.9%)	Lactuca serriola (22.0%) Agropyron caninum (16.2%) Triticum aestivum (12.9%) Agropyron smithii (12.0%) Erodium cicutarium (9.1%) Kochia scoparia (7.1%) Centaurea diffusa (5.2%)	Agropyron caninum (50.1%) Agropyron smithii (11.1%) Bromus tectorum (9.9%) Kochia scoparia (7.6%)	Agropyron smithii (17.3%) Erodium cicutarium (16.2%) Centaurea diffusa (15.1%) Agropyron caninum (14.3%)	Kochia scoparia (24.2%) Agropyron caninum (21.4%) Centaurea diffusa (19.2%) Lactuca serriola (6.6%) Agropyron smithii (6.0%)	Agropyron caninum (24.9%) Centaurea diffusa (18.3%) Lactuca serriola (8.9%) Kochia scoparia (7.7%) Agropyron smithii (7.1%) Agropyron cristatum (7.1%)	Agropyron smithii (23.7%) Kochia scoparia (23.0%) Bromus tectorum (19.3%) Agropyron caninum (9.6%) Alyssum minus (8.9%)	Kochia scoparia (35.9%) Triticum aestivum (14.7%) Agropyron smithii (14.3%) Agropyron caninum (9.8%) Salsola iberica (8.6%) Bromus tectorum (6.5%)	Centaurea diffusa (13.5%) Agropyron caninum (11.2%) Agropyron smithii (10.7%) Buchloe dactyloides (9.6%) Bromus inermis (9.4%) Bromus tectorum (6.0%) Bouteloua curtipendula (5.8%)	Agropyron smithii (30.9%) Grindelia squarrosa (9.4%) Agropyron caninum (7.4%) Melilotus officinalis (6.0%) Convolvulus arvensis (6.0%) Daucus carota (5.4%)	Agropyron smithii (35.2%) Agropyron caninum (32.4%)	ND	ND
	2009	Agropyron smithii (38.2%) Agropyron caninum (27.8%) Bromus tectorum (16.3%) Kochia scoparia (8.3%)	Agropyron caninum (27.2%) Kochia scoparia (16.1%) Agropyron smithii (15.3%) Bromus inermis (6.1%) Bromus tectorum 5.3%)	Agropyron smithii (32.1%) Agropyron caninum (28.7%) Kochia scoparia (10.4%) Bromus tectorum (9.5%)	Agropyron smithii (31.0%) Agropyron caninum (21.4%) Kochia scoparia (7.7%)	Agropyron smithii (27.1%) Agropyron caninum (19.4%) Kochia scoparia (13.0%) Bouteloua gracilis (9.4%) Buchloe dactyloides (7.4%) Bromus tectorum (5.4%)	Agropyron caninum (19.5%) Kochia scoparia (16.7%) Buchloe dactyloides (12.3%) Agropyron smithii (10.9%) Alyssum minus (7.5%) Bouteloua gracilis (6.5%) Erodium cicutarium (5.5%)	Agropyron smithii (26.8%) Kochia scoparia (25.9%) Agropyron caninum (15.3%) Bromus tectorum (8.3%) Centaurea diffusa (8.2%)	Kochia scoparia (31.0%) Agropyron smithii (27.6%) Agropyron caninum (26.5%) Melilotus officinalis (6.3%)	Bromus inermis (28.8%) Agropyron smithii (14.0%) Bouteloua curtipendula (13.2%) Kochia scoparia (5.7%) Buchloe dactyloides (5.0%)	Agropyron smithii (27.1%) Buchloe dactyloides (13.2%) Sporobolis cryptandrus (11.1%) Agropyron caninum (10.4%)	Agropyron smithii (31.1%) Agropyron caninum (27.4%) Melilotus officinalis (8.0%) Buchloe dactyloides (6.3%) Bouteloua curtipendula (5.7%) Bouteloua gracilis (5.2%)	ND	ND
