Areas monitored for Plutonium and Americium, and B371 groundwater conditions: Groundwater immediately downgradient of the former B371 and B771 complexes is monitored for Pu and Am. Abundant technical research (much of which focused specifically on Rocky Flats) has indicated that the groundwater regime does not constitute a meaningful migration pathway for these constituents. Therefore, as in previous years, it is not surprising that the groundwater monitoring wells at Rocky Flats that are sampled for Pu and Am consistently report results for these constituents that are qualified as nondetects. However, due to the production-era missions of these buildings Pu and Am were included in the RFLMA monitoring for these wells to provide stakeholder assurance.

In 2012, just as in previous years, the five wells monitored for Pu and Am (Sentinel wells 20205, 20505, and 20705 at former B771; and 37405 and 37705 at former B371) only reported values qualified as nondetects for these radionuclides. Reported values in 2012 ranged from –0.00464 pCi/L to 0.00922 pCi/L, again all qualified as nondetects. (As an activity-based analysis that is compared against the activity in a laboratory blank, the analysis always generates a number.) In fact, the only Pu or Am results reported since Site closure that are not qualified as nondetects have been three J-qualified results in samples collected in December 2005, the highest activity of which was 0.0238 pCi/L (representing Am in a sample from well 20705).

These areas are also monitored for other constituents. The groundwater downgradient of the former B771 complex is discussed above in the context of the IHSS 118.1 Plume and will not be repeated here. Groundwater at the former B371 complex is also analyzed for VOCs, nitrate, and U. Of the VOCs, the most commonly reported detection (consistently reported at J-qualified concentrations below 1 µg/L) is of PCE in samples collected from well 37505. The highest concentration reported in 2012 was estimated at 0.55 µg/L. VOCs were not detected in 2012 in samples collected from wells 37405 and 37705 and historically have been detected only rarely in samples from these wells.

S-K trending results (Table 90) indicate an increasing trend meeting the 95 percent level of confidence for nitrate in samples from well 37405 and for U in samples from well 37505. The associated trend plots are provided in Appendix B. Given that the concentrations are so low, time series plots are not included in this report. For 2012, the highest concentration of nitrate reported for well 37405 was 5.68 mg/L, and the highest concentration of uranium at well 37505 was 8.48 µg/L. Both of these results are well below their respective RFLMA values (10 mg/L and 120 µg/L, respectively).

3.2 Ecological Monitoring

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 ecological monitoring that was conducted at the Site during 2012. It 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 highlights from the 2012 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 2012 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 2012.
- Document where revegetation activities were conducted in 2012.
- Conduct photomonitoring for visual documentation of changes in vegetation establishment at the Site.

3.2.2.1 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 636 species of plants. In 2012, three new records of vascular plant species for the Site flora are reported. The first two on the list below, cudweed (*Gnaphalium wrightii*) and prairie sandreed (*Calamovilfa longifolia*), were collected on the buttress of the Original Landfill. The third species, silver buffaloberry (*Shepherdia*

argentea), was planted as part of a habitat enhancement project at the Site in 2013. The following taxonomic names will be used at the Site for the new plant species records[20]:

Family	Scientific Name	Speccode	Common Name
Asteraceae	Gnaphalium wrightii A. Gray	GNWR1	Cudweed
Poaceae	Calamovilfa longifolia (Hook.) Schribn.	CALO1	Prairie Sandreed
Elaeagnaceae	Shepherdia argentea (Pursh) Nutt.	SHAR1	Buffaloberry

Voucher specimens of the species will be deposited at the University of Colorado Herbarium in Boulder, Colorado.

3.2.2.2 Weed Mapping and Weed Control

Figure 266 and Figure 267 show the 2012 weed distribution maps for diffuse knapweed (*Centaurea diffusa*) and Dalmatian toadflax (*Linaria dalmatica*), respectively. Table 105 shows the estimated total acreage and acreage-by-density categories for each species, based on the mapping data from 2007 through 2012. The total area of the COU is approximately 1,308 acres. In 2012, diffuse knapweed was observed on approximately 173 acres at various levels of infestation. Dalmatian toadflax was mapped on approximately 116 acres in 2012. Both species showed an increase from the amounts mapped in 2011. However, annual fluctuations in the abundance of many grassland species are not uncommon, as they respond to changes in temperature, precipitation amounts, timing of precipitation, and other environmental factors. The acreage infested by these species is still less than that found in earlier years.

Additional species that were mapped based on fortuitous observations in 2012 included Scotch thistle (*Onopordum acanthium*), leafy spurge (*Euphorbia uralensis*), whitetop (*Cardaria draba*), and Dame's rocket (*Hesperis matronalis*). Figure 268 shows the locations of these species as mapped in 2012. No acreages are provided for these species since the map simply shows the general location of the infestations.

During 2012, approximately 266 acres were treated with herbicides at the Site via ground application (Figure 269). Table 106 lists the target species, herbicides used, application rates, and approximate timing of the application during the year. (**Note:** Multiple herbicides are listed at some locations. Depending on location-specific characteristics such as target weed species, the locations of water bodies, soil types, and the professional judgment of the licensed herbicide applicator, different herbicides were used within that location to provide the control needed.)

[20] Nomenclature follows GPFA (1986), Weber (1976), Weber (1990), Weber and Wittmann (1992), and Weber and Wittmann (2001), in that order of determination. Species were verified at the University of Colorado Herbarium in Boulder, Colorado.