	2010	Agropyron smithii (62.2%) Agropyron caninum (25.5%)	Agropyron caninum (33.3%) Agropyron smithii (27.7%) Bromus tectorum (19.7%) Bouteloua curtipendula (7.1%)	Agropyron smithii (40.4%) Agropyron caninum (25.1%) Bromus tectorum (13.6%)	ND	Agropyron smithii (39.8%) Agropyron caninum (13.5%) Buchloe dactyloides (11.4%) Bromus tectorum (6.6%) Bouteloua curtipendula (5.2%)	ND	Agropyron smithii (43.8%) Bromus tectorum (22.9%) Agropyron caninum (7.1%) Buchloe dactyloides (5.6%)	Agropyron smithii (40.8%) Agropyron caninum (21.2%) Bromus tectorum (13.7%) Melilotus officinalis (12.3%)	ND	ND	Agropyron smithii (25.5%) Agropyron caninum (25.0%) Buchloe dactyloides (13.8%) Bouteloua curtipendula (8.0%) Bouteloua gracilis (6.9%) Melilotus officinalis (9.4%)	ND	ND
	2011	ND	ND	ND	ND	ND	ND	ND	ND	Bromus inermis (26.2%) Bouteloua curitipendula (14.9%) Buchloe dactyloides (7.1%) Panicum virgatum (6.8%)	ND	ND	ND	ND
	2012	ND	ND	ND	ND	ND	ND	ND	ND	Bouteloua curtipendula (32.8%) Bromus inermis (21.9%) Agrypyron smithii (9.4%) Bouteloua gracilis (8.8%) Buchloe dactyloides (7.9%)	ND	ND	ND	ND
	2013	Agropyron smithii (77.0%) Bromus tectorum (7.8%) Buchloe dactyloides (6.7%)	Agropyron smithii (34.6%) Buchloe dactyloides (13.3%) Bouteloua curtipendula (12.6%) Bromus tectorum (10.3%) Agropyron caninum (6.8%)	Agropyron smithii (58.5%) Andropogon gerardii (7.5%) Bromus tectorum (7.3%) Buchloe dactyloides (5.9%)	Agropyron smithii (41.6%) Buchloe dactyloides (22.8%) Bouteloua gracilis (8.5%) Bouteloua curtipendula (7.4%) Bromus tectorum (6.4%) Sporobolus cryptandrus (5.8%)	Agropyron smithii (48.8%) Buchloe dactyloides (17.7%) Bouteloua gracilis (10.9%) Bromus tectorum (6.5%) Bromus inermis (5.6%)	Agropyron smithii (46.8%) Bouteloua gracilis (14.2%) Buchloe dactyloides (12.1%) Agropyron intermedium (11.5%) Bromus tectorum (5.3%)	Agropyron smithii (40.3%) Bouteloua gracilis (22.8%) Bromus tectorum (13.7%)	Agropyron smithii (77.1%) Bouteloua curtipendula (6.7%)	Bouteloua curtipendula (29.4%) Bromus inermis (24.2%) Agropyron smithii (10.3%) Buchloe dactyloides (8.5%) Stipa viridula (5.7%)	Bouteloua curtipendula (16.9%) Bromus inermis (16.2%) Agropyron smithii (12.3%) Buchloe dactyloides (11.9%) Sporobolus cryptandrus (7.7%) Grindelia squarrosa (7.7%) Melilotus officinalis (6.9%) Melilotus alba (5.8%)	Buchloe dactyloides (30.4%) Agropyron smithii (22.0%) Bouteloua curtipendula (9.0%) Bouteloua gracilis (8.1%) Melilotus officinalis (5.1%)	Bouteloua gracilis (19.3%) Buchloe dactyloides (17.9%) Agropyron caninum (14.7%) Bouteloua curtipendula (11.5%) Kochia scoparia (8.7%) Agropyron smithii (6.4%)	Agropyron caninum (19.3%) Agropyron intermedium (17.5%) Agropyron smithii (12.6%) Buchloe dactyloides (8.6%) Bromus tectorum (7.7%) Bromus inermis (5.2%)

* Values greater than 100 percent are a result of the monitoring protocol that uses the midpoints of the cover class system for analysis.

ND = No Data collected at this location for this year.

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3.2.8 Wildlife Monitoring

During 2013, wildlife surveys at the Site consisted of observing black-tailed prairie dogs (*Cynomys ludovicianus*), monitoring bird nesting boxes, and observing active raptor nests. A summary of the survey results are presented here, while more-detailed information on the wildlife monitoring is presented on the Ecology DVD included with this report.

3.2.8.1 Prairie Dog Monitoring

Figure 266 shows the locations of former and current prairie dog towns in the COU and on the adjacent POU property. An outbreak of the plague killed all the prairie dogs at the Site in 2009. Observations of the former towns in the southern portion of the Site during 2013 revealed that no prairie dog towns were active within the COU. However, two small towns in the POU north of the A-4 pond (northern towns shown on Figure 266) had prairie dogs present this year. The maximum number of individuals recorded at each of these towns varied throughout the year, but the northern-most town had approximately 11 individuals present in October and November, 2013, while the town closer to the COU fence had approximately 37 individuals in August. In general, the numbers of prairie dogs have been gradually increasing over the past few years at the towns north of the COU.

No individual prairie dogs were observed roaming along the roads at the Site in 2013. The prairie dogs typically travel beyond their existing towns in search of other potential burrow locations in the late spring and early summer. With the exception of the sightings at the towns north of the A-4 pond, inspectors have observed no signs of the prairie dogs' return at the previously occupied prairie dog towns in the southern areas. Fortuitous monitoring of these locations will continue throughout 2014 to determine whether the prairie dogs are returning at these locations.

3.2.8.2 Nest Box Monitoring

Table 119 summarizes the nest box observations made in 2013. Seven of the 16 nest boxes showed evidence of nesting activity in 2013. For the first time a mountain bluebird (*Sialia currucoides*) nested in one of the boxes in the center of the COU (#3; Figure 267). Tree swallows (*Tachycineta bicolor*) occupied five nest boxes (# 5, 6, 9, 12, and 15) and house wrens (*Troglodytes aedon*) occupied the other nest box (#11) that was used this year. During the cleanout of the next boxes conducted in December it was discovered that two of the boxes (#3, 6) were broken. One had fallen off the tree, and the wooden sides of another box had split causing it to fall apart. The boxes will be repaired or replaced before the nesting season begins in 2014.

3.2.8.3 Raptor Nesting Observations

In 2013, no active raptor nests were observed within the COU.

3.2.8.4 Video of RFS Wildlife

In 2013, a game trail camera, capable of capturing still photos and video, was set out at various locations at the Site. In addition, a high-definition video camera was used to capture footage of the elk herd in the COU in fall 2013. Videos are provided on the Ecology DVD included with this report and may be watched by clicking on the various video links.

Table 119. Bluebird Nest Box Summary 2013

Nest Box Number	Active Nest Yes/No	Species	Comments
1	No		
2	No		
3	Yes	Mountain Bluebird	A mountain bluebird flew out of the box in May and eggs were present. However, during June, July, and August the nest did not appear to be active, but the box was full of grass. A few bluish feathers were observed.
5	Yes	House Wren/Tree Swallow	In May the box was being filled with twigs, probably by a house wren. In June, a tree swallow flew out of the box. In July, the side of the box was open and most of the twigs had been pulled out. Also the metal number tag on the side of the box was torn. Perhaps a raccoon or other animal found the box and pulled everything out.
6	Yes	Tree Swallow	Two tree swallows were at the box in June. One was observed going into the box.
7	No		
8	No		
9	Yes	Tree Swallow	A tree swallow was using the box in May. It was gone the remainder of the summer.
10	No		
11	Yes	House Wren	House wren flew out of box in July. Box was full of twigs in June.
12	Yes	Tree Swallow	Two tree swallows were at the box in June. One was observed going into the box while the other guarded the door opening. In July young could be heard in the box. Box was empty in August.
13	No		
14	No		
15	Yes	Tree Swallow	Nest material was present in June. A tree swallow was sitting in the box entrance in July.
16	No		
17	No		

Notes: Nest box #4 was destroyed when the tree fell over several years ago.

3.2.9 Preble's Meadow Jumping Mouse Mitigation Monitoring

The Preble's meadow jumping mouse (*Zapus hudsonius preblei*) is a federally listed threatened species under the Endangered Species Act that lives in most of the stream drainages at the Site. Prior to site closure, DOE conducted Section 7 consultation with USFWS on a Programmatic Biological Assessment (PBA) that addressed closure and post-closure activities that could have a potential impact on the Preble's mouse. The resulting Biological Opinion gave approval for the activities listed in the PBA. Mitigation was required for impacts to Preble's mouse habitat. As part of the mitigation process, monitoring of the mitigation efforts and reporting was also required. In 2013, vegetation monitoring and photopoint monitoring was conducted at various Preble's mouse mitigation locations in the COU. No locations had met all the success criteria and monitoring will continue in 2014. The results were summarized in an annual report that is due to USFWS by December 1 each year. Although the 2013 results are not discussed in this annual report, they are available in a separate 2013 report on Preble's meadow jumping mouse mitigation monitoring (DOE 2013c).