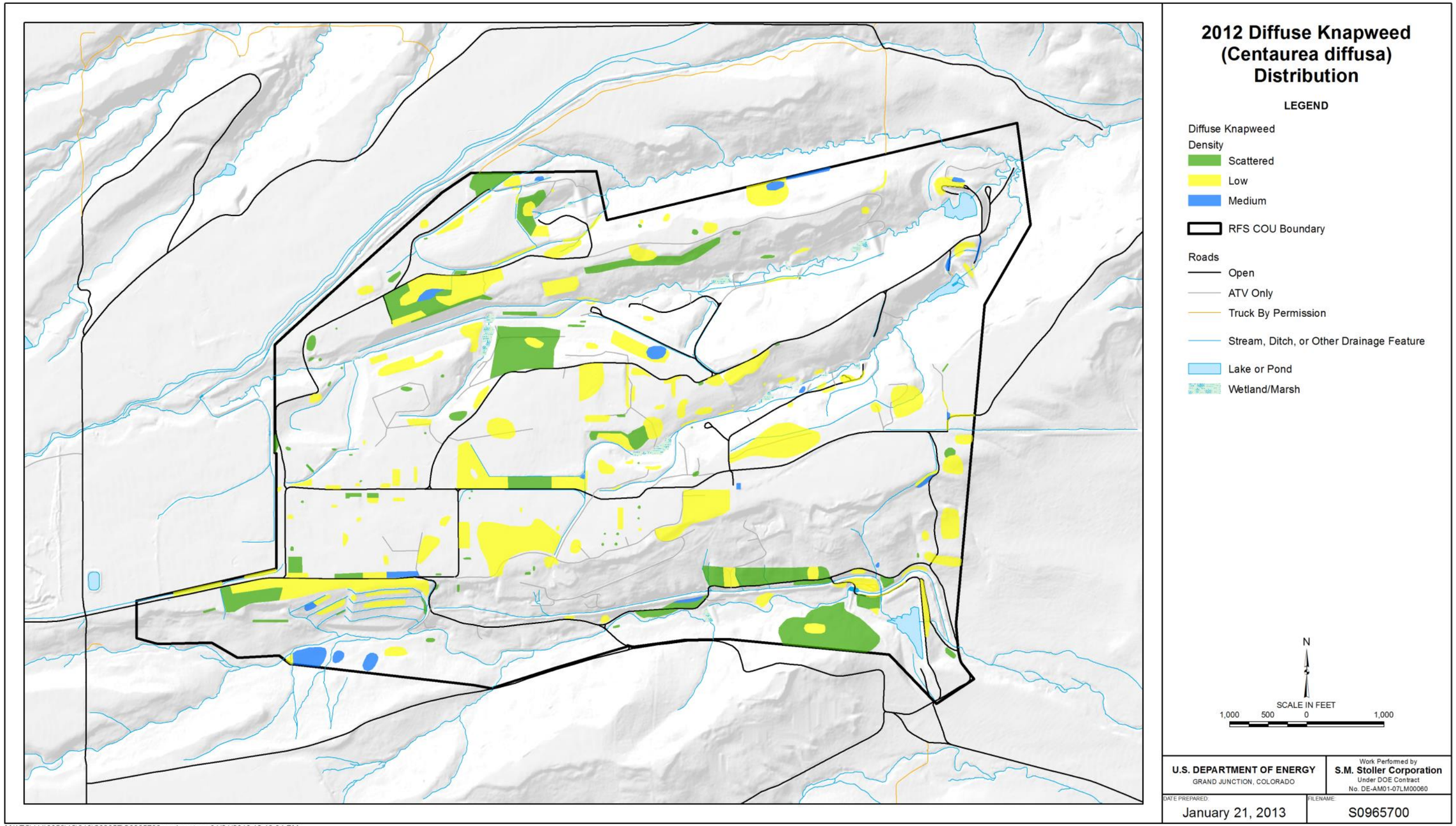


*Figure 266. 2012 Diffuse Knapweed (*Centaurea diffusa*) Distribution at Rocky Flats*

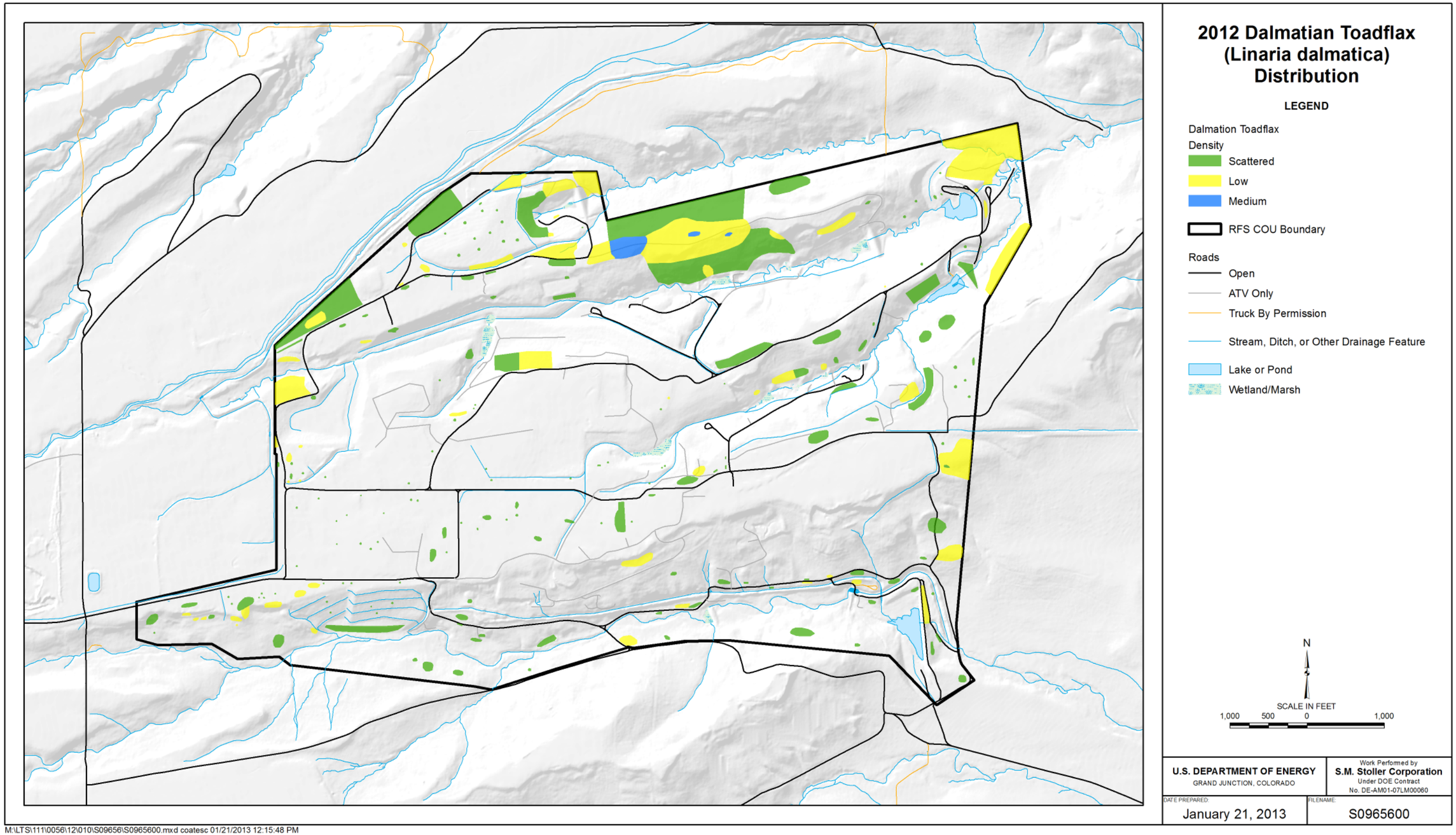


*Figure 267. 2012 Dalmation Toadflax (*Linaria dalmatica*) Distribution at Rocky Flats*