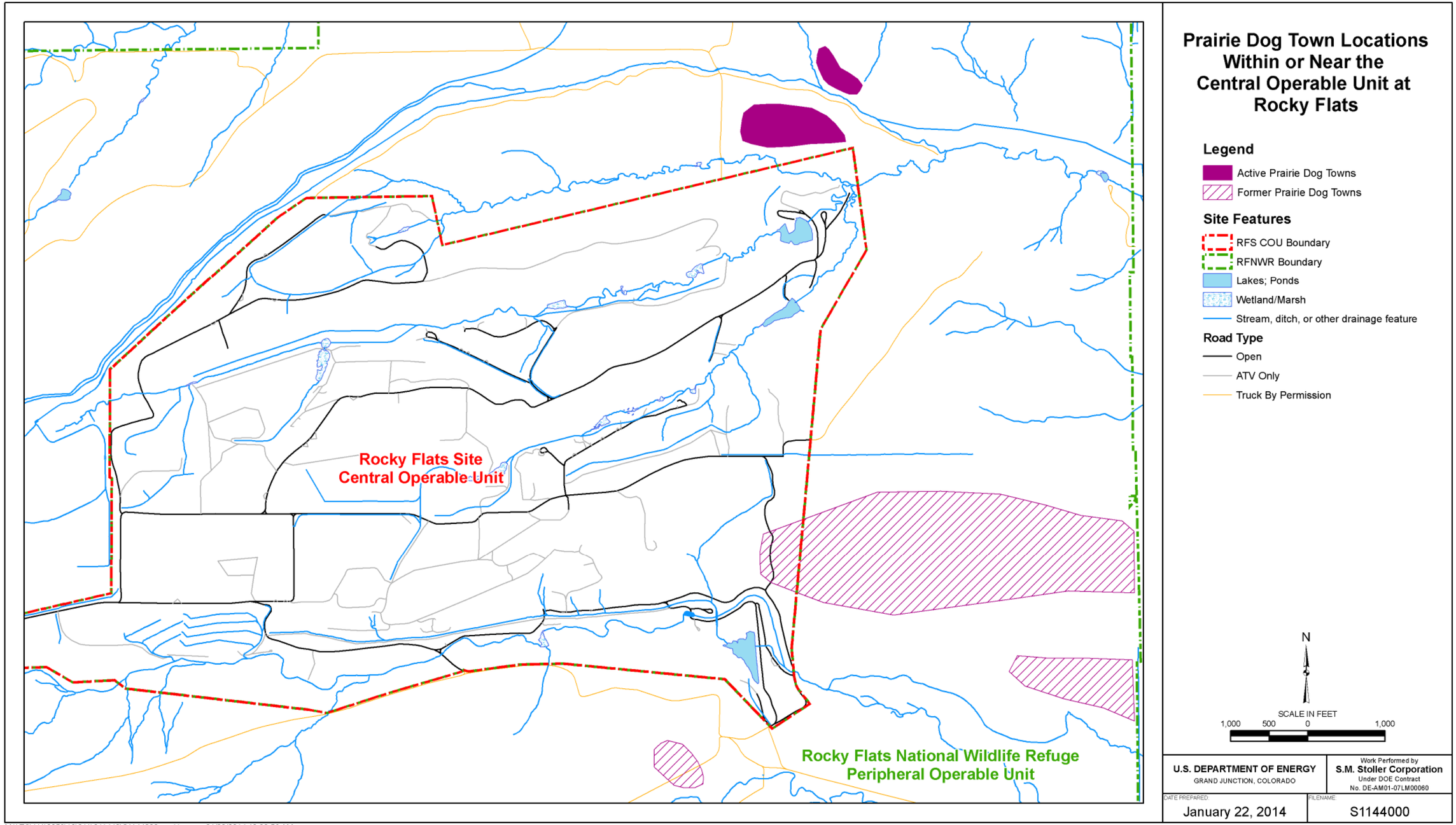
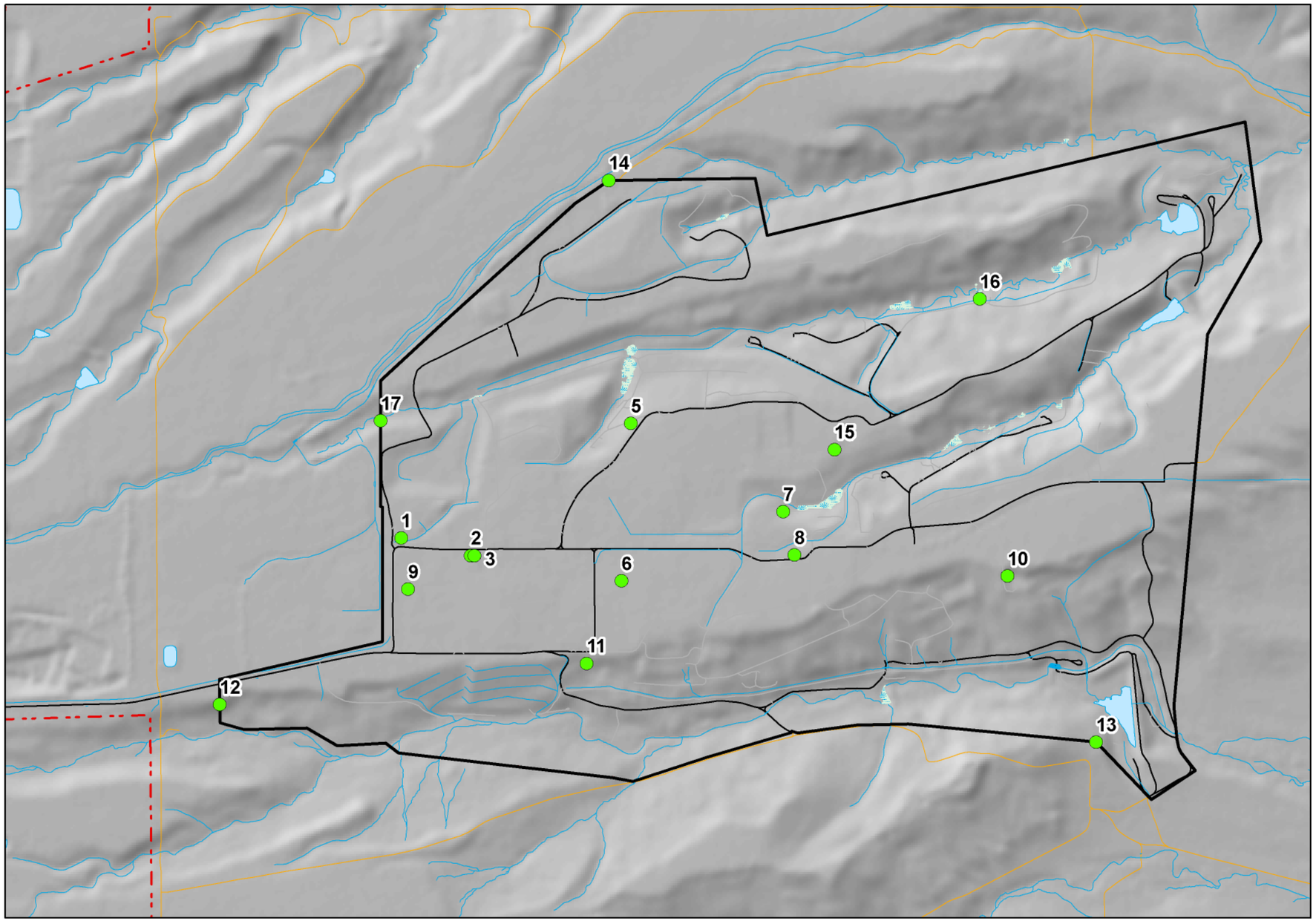


Figure 266. Prairie Dog Town Locations Within or Near the Central Operable Unit at Rocky Flats



Rocky Flats Site
Nest Box Locations

LEGEND

- Nest Box Locations
- RFS COU Boundary
- RFNWR Boundary
- Lake or Pond
- Wetland/Marsh
- Stream, Ditch, or Other Drainage Feature
- Open
- ATV Only
- Truck By Permission

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
DATE PREPARED: January 22, 2014	FILENAME: S1144100

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Figure 267. Rocky Flats Site Nest Box Locations

3.2.10 Wetland Monitoring

The *Rocky Flats Wetland Mitigation Monitoring and Management Plan* (Plan) (DOE 2006b) was established to provide the strategy to determine successful wetland mitigation at the Site. The Plan requires annual interim qualitative assessments and annual reporting for the first 4 years to evaluate the successfulness of the compensatory mitigation wetlands. Typically during the fifth year after project completion, wetland delineations and mapping efforts are conducted to determine the type and extent of the wetlands. Wetland delineations are conducted to characterize and determine whether hydrophytic vegetation, hydric soils, and wetland hydrology exist at a location. Mitigation wetlands are mapped and delineated following the current U.S. Army Corps of Engineers (USACE) wetland delineation procedure (USACE 2010). The goal of the wetland mitigation at Rocky Flats is no-net loss of wetlands. Wetlands are mitigated at a 1:1 ratio.

During and since Site closure, impacts to wetlands have been classified as either CERCLA related or non-CERCLA related and tracked separately. CERCLA related wetland impacts are administered under the EPA, while non-CERCLA related wetland impacts are administered under USACE. The Plan states "The annual report for the fifth year will contain the wetland delineation data and will serve as the final wetland mitigation report (unless further monitoring is required by the regulatory agencies)." This report serves as that final wetland mitigation report for those projects that disturbed wetlands in 2009 or earlier and closes out the Plan. An accounting for the impacted and compensatory mitigation wetland acreage is provided in the section below.

Although the Plan is closed out (with the delivery of this report), projects with wetland impacts after 2009 will continue to be monitored following the same basic methodology as outlined in the Plan. The methodology and process will be documented in the RFSOG. CERCLA-related projects that impact wetlands will have their compensatory wetlands delineated in the fifth year and closed out. Non-CERCLA projects that impact wetlands subject to the USACE Clean Water Act 404 permitting process will be closed out as required by the permit issued for the project.