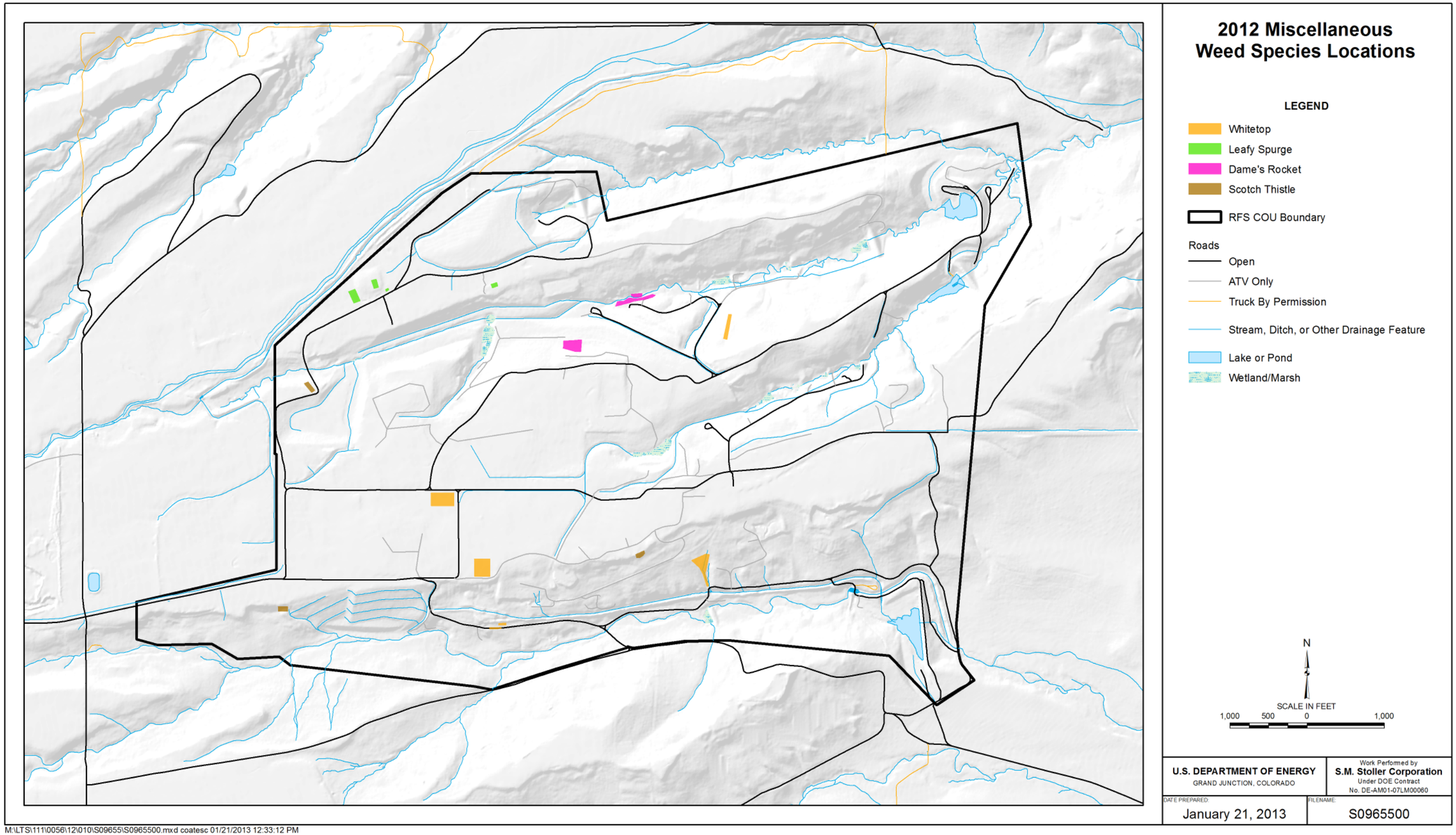
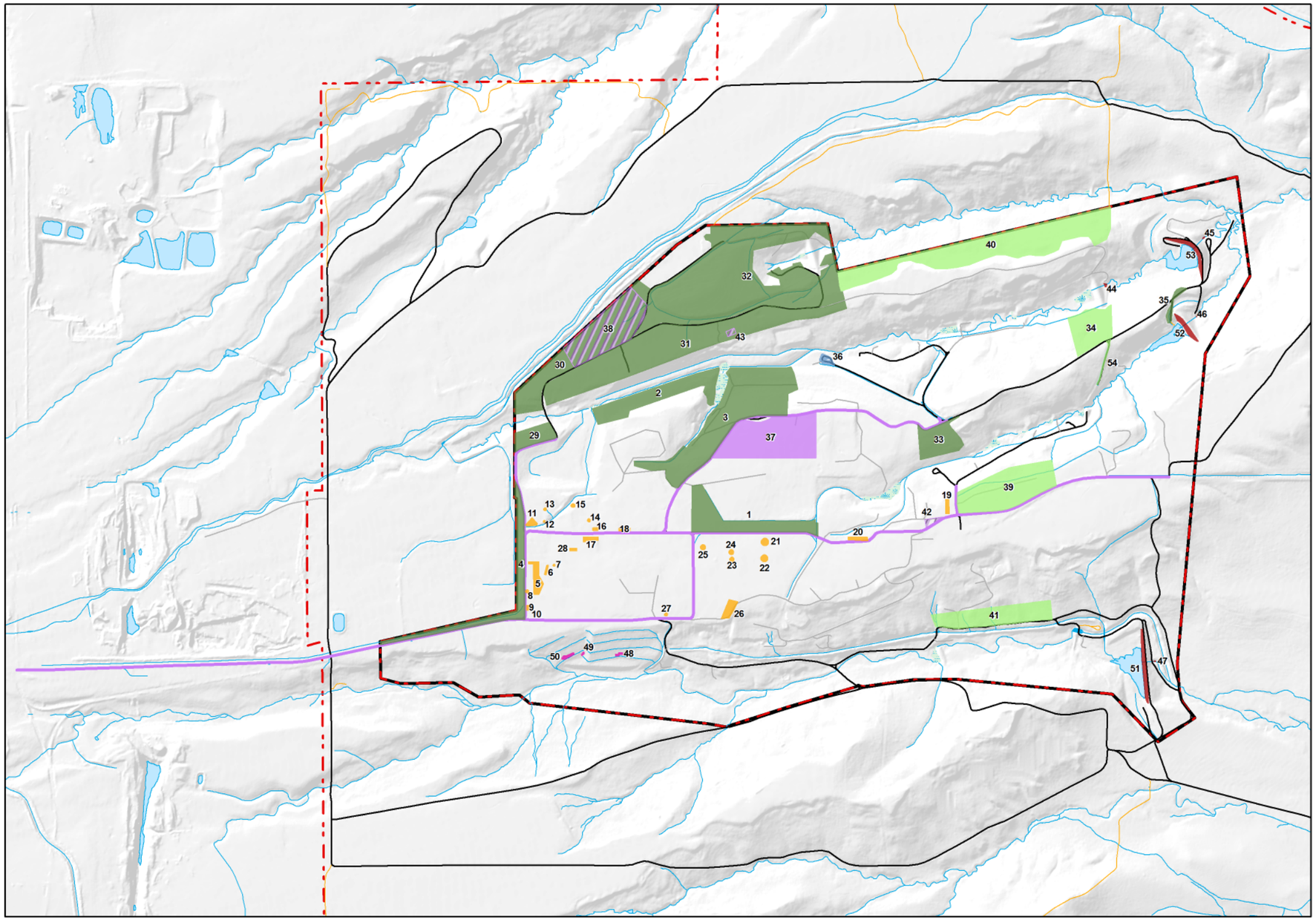


Figure 268. 2012 Miscellaneous Weed Species Locations at Rocky Flats



2012 RFS Herbicide Application Locations

LEGEND

- 2 gal Garlon 3A
- 10 lb Karmex + 48 oz Arsenal + 1 oz Telar + 48 oz Redeem + 2 gal Roundup
- 7 oz Milestone + 0.5 oz Escort
- 7 oz Milestone + 1 oz Escort
- 5 oz Plateau
- 8 oz Plateau
- 1 gal Rodeo
- 16 oz Transline
- 5 oz Plateau

Roads
- Open
- ATV Only
- Truck By Permission

- Stream, Ditch, or Other Drainage Feature
- RFNWR Boundary
- RFS COU Boundary
- Lake or Pond
- Wetland/Marsh

NOTE:
1) Rates are the amount of herbicide per acre.
2) The ID numbers for each location refer to additional information which may be found in tables in the text of the report.

N

SCALE IN FEET
1,500 1,000 500 0 1,500

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 21, 2013

FILENAME: S0965800

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Figure 269. 2012 Herbicide Application Locations at the Rocky Flats Site

Table 105. COU Noxious Weed Acreage Summary (2007–2012)

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
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