3.2.10.1 Wetland Mitigation Closeouts

As mentioned above, impacts to wetlands at the Site, during and since Site closure, have been classified as either CERCLA related or non-CERCLA related and tracked separately. The following discussion closes out the wetland mitigation activities for each of the projects that were completed in 2009 and earlier and lists those that are still ongoing.

Table 120 shows the total acreage of wetlands impacted by completed (–6.3983 acres) and ongoing (–0.1688 acre) CERCLA project activities at the Site. The completed projects have a wetland mitigation credit of 6.3848 acres. The list of engineered[21] wetlands used for credit for the completed CERCLA related projects is shown in Table 121. These wetlands were delineated in 2010 and 2012. Details related to these wetlands (based on their GIS #) can be found in the 2010

[21] Engineered wetlands are defined as those wetland areas that were engineered or expected to develop into wetlands. Naturally occurring wetlands are those that developed at various locations where seeps or wet spots appeared on the ground after Site closure. These naturally occurring wetlands were not planned or engineered and therefore are not counted as mitigation.

and 2012 annual wetland mitigation and monitoring reports (DOE 2011b, 2013d). These locations are considered closed out and having met the 1:1 mitigation ratio. These locations are no longer monitored and will no longer be accounted for.

Table 120. Wetland Impacts From CERCLA Projects at Rocky Flats

Project Description	Agency	Actual Wetland Acres Disturbed (Debits)	Mitigation Wetland Acres (Credit)
CERCLA Completed Projects			
RFS CERCLA Cleanup/Reconfiguration	EPA	-6.3983	6.3848
CERCLA Ongoing Projects			
Point of Compliance Flume Project (2011)	EPA	-0.1279	In Process
GS10 Flume Project (2014)	EPA	-0.0409	In Process
	Total Debit	-0.1688	

Notes: Date in parentheses is the year of the first full growing season after the mitigation was installed.

Table 121. Engineered Mitigation Wetlands at Rocky Flats Used for CERCLA Mitigation

Delineation Year	Location	GIS #	Acres	Wetland Y/N
2010	East Shooting Range	32	0.0134	Y
2010	East Trenches	33	0.0001	Y
2010	FC1 - A	34	1.0272	Y
2010	FC2 - A	44	1.0328	Y
2010	FC2 - B	45	0.1068	Y
2010	FC3 - Upper	51	0.1345	Y
2010	FC4 - A	52	1.0528	Y
2010	PLF - A	76	0.0802	Y
2010	PLF - B	77	0.1806	Y
2010	PLF - C	78	0.0170	Y
2010	PLF - D	79	0.0040	Y
2010	PLF - E	80	0.0117	Y
2010	PLF - F	81	0.0518	Y
2010	PLF - G	82	0.3838	Y
2010	PLF Pond - Open Water	NA	0.5299	Y
2010	Solar Ponds Discharge Gallery	85	0.0087	Y
2012	B1 - A	6	0.5399	Y
2012	B1 - B	7	0.0398	Y
2012	B1 - C	8	0.0341	Y
2012	B2 - A	13	0.4205	Y
2012	B2 - B	14	0.1119	Y
2012	B3 - A	15	0.3443	Y
2012	B3 - B	16	0.1576	Y
2012	OLF - B	67	0.0761	Y
2012	OLF - E	70	0.0253	Y
	Total		6.3848	

The ongoing CERCLA project activities will continue to have interim monitoring conducted in years one through four, with final wetland delineations conducted in the fifth year. Data from

interim monitoring and final wetland delineations will be presented and summarized in the *Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats, Colorado, Site*. Wetland monitoring and reporting will be concluded after the final wetland delineations are reported in the fifth year unless further monitoring is required by EPA.

Non-CERLCA related wetland impacts have been covered under various nationwide permits through the USACE (Table 122). Both completed and ongoing projects are presented in the table. The total wetland impact from completed USACE permitted projects is –1.4028 acres. On-going USACE permitted project wetland impacts account for –0.1703 acre. The completed USACE permitted projects have a wetland mitigation credit of 1.5033 acres. The list of engineered wetlands used for credit for the completed USACE permitted related projects is shown in Table 123. These wetlands were delineated in 2010 and 2012. Details related to these wetlands (based on their GIS #) can be found in the 2010 and 2012 annual wetland mitigation and monitoring reports (DOE 2011b, 2013d). These locations are considered closed out and having met the 1:1 mitigation ratio. These locations are no longer monitored and will no longer be accounted for.