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

Table 106. FY 2012 Herbicide Application Summary

Location	Target Species[a]	Treatment[b] (Rate/Acre)	Actual Acreage Treated[c]	Time of Year Treated
1	CEDI1	7 oz Milestone + 1 oz Escort	9.00	Spring 2012
2	CEDI1	7 oz Milestone + 1 oz Escort	9.00	Spring 2012
3	CEDI1, VETH1, VEBL1, CIIN1	7 oz Milestone + 1 oz Escort	25.00	Spring 2012
4	CEDI1	7 oz Milestone + 1 oz Escort	7.50	Spring 2012
5	CEDI1	16 oz Transline	0.97	Spring 2012
6	CEDI1	16 oz Transline	0.07	Spring 2012
7	CEDI1	16 oz Transline	0.02	Spring 2012
8	CEDI1	16 oz Transline	0.04	Spring 2012
9	CEDI1	16 oz Transline	0.04	Spring 2012
10	CEDI1	16 oz Transline	0.02	Spring 2012
11	CEDI1	16 oz Transline	0.22	Spring 2012
12	CEDI1	16 oz Transline	0.01	Spring 2012
13	CEDI1	16 oz Transline	0.03	Spring 2012
14	CEDI1	16 oz Transline	0.03	Spring 2012
15	CEDI1	16 oz Transline	0.05	Spring 2012
16	CEDI1	16 oz Transline	0.06	Spring 2012
17	CEDI1	16 oz Transline	0.23	Spring 2012
18	CEDI1	16 oz Transline	0.13	Spring 2012
19	CEDI1	16 oz Transline	0.20	Spring 2012
20	CEDI1	16 oz Transline	0.26	Spring 2012
21	CEDI1	16 oz Transline	0.19	Spring 2012
22	CEDI1	16 oz Transline	0.16	Spring 2012
23	CEDI1	16 oz Transline	0.06	Spring 2012
24	CEDI1	16 oz Transline	0.08	Spring 2012
25	CEDI1	16 oz Transline	0.09	Spring 2012
26	CEDI1	16 oz Transline	0.67	Spring 2012
27	CEDI1	16 oz Transline	0.03	Spring 2012
28	CEDI1	16 oz Transline	0.09	Spring 2012
29	CEDI1, CIAR1	7 oz Milestone + 1 oz Escort	3.00	Spring 2012
30	CEDI1, VETH1, COAR1, LIDA1	7 oz Milestone + 1 oz Escort	19.00	Spring 2012
31	CEDI1, VETH1	7 oz Milestone + 1 oz Escort	32.00	Spring 2012
32	CEDI1, VETH1, LIDA1, HYPE1	7 oz Milestone + 1 oz Escort	49.00	Spring 2012
33	CEDI1, VETH1, CIAR1	7 oz Milestone + 1 oz Escort	5.25	Spring 2012
34	CIAR1	7 oz Milestone + 0.5 oz Escort	6.00	Spring 2012
35	CEDI1	7 oz Milestone + 1 oz Escort	1.00	Spring 2012
36	Total Kill	10 lb Karmex + 48 oz Arsenal + 1 oz Telar + 48 oz Redeem + 2 gal Roundup	0.50	Spring 2012
37	BRTE1	5 oz Plateau	15.00	Fall 2012
38	EUUR1	8 oz Plateau	12.10	Fall 2012
39	CEDI1	7 oz Milestone + .5 oz Escort	13.00	Fall 2012
40	CEDI1, CIAR1, VETH1	7 oz Milestone + .5 oz Escort	25.00	Fall 2012
41	CEDI1	7 oz Milestone + .5 oz Escort	9.00	Fall 2012
42	EUUR1	8 oz Plateau	0.30	Fall 2012
43	EUUR1	8 oz Plateau	0.20	Fall 2012
44	TYLA1	1 gal Rodeo	0.03	Spring 2012
45	TYLA1	1 gal Rodeo	0.01	Spring 2012
46	TYLA1	1 gal Rodeo	0.01	Spring 2012
47	TYLA1	1 gal Rodeo	0.01	Spring 2012

Table 106 (continued). FY 2012 Herbicide Application Summary

Location	Target Species[a]	Treatment[b] (Rate/Acre)	Actual Acreage Treated[c]	Time of Year Treated
48	Woody Plants	2 gal Garlon 3A	0.06	Spring 2012
49	Woody Plants	2 gal Garlon 3A	0.03	Spring 2012
50	Woody Plants	2 gal Garlon 3A	0.15	Spring 2012
51	Total Kill	1 gal Rodeo	0.80	Fall 2012
52	Total Kill	1 gal Rodeo	0.50	Fall 2012
53	Total Kill	1 gal Rodeo	0.70	Fall 2012
54	CEDI1	7 oz Milestone + 0.5 oz Escort	0.50	Spring 2012
A	BRTE1, Various other weedy species	5 oz Plateau	0.80	Fall 2012
B	BRTE1, Various other weedy species	5 oz Plateau	4.90	Fall 2012
C	BRTE1, Various other weedy species	5 oz Plateau	1.60	Fall 2012
D	BRTE1, Various other weedy species	5 oz Plateau	3.40	Fall 2012
E	BRTE1, Various other weedy species	5 oz Plateau	4.10	Fall 2012
F	BRTE1, Various other weedy species	5 oz Plateau	0.80	Fall 2012
G	BRTE1, Various other weedy species	5 oz Plateau	2.00	Fall 2012
H	BRTE1, Various other weedy species	5 oz Plateau	0.30	Fall 2012
I	BRTE1, Various other weedy species	5 oz Plateau	1.10	Fall 2012
		Annual Total Acreage Treated	266.42	
		Spring Total Acreage Treated	170.82	
		Fall Total Acreage Treated	95.60	

[a] Species Codes: BRTE1 = Downy Brome, CEDI1 = Diffuse knapweed, CIAR1 = Canada thistle, CIIN1 = Chicory, COAR1 = Field Bindweed, EUUR1 = Leafy Spurge, HYPE1 = St. Johns-wort, LIDA1 = Dalmatian Toadflax, VEBL1 = Moth Mullein, VETH1 = Common Mullein, TYLA1 = Cattails
[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.

Russian olive (*Elaeagnus angustifolia*) is a non-native tree once commonly planted in the arid west for habitat enhancement and windbreaks. It is now on the Colorado state noxious weed list. While not common at the Site, in recent years it has appeared in many of the revegetation locations as birds or other animals have deposited seeds across the Site. In an effort to control these and not let them develop into seed-producing trees, approximately 200 to 300 seedlings/ saplings and small trees were foliar sprayed with Garlon 3A (Triclopyr) in 2012. At the same time, approximately two or three dozen tamarisk (or salt cedar, *Tamarix ramosissima*, also on the state noxious weed list) were sprayed with Garlon 3A at several of the wetland mitigation areas.

Leafy spurge, a state-listed noxious weed, was documented for the first time at the Site in 2007. Those populations continue to be sprayed to control and try to eradicate the species from the Site. Hand control and weed-whacking were also used to control some small patches of Scotch thistle, whitetop, Dame's rocket, leafy spurge, and tamarisk in 2012. No new species of noxious weeds were observed at the Site during 2012.

Biocontrol insects continue to be used at the Site. In 2012, 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.

3.2.2.3 Revegetation Activities in 2012

During 2012, interseeding and revegetation activities were conducted to increase vegetation cover or diversity at several locations (Figure 270). Table 107 lists the activities conducted at each location. The A-3 dam and PLF Pond dam were breached to create more natural flow-through conditions. Disturbed areas were revegetated with native upland and wetland species. Approximately 310 coyote willow (*Salix exigua*) stakes, 49 peachleaf willow (*Salix amygdaloides*) stakes, and 7 plains cottonwood (*Populus deltoides*) poles were installed around the perimeter of the A-3 wetland after the turf reinforcement mat was installed and final normal water levels were reached. No woody plant stakes were installed at the PLF in 2012 because by the time the breach was completed, the woody species had already begun to leaf-out.

After the A-2 pond dam was breached in the winter of 2008/2009 and the water level dropped from its previous elevation, the previous locations where cattails (*Typha* ssp.) had grown became infested with Canada thistle (*Cirsium arvense*), a state listed noxious weed. These now upland areas were sprayed in fall 2011 to kill the Canada thistle and were reseeded in 2012 to return the areas to native prairie. Sandy, rocky conditions in FC-1 (a former borrow pit are used during Site closure) have limited the establishment of vegetation as compared to many other areas at the Site. In an attempt to increase the vegetation density at FC-1, several test plots were set out in fall 2012 to test whether the native graminoid, prairie sandreed, common in sandy soils, would be a good species to interseed into the area. The test plots will be evaluated for the next couple of years. If the species establishes well, it may be interseeded at that time to increase the vegetation cover in the FC-1 area.

As part of a project to enhance habitat onsite for wildlife and to increase vegetation diversity, several locations (locations 4, 13, and 14; Figure 270) were interseeded with a shrub mix consisting of four-wing saltbush (*Atriplex canescens*) and rubber rabbitbrush (*Chrysothamnus naueousus*). In spring 2012, potted plant materials of five different shrub and tree species were installed on a hillside in the north-central COU. The species included four-wing saltbush, plains cottonwood, chokecherry (*Prunus virginana*), coyote willow, and silver buffaloberry. These plants were irrigated for the first growing season using a gravity-fed irrigation system. At the end of the first growing season all of the plants survived. However, several plains cottonwood and chokecherry plants that had been repeatedly browsed (some to the ground) by the deer and elk may not survive through the winter. The coyote willow have done well near the wetter areas. The most suited upland shrub species, however, appear to be the four-wing saltbush and silver buffaloberry, as both did very well this year and did not sustain any browse damage. If future plantings are conducted these latter two species would be the ones of choice.

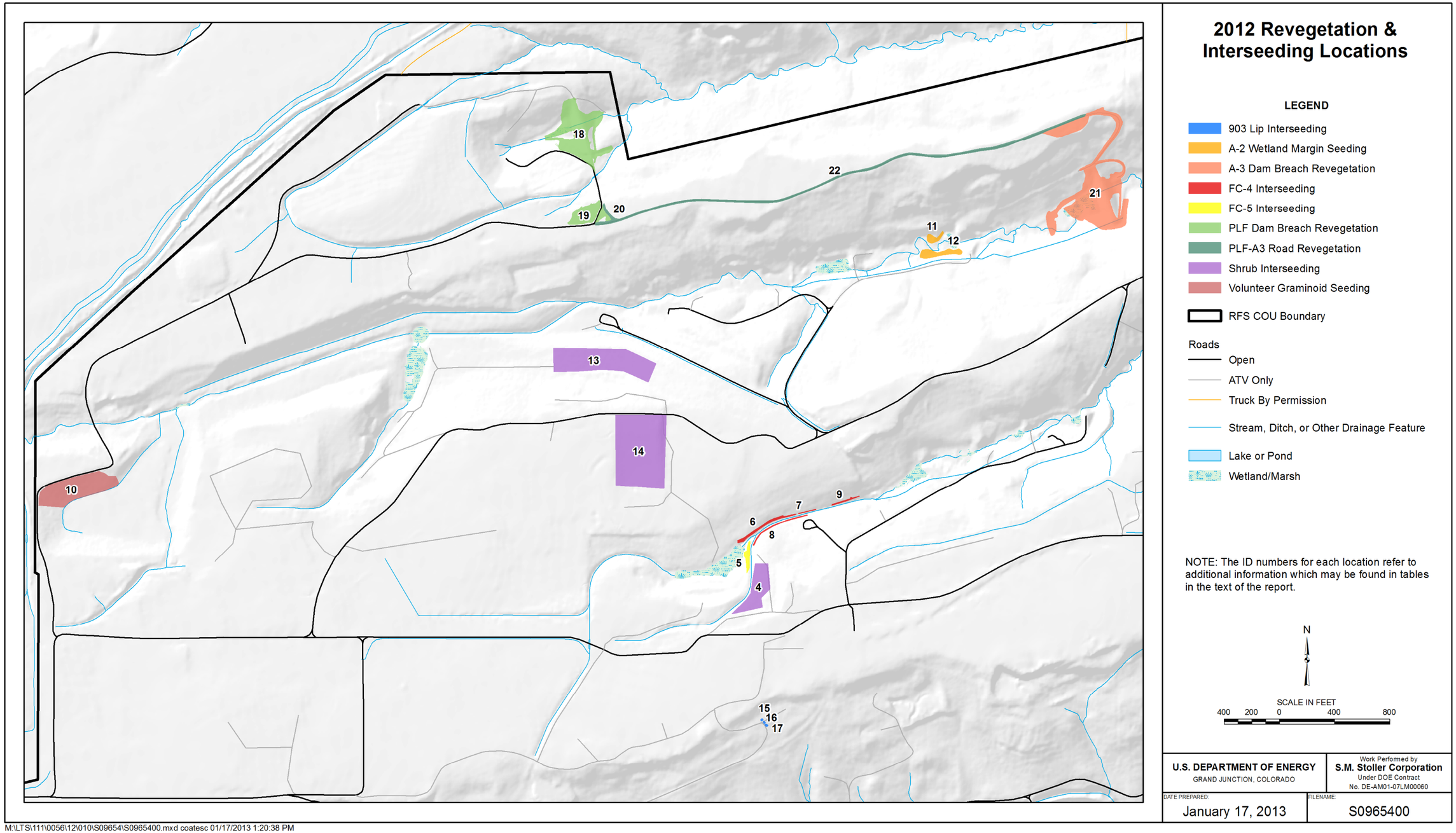

Figure 270. 2012 Revegetation and Interseeding Locations

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Table 107. 2012 Revegetation Location Summary

Location	Seeding Date	Acres	Project	Seed Mix	Seeding Method
4	11/30/2011	0.9	Shrub Interseeding	Four-wing Saltbush/Rubber Rabbitbrush	Hand Broadcasting
5	11/29/2011	0.1	FC-5 Interseeding	Mesic seed mix + Switchgrass	Hand Broadcasting
6	11/29/2011	0.1	FC-4 Interseeding	Mesic seed mix + Switchgrass	Hand Broadcasting
7	11/29/2011	0.0	FC-4 Interseeding	Mesic seed mix + Switchgrass	Hand Broadcasting
8	11/29/2011	0.1	FC-4 Interseeding	Mesic seed mix + Switchgrass	Hand Broadcasting
9	11/29/2011	0.0	FC-4 Interseeding	Mesic seed mix + Switchgrass	Hand Broadcasting
10	2/1/2012	1.9	Volunteer Graminoid Seeding	Volunteer collected seed	Hand Broadcasting
11	3/20/2012	0.1	A-2 Wetland Margin Seeding	Mesic seed mix + Switchgrass	Hand Broadcasting
12	3/20/2012	0.3	A-2 Wetland Margin Seeding	Mesic seed mix + Switchgrass	Hand Broadcasting
13	3/20/2012	2.6	Shrub Interseeding	Four-wing Saltbush/Rubber Rabbitbrush	Hand Broadcasting
14	3/20/2012	4.3	Shrub Interseeding	Four-wing Saltbush/Rubber Rabbitbrush	Hand Broadcasting
15	3/20/2012	0.0	903 Lip Interseeding	Mesic seed mix	Hand Broadcasting
16	3/20/2012	0.0	903 Lip Interseeding	Mesic seed mix	Hand Broadcasting
17	3/20/2012	0.0	903 Lip Interseeding	Mesic seed mix	Hand Broadcasting
18	5/24/2012	2.4	PLF Dam Breach Revegetation	Mesic seed mix + Switchgrass/Wetland seed mix	Hand Broadcasting
19	5/24/2012	0.6	PLF Dam Breach Revegetation	Mesic seed mix + Switchgrass/Wetland seed mix	Hand Broadcasting
20	5/24/2012	0.1	PLF Dam Breach Revegetation	Mesic seed mix + Switchgrass/Wetland seed mix	Hand Broadcasting
21	3/29/2012	4.3	A-3 Dam Breach Revegetation	Mesic seed mix + Switchgrass/Wetland seed mix	Hand Broadcasting
22	7/2/2012	1.2	PLF-A3 Road Revegetation	Xeric seed mix	ATV/Hand Broadcasting
	Total	19.1			

[a] Seed mixes are listed in the *Rocky Flats, Colorado, Site Revegetation Plan*, January 2009. This can be found at: http://www.lm.doe.gov/Rocky_Flats/SOG.aspx.
PAVI1 = Panicum virgatum (switchgrass)

3.2.2.4 Volunteer Seed Collections

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 revegetation projects. In 2012, approximately 14 pounds of forb seed and 9 pounds of graminoid seed were collected by volunteers. The graminoid seed was interseeded at various locations, and the forb seed was used to establish several new forb "nursery" areas. The forb nursery areas are locations where the forb seed is 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. Observations in 2012 of several of the original forb nurseries that were established in 2009 showed that various forb species (which were likely in the volunteer-collected seed) are beginning to establish at some of the locations. Some of the species observed were curly-top gumweed (*Grindelia squarrosa*), Porter's aster (*Aster porteri*), golden aster (*Chysopsis fulcrata* and *Chrysopsis villosa*), purple prairie clover (*Dalea purpurea*), blanket flower (*Gallardia aristata*), western sagewort (*Artemesia campestris*), and orange paintbrush (*Castilleja integra*).