Table 122. Wetland Impacts From USACE Permitted Projects At Rocky Flats

Project	NWP #	Permit #	Permit Date	Specified Compensatory Mitigation	Mitigation Acres Required in NWP	Actual Wetland Acres Disturbed (Debits)	Mitigation Credit
Completed USACE Permitted Projects							
COU Fence Installation	18	200680545	10/18/2006	No	0.00	(-)2.47 cu. yds.	
Cleaning/Removing and Repairing Culverts, Tributaries at Rocky Flats	3	200580288	5/13/2005	No	0.00	-0.0011	
C-1 Pond Breach	3	200380639	12/31/2003	No	0.00	-0.2507	
Removing Culverts and to Reconstruct Portions of Stream Channels at RFETS, Six Locations	27	200480620	12/8/2004	No	0.00	-0.5045	
Modification of Six Dams, North Branch Walnut Creek and South Branch Walnut Creek	27	NOW-2008-1051-DEN	4/22/2008	No	0.00	-0.6454	
Upgrading Outlet Works on the C-2 Dam, Woman Creek	3	200580337	6/9/2005	No	0.00	-0.0011	
				Total	0.00	-1.4028	1.5033
Ongoing USACE Permitted Projects							
PLF/A-3 Dam Breach (2012)	43	NOW-2011-2455-DEN	11/18/2011	Yes	0.24	-0.1703	In Process
				Total	0.24	-0.1703	

Notes: Date in parentheses is the year of the first full growing season after the mitigation was installed.

Table 123. Engineered Mitigation Wetlands at Rocky Flats used for USACE Permitted Project Mitigation

Delineation Year	Location	GIS #	Acres	Wetland Y/N
2010	B116 - North	9	0.0100	Y
2010	B116 - South	10	0.0190	Y
2010	B131	11	0.0547	Y
2010	C1 Pond - A	28	0.0169	Y
2010	C1 Pond - B	29	0.0230	Y
2010	C1 Pond - C	30	0.1503	Y
2010	FC1 - B	35	0.0318	Y
2010	FC1 - D	37	0.0005	Y
2010	FC1 - E	38	0.0311	Y
2010	FC1 - F	39	0.0099	Y
2010	FC1 - G	40	0.1000	Y
2010	FC1 Road Crossing	43	0.0118	Y
2010	FC2 Hillside - A	46	0.0980	Y
2010	FC2 Hillside - B	47	0.0677	Y
2010	FC2/FC3 Confluence - A	48	0.0504	Y
2010	FC2/FC3 Confluence - B	49	0.1656	Y
2010	FC2/FC3 Confluence - Open Water	NA	0.0918	Y
2010	FC3 - Lower	50	0.0616	Y
2010	FC4 - B	53	0.1280	Y
2010	FC5 - East	58	0.0262	Y
2010	FC5 - West	59	0.0440	Y
2010	SW093 - A	86	0.0207	Y
2012	A1 - A	1	0.0742	Y
2012	A1 - B	2	0.0018	Y
2012	A2 - A	3	0.1566	Y
2012	A2 - B	4	0.0212	Y
2012	B4 - A	19	0.0046	Y
2012	B4 - B	20	0.0304	Y
2012	B4 - C	21	0.0016	Y
	Total		1.5033	

The ongoing USACE permitted project activities will be monitored as required by the permits. Typically this monitoring includes interim monitoring conducted in years one through four, with final wetland delineations conducted in the fifth year. Data from interim monitoring and final wetland delineations will be presented and summarized in the *Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats, Colorado, Site* and/or in specific reports as required by the USACE for specific permits issued for projects. Wetland monitoring and reporting will be concluded after the final wetland delineations are reported in the fifth year unless further monitoring is required by the USACE.

Naturally occurring wetlands that have developed at various locations where seeps or wet spots have appeared on the ground since Site closure are shown in Table 124. These account for approximately 1.2 acres. These naturally occurring wetlands were not planned or engineered and therefore are not counted as mitigation.

Table 124. Naturally Occurring (Non-Engineered) Wetlands in the COU at Rocky Flats