3.2.2.5 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 locations monitored in 2012 had previously met the success criteria. This report section summarizes the revegetation monitoring results for data collected during 2012. The methods and the large data summary tables are not presented here but may be found in the full 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:

$$\text{Relative cover of Species A} = (20 \div 80) \times 100 = 25 \text{ percent}$$

- 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 2012. 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 2012 (Figure 271[21]).

Species richness in 2012 ranged from a low of 13 species in unit L33, to a high of 34 species in unit L21. The wide range in the number of species present is attributable to a number of factors, including how long ago the area was revegetated, size of the location, number of quadrats sampled in the location, degree of disturbance in the area prior to revegetation, and management actions (e.g., weed control) that have been conducted in the area. Thirteen different seeded graminoid species had become established and were growing at some locations in 2012. 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*), Canada wild rye (*Elymus canadensis*), junegrass (*Koeleria pyramidata*), switchgrass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*), sand dropseed (*Sporobolus cryptandrus*), and green needlegrass (*Stipa viridula*). Five species were established at all 13 locations in 2012: slender wheatgrass, western wheatgrass, sideoats grama, blue grama, and buffalograss. Several noxious weeds were also found at the locations monitored in 2012. These included quackgrass (*Agropyron repens*), downy brome (*Bromus tectorum*), filaree (*Erodium cicutarium*), diffuse knapweed, Canada thistle, bindweed (*Convolvulus arvensis*), Russian olive, St. John's-wort (*Hypericum perforatum*), Dalmatian toadflax, moth mullein (*Verbascum blattaria*), and common mullein (*Verbascum thapsus*). Total mean absolute foliar cover of noxious weeds at the various locations ranged from 0.1 percent to 12 percent. Weeds will continue to be managed as needed to reduce noxious weed populations in the revegetation areas and enable the desired seeded species to become established more quickly and compete with the weeds.

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 2012. Ground cover protection from rock, litter, and current-year live vegetation varied from 72 percent to over 100 percent at the revegetation locations in 2012. The occasional values over 100 percent are the result of the class system used for estimating cover, which estimates cover values into a range and uses the midpoint of the cover class for analysis. 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 2012.

The third success criterion states that a minimum of 30 percent relative cover of desired species must be present, and the fourth criterion states that no single species should constitute more than 45 percent of the total relative cover. Total relative vegetation cover of desired (native) species was greater than 71 percent at all 13 of the locations monitored in 2012. Five of the 13 monitored revegetation locations (38 percent) had a single species that constituted greater than 45 percent of

[21] Although the text refers to the revegetation units with a prefix of "L," (e.g., L1), the revegetation unit numbers area shown on Figure 1 without the "L".

the relative cover in 2012. Four of these locations were dominated by western wheatgrass (one of the seeded native species), and the other location was dominated by sideoats grama (also a seeded native species). All five locations failed to meet all four success criteria solely because they each had a single species that covered greater than 45 percent of the area.

Regarding the use of the success criteria, the Revegetation Plan states:

> Success criteria and monitoring are an important component of a revegetation project . . . *These success criteria are provided as initial guidance; however, common sense combined with scientific data must be applied to final evaluations to determine whether further management actions are required* [emphasis added].

Additionally, the Revegetation Plan's success criterion regarding dominance by a single species states that "[n]o 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*)" [emphasis added].

Western wheatgrass and sideoats grama are desirable native species. At locations that fail only this last criterion, and otherwise have a good stand of vegetation, several questions are worth considering:

- Is the dominance of these areas by a single species (with greater than 45 percent relative foliar cover) detrimental to long-term wildlife and habitat management?
- Is the dominance by these species likely to change in the future?
- Is there any other reason not to pass these locations in 2012, just because they failed this last criterion?

As discussed in previous years, one way to answer the first question is to evaluate the dominance of relative foliar cover of native species on the undisturbed native grassland areas of the Site. Do native species account for greater than 45 percent of the cover at some locations on the native grasslands? Monitoring in 2009 at two reference locations in native grassland used for Preble's meadow jumping mouse mitigation monitoring (Original Landfill and A-Ponds reference areas) documented that western wheatgrass provided, respectively, 54 and 59 percent relative foliar cover. At TR06, a xeric grassland monitoring location at the Site, data collected over multiple years showed that needle-and-thread grass (*Stipa comata*), a native grassland species, consistently provided greater than 45 percent relative foliar cover. Because it is not uncommon for some of the native graminoid species to dominate the foliar cover at some locations, it is unlikely that the dominance of western wheatgrass or sideoats grama at these revegetation areas will be detrimental to long-term wildlife and habitat management.

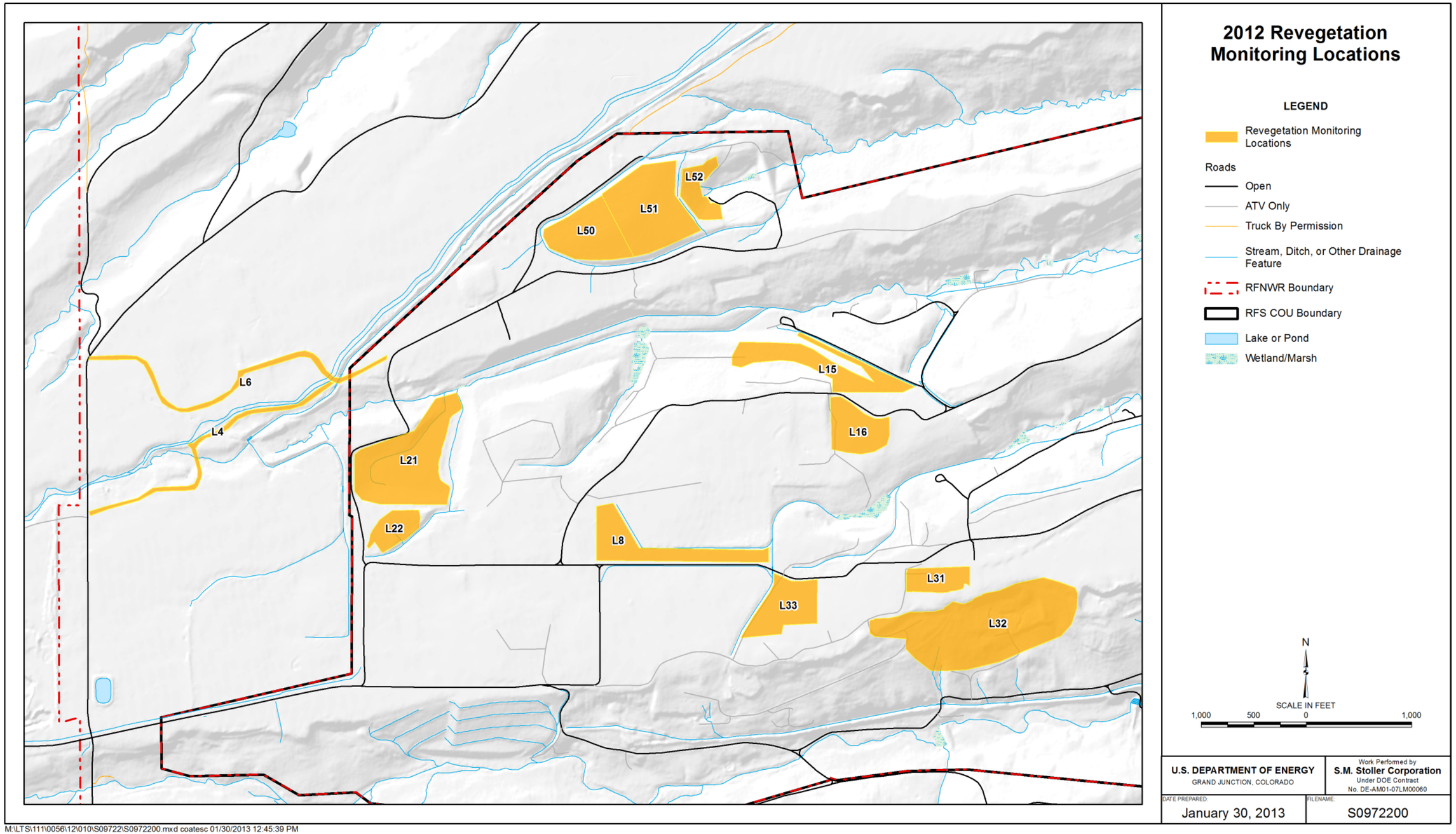

Figure 271. 2012 Revegetation Monitoring Locations

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Relative foliar cover of different species and overall vegetation cover also commonly fluctuate in response to environmental conditions, such as temperature and the amount and timing of precipitation. Data recorded for western wheatgrass, needle-and-thread grass, and overall foliar cover from various vegetation monitoring efforts on the native prairies at the Site have shown that fluctuations in cover are common in response to changing environmental conditions. Therefore, although some of the locations monitored in 2012 were dominated by individual species with greater than 45 percent cover, this may change over time as environmental conditions change. Given the evidence that dominance by a single species occurs on the native prairie, and given that annual fluctuations in foliar cover are common, there is no practical reason these locations cannot be considered to have passed all four criteria in 2012.
David Buckner, an ecologist under contract with EPA, conducted revegetation monitoring for EPA at the Site in 2009, 2010, and 2011. He noted similar conditions in the revegetation areas they sampled, and he expressed no concerns for areas with greater than 45 percent cover by a single species. In the 2010 report, he states, "The single sample showed that western wheatgrass comprised half of the cover, and though slightly in excess of the 45 percent DOE criterion, it is not likely that this represents a problem situation. Many native stands on finer-textured soils 'naturally' have as much western wheatgrass as is present here, or more" (EPA 2010a). Consequently, all of these locations are considered to have passed this criterion.

In summary, all 13 locations (approximately 74 acres) continued to meet all four criteria in 2012. This continues to demonstrate that the vegetation has become well established and that the vegetation should be sustainable in the long-term.

To evaluate potential successional change and trajectories in plant community composition a comparison of past monitoring data was made with the 2012 data for each location. The evaluation compared the 2008 through 2012 summary data for specific locations for total species richness found at each revegetation location, percentage of seeded species present, total absolute foliar cover, total native relative foliar cover, total absolute ground cover, and the list of species that contributed 5 percent or more of total relative foliar cover at each location (Table 108). Some locations had no data for a specific year because no monitoring was conducted at those locations in that year.

Changes in species richness from 2008 to 2012 varied by location. Four locations showed increases in species richness (ranging from one to eight species) while the other nine locations showed declines (ranging from a loss of one to 25 species). The declines are likely due to two primary causes. Initially most revegetation locations tend to have a flush of weedy species that can account for high species richness at the beginning of a project. As the seeded perennial graminoids begin to establish, some of the early successional weedy species are outcompeted and disappear from the area, thereby accounting for some loss of richness. An additional factor that probably accounts for the larger declines in richness are the herbicide applications that have been made at these locations to remove the weedy competition and allow the seeded native graminoid species a better chance to establish.

Total absolute foliar cover has gone up at 12 of 13 locations from 2008 to 2012. At one location it declined by one percent. An increase in the absolute foliar cover 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 10 of 13 locations. These two measures suggests that a "native" prairie is establishing and is

not merely weedy vegetation. The decrease in total relative native cover at three locations is largely a result of an increase in non-native graminoid cover [from species such as smooth brome (*Bromus inermis*), Japanese brome (*Bromus japonicus*), and Canada bluegrass (*Poa compressa*)] combined with a small increase from various species of non-native forbs.

The seeded native species continue to increase in dominance at each of the revegetation locations monitored in 2012. 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) as the slender wheatgrass has declined. Slender wheatgrass is used in the seed mixes at the Site because it is a good early native colonizer, which is expected to decline over time. It provides good vegetation cover for other slower establishing species such as many of the warm-season species. In general, there has been a continuing increase in warm-season, native graminoid cover as the vegetation has established. The mix of both cool-season and warm-season graminoids is desirable for long-term sustainability. Overall, 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. For additional details on the revegetation monitoring please see the Revegetation Monitoring Report on the Ecology DVD.

3.2.2.6 Photomonitoring Results

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

3.2.3 Wildlife Monitoring

During 2012, wildlife surveys at the Rocky Flats Site (Site) consisted of observing black-tailed prairie dogs (*Cynomys ludovicianus*), monitoring bird nesting boxes, and observing active raptor nests. More-detailed information for the wildlife monitoring is presented on the Ecology DVD included with this report.

3.2.3.1 Prairie Dog Monitoring

Figure 272 shows the locations of former and current prairie dog towns in the COU and on the adjacent POU property as of 2008. In 2009, the prairie dogs throughout the COU and POU were killed by an outbreak of plague that began in the colonies east of the POU on the adjacent Westminster Hills Open Space/Dog Park (Jefferson County 2009). Plague is an infectious disease caused by *Yersinia pestis*, a bacterium found in fleas that pass on the bacterium to wild rodents by biting them. Prairie dogs are susceptible to plague, and colonies can be wiped out by plague every few years. Observations of the former towns during 2012 revealed that no prairie dog towns were active within the COU. However, the small town in the POU north of the A-4 pond (northern town shown on Figure 272) had approximately 25 individuals present in May. Six to twelve of these individuals appeared to be young of the year. The numbers of prairie dogs at this town have been gradually increasing over the past few years.

Table 108. Revegetation Summary Data for Previously Successful Areas (L24–L37)