Delineation Year	Location	GIS #	Acres	Wetland Y/N	Engineered Y/N
2010	B131 - SAEX1	12	0.0779	Y	N
2010	B371 - A	17	0.0029	Y	N
2010	B371 - B	18	0.0038	Y	N
2010	B771 - N	22	0.0195	Y	N
2010	B771 - NW	23	0.0176	Y	N
2010	B881 - A	24	0.2941	Y	N
2010	B881 - B	25	0.0086	Y	N
2010	B881 - C	26	0.0084	Y	N
2010	Bowman's Pond	27	0.0270	Y	N
2010	FC4 Hillside - A	54	0.0273	Y	N
2010	FC4 Hillside - B	55	0.0945	Y	N
2010	FC4 Hillside - C	56	0.0173	Y	N
2010	FC4 Hillside - D	57	0.0525	Y	N
2010	Mound - East	60	0.0393	Y	N
2010	Mound - SW	62	0.0084	Y	N
2010	Mound - Well	63	0.0014	Y	N
2010	Mound - West	64	0.0519	Y	N
2010	Mound W-W	65	0.0026	Y	N
2010	Ridge Road	83	0.0359	Y	N
2010	Solar Pond Well Wetland	84	0.1404	Y	N
2012	OLF - A	66	0.0104	Y	N
2012	OLF - C	68	0.0688	Y	N
2012	OLF - D	69	0.1182	Y	N
2012	OLF - F	71	0.0020	Y	N
2012	OLF - G	73	0.0301	Y	N
2012	OLF - H	74	0.0189	Y	N
2012	OLF - J	75	0.0241	Y	N
	Total		1.2038		

3.2.10.2 Interim Wetland Monitoring

During 2013, interim wetland monitoring was conducted at 15 potential wetland locations (Figure 268). (**Note:** Several of the locations shown on the map had multiple potential wetland areas evaluated.) Based on the 2013 monitoring, 12 of the 15 areas monitored had hydrophytic vegetation, hydric soils, and wetland hydrology (the three criteria necessary for an area to be classified as a wetland). This indicates that these areas have and are continuing to develop the necessary conditions to support wetlands. After the appropriate amount of time, wetland delineations will be conducted at these locations. Additional details and monitoring summaries of the 2013 interim monitoring are presented on the Ecology DVD included with this report.

An additional wetland mitigation monitoring report was also written and submitted to the USACE in 2013 as a requirement for the Nationwide Permit #43 that was used for the A-3/PLF dam breach project that took place in spring 2012. Results of the interim monitoring conducted in 2013 are not presented here, but are available in the *Annual Mitigation Monitoring Report for Nationwide Permit #43, A-3/PLF Dam Breach Project at the Rocky Flats Site, 2013 Annual Report* (2013a). This report is due to USACE by December 31 each year.

3.2.11 Summary

The Ecology Program at the Site conducts monitoring of the ecological resources to ensure regulatory compliance and to preserve, protect, and manage those resources. Proactive management of the natural resources is critical to the long-term sustainability of the ecosystems at the Site. Noxious weeds continue to be a top priority, as does the revegetation of the COU. Data from 2013 documented the continuing establishment of vegetation at revegetation locations. Noxious weed control activities and additional habitat management activities were conducted during 2013 to improve and enhance the vegetation at the Site. Preble's mouse mitigation monitoring continued to document the establishment of Preble's habitat at several locations. Wetland mitigation was closed out at several locations and interim monitoring documented the establishment of additional mitigation for ongoing projects. Overall, the monitoring results continue to provide useful information for management activities. Full, detailed reports and analyses for each field monitoring effort are presented as stand-alone reports on the Ecology DVD included with this report.

3.3 Data Management

3.3.1 Water Data

Data from samples submitted to an analytical laboratory are received in both hard copy and electronic data deliverable formats. The electronic data are loaded into an Oracle-based relational database. The environmental monitoring data are accessible using the SEEPro (Site Environmental Evaluation for Projects) application. The hard-copy analytical reports are archived in the records library in Grand Junction, Colorado, along with the original field data forms and other relevant hard-copy forms or documents containing project data. Well construction and lithology logs are maintained for previously drilled wells and are produced for all new wells drilled. These logs are archived in the records library and can also be accessed electronically via the SEEPro database and the Geospatial Environmental Mapping System.

SEEPro uses Oracle software for data management and Microsoft Access for data retrieval and display. It compiles water quality, air quality, field parameter, sample-tracking, sample location, and water-level data for groundwater, surface water, boreholes, soils, and sediment samples. Field parameter data include such information as sample location, sample date, pH, turbidity, conductivity, and temperature. Chemical information (Chemical Abstracts Service registry numbers, analytical results, and detection limits) is also included. Data managers follow specific procedures for verification of database information received from subcontractors or verification of data input directly into SEEPro. These procedures provide quality assurance (QA) documentation, which ensures that available data have been incorporated and entered or uploaded properly into SEEPro. Data integrity is maintained with standardized error-checking routines used when loading data into SEEPro. Other procedures address database system security and software change control.

The Site field data are entered through the FieldPar field data entry system. This system is a data entry module that is compatible with the SEEPro database and is used in the office by field personnel. The samplers verify data entered into FieldPar before loading the data into the main SEEPro database.