		Location												
		L4	L6	L8	L15	L16	L21	L22	L31	L32	L33	L50	L51	L52
Species Richness	2008	29	29	20	22	23	38	35	34	45	38	19	29	17
	2009	39	36	20	17	38	40	30	14	38	22	27	31	13
	2010	ND	ND	ND	ND	ND	32	ND	ND	ND	ND	ND	ND	ND
	2011	ND	ND	ND	ND	ND	29	ND	ND	49	ND	ND	ND	ND
	2012	31	23	19	21	20	34	22	18	24	13	27	30	18
Percent Seeded Species Present	2008	82	73	27	43	18	77	82	82	86	64	77	92	71
	2009	55	55	55	86	64	77	73	73	86	64	62	77	57
	2010	ND	ND	ND	ND	ND	77	ND	ND	ND	ND	ND	ND	ND
	2011	ND	ND	ND	ND	ND	62	ND	ND	86	ND	ND	ND	ND
	2012	73	64	55	86	64	85	82	82	86	73	77	69	86
Total Absolute Foliar Cover	2008	36.1	29.6	31.0	30.8	42.3	21.2	53.0	37.4	44.5	39.0	51.5	40.7	37.5
	2009	56.8	52.5	59.5	67.0	83.5	32.1	76.5	57.3	71.1	51.8	63.7	55.0	31.0
	2010	ND	ND	ND	ND	ND	29.6	ND	ND	ND	ND	ND	ND	ND
	2011	ND	ND	ND	ND	ND	29.6	ND	ND	76.1	ND	ND	ND	ND
	2012	65.6	55.6	43.9	54.4	60.6	27.3	52.0	64.3	63.3	46.8	52.8	49.2	43.8
Total Relative Native Foliar Cover	2008	47.8	67.1	52.0	60.6	36.7	74.4	84.9	53.8	50.2	67.0	86.4	84.4	81.3
	2009	64.7	65.2	86.3	87.3	65.9	79.0	64.4	88.2	53.6	87.2	85.3	89.1	91.9
	2010	ND	ND	ND	ND	ND	83.4	ND	ND	ND	ND	ND	ND	ND
	2011	ND	ND	ND	ND	ND	91.8	ND	ND	58.9	ND	ND	ND	ND
	2012	82.5	92.1	79.8	88.3	76.1	84.8	73.6	93.0	71.8	98.7	75.1	90.5	72.6
Total Absolute Ground Cover (Basal Veg, Litter, Rock)	2008	69.4	76.8	50.3	45.5	56.0	58.5	66.3	91.9	84.6	66.1	108.0	91.5	94.0
	2009	79.1	84.8	85.6	68.5	76.5	50.8	101.3	95.8	88.3	76.0	98.2	91.0	89.5
	2010	ND	ND	ND	ND	ND	63.1	ND	ND	ND	ND	ND	ND	ND
	2011	ND	ND	ND	ND	ND	77.2	ND	ND	90.3	ND	ND	ND	ND
	2012	102.0	94.1	94.5	89.3	99.1	72.0	99.5	100.8	94.4	96.3	95.8	106.8	102.5
Species with greater than 5 percent relative foliar cover	2008	Centaurea diffusa (23.2%) Agropyron caninum (18.3%) Agropyron smithii (12.1%) Grindelia squarrosa (8.3%) Alyssum minus (7.3%)	Agropyron caninum (31.6%) Agropyron smithii (14.3%) Centaurea diffusa (7.6%) Kochia scoparia (6.8%) Verbascum blattaria (5.9%) Bromus tectorum (5.1%)	Agropyron caninum (41.1%) Kochia scoparia (24.2%) Agropyron smithii (7.3%)	Agropyron caninum (19.1%) Agropyron smithii (18.3%) Grindelia squarrosa (17.5%) Centaurea diffusa (14.6%) Plantago lanceolata (10.2%) Melilotus officinalis (5.7%)	Centaurea diffusa (33.7%) Agropyron smithii (17.2%) Agropyron caninum (10.7%) Polygonum arenastrum (11.5%) Melilotus officinalis (5.3%) Cirsium arvense (5.0%)	Agropyron caninum (20.9%) Salsola iberica (5.9%) Elymus canadensis (7.9%) Scirpus validus (6.3%) Bouteloua curtipendula (6.3%) Panicum virgatum (5.5%)	Agropyron caninum (22.2%) Agropyron smithii (22.2%) Bouteloua curtipendula (20.3%) Buchloe dactyloides (5.2%)	Bromus inermis (22.7%) Agropyron smithii (21.1%) Stipa viridula (5.4%) Bouteloua curtipendula (12.7%) Centaurea diffusa (5.0%) Bromus tectorum (5.0%) Poa compressa (5.0%)	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 (29.5%) Agropyron caninum (17.0%) Centaurea diffusa (14.4%) Bouteloua gracilis (7.7%) Bouteloua curtipendula (5.1%)	Agropyron caninum (58.3%) Agropyron smithii (12.6%) Poa compressa (8.7%) Buchloe dactyloides (7.1%)	Agropyron caninum (34.0%) Agropyron smithii (15.2%) Andropogon gerardii (11.9%)	Agropyron smithii (48.7%) Agropyron caninum 16.7%) Centaurea diffusa (5.3%)
	2009	Agropyron smithii (18.1%) Alyssum minus (10.6%) Ambrosia artemisiifolia (8.4%) Agropyron caninum (7.9%) Centaurea diffusa (7.0%) Grindelia squarrosa (5.9%)	Agropyron caninum (24.0%) Agropyron smithii (20.5%) Melilotus officinalis (9.5%) Centaurea diffusa (7.9%) Poa compressa (5.5%)	Agropyron smithii (37.6%) Agropyron caninum (37.0%) Kochia scoparia (7.8%)	Agropyron smithii (43.1%) Agropyron caninum (26.9%) Kochia scoparia (10.3%) Hordeum jubatum (9.5%)	Agropyron smithii (18.3%) Agropyron caninum (13.6%) Kochia scoparia (9.9%) Melilotus officinalis (6.1%) Helianthus annuus (5.7%) Ambrosia artemisiifolia (5.5%)	Agropyron caninum (20.8%) Melilotus officinalis (15.3%) Juncus balticus (8.3%) Bouteloua gracilis (7.0%) Bouteloua curtipendula (5.7%) Carex nebrascensis (5.7%)	Agropyron smithii (19.9%) Centaurea diffusa (11.8%) Plantago lanceolata (10.8%) Agropyron caninum (10.8%) Buchloe dactyloides (9.8%) Bouteloua gracilis (5.9%)	Bouteloua curtipendula (54.1%) Andropogon scoparius (12.2%) Buchloe dactyloides (7.4%)	Bromus inermis (28.8%) Agropyron smithii (14.0%) Bouteloua curtipendula (13.2%) Kochia scoparia (5.7%) Buchloe dactyloides (5.0%)	Agropyron smithii (35.3%) Agropyron caninum (16.9%) Bouteloua gracilis (15.7%) Bouteloua curtipendula (10.6%)	Agropyron caninum (41.4%) Agropyron smithii (21.2%) Buchloe dactyloides (6.8%)	Agropyron smithii (18.2%) Agropyron caninum (17.0%) Andropogon gerardii (16.1%) Buchloe dactyloides (15.5%) Bouteloua curtipendula (11.2%)	Agropyron smithii (56.5%) Agropyron caninum (13.7%) Artemesia ludoviciana (12.1%) Bouteloua gracilis (5.6%)
	2010	ND	ND	ND	ND	ND	Agropyron smithii (16.0%) Bouteloua gracilis(15.2%) Melilotus officinalis (11.2%) Bouteloua curtipendula (6.6%) Buchloe dactyloides (6.0%) Astragalus canadensis (5.4%)	ND	ND	ND	ND	ND	ND	ND
	2011	ND	ND	ND	ND	ND	Agropyron smithii (20.3%) Agropyron caninum (16.1%) Bouteloua curtipendula (9.6%) Juncus balticus (8.7%) Buchloe dactyloides (7.9%) Panicum virgatum (7.0%) Andropogon gerardii (5.4) Bouteloua gracilis (5.6%)	ND	ND	Bromus inermis (26.2%) Bouteloua curitipendula (14.9%) Buchloe dactyloides (7.1%) Panicum virgatum (6.8%)	ND	ND	ND	ND
	2012	Agropyron smithii (45.3%) Buchloe dactyloides (7.6%) Bouteloua gracilis (6.7%) Bouteloua curtipendula (6.5%) Sporobolus cryptandrus (5.1%)	Agropyron smithii (49%) Buchloe dactyloides (23.4%) Bouteloua gracilis (7.9%)	Agropyron smithii (34.8%) Buchloe dactyloides (18.2%) Agropyron caninum (10.8%) Bromus tectorum (9.4%)	Agropyron smithii (64.8%) Agropyron caninum (9.0%)	Agropyron smithii (34.4%) Bromus tectorum (14.6%) Stipa viridula (10.9%) Agropyron caninum (8.9%) Buchloe dactyloides (8.9%) Bouteloua curtipendula (7.6%)	Panicum virgatum (14.3%) Bouteloua curtipendula (10.7%) Bouteloua gracilis (9.1%) Andropogon scoparius (9.1%) Andropogon gerardii (8.5) Agropyron smithii (5.8%) Buchloe dactyloides (5.2%)	Bouteloua curtipendula (25.5%) Agropyron smithii (11.5%) Buchloe dactyloides (11.1%) Bromus inermis (10.1%) Sorghastrum nutans (8.7%)	Bouteloua curtipendula (46.3%) Buchloe dactyloides (14.4%) Andropogon scoparius (12.1%) Bouteloua gracilis (8.2%) Sorghastrum nutans (7.4%)	Bouteloua curtipendula (32.8%) Bromus inermis (21.9%) Agrypyron smithii (9.4%) Bouteloua gracilis (8.8%) Buchloe dactyloides (7.9%)	Agropyron smithii (47.1%) Bouteloua curtipendula (15.2%) Bouteloua gracilis (15.2%) Buchloe dactyloides (10.7%) Agropyron caninum (7.0%)	Agropyron caninum (19.9%) Agropyron smithii (18.6%) Buchloe dactyloides (10.4%) Bouteloua curtipendula (6.9%) Koleria pyrimidata (5.4%)	Buchloe dactyloides (29.8%) Andropogon gerardii (22.7%) Agropyron smithii (14.6%) Agropyron caninum (5.4%)	Agropyron smithii (32.6%) Bromus japonicus (9.7%) Ambrosia psilostachya (9.1%) Bouteloua curtipendula (8.0) Bouteloua gracilis (6.9%)

* 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.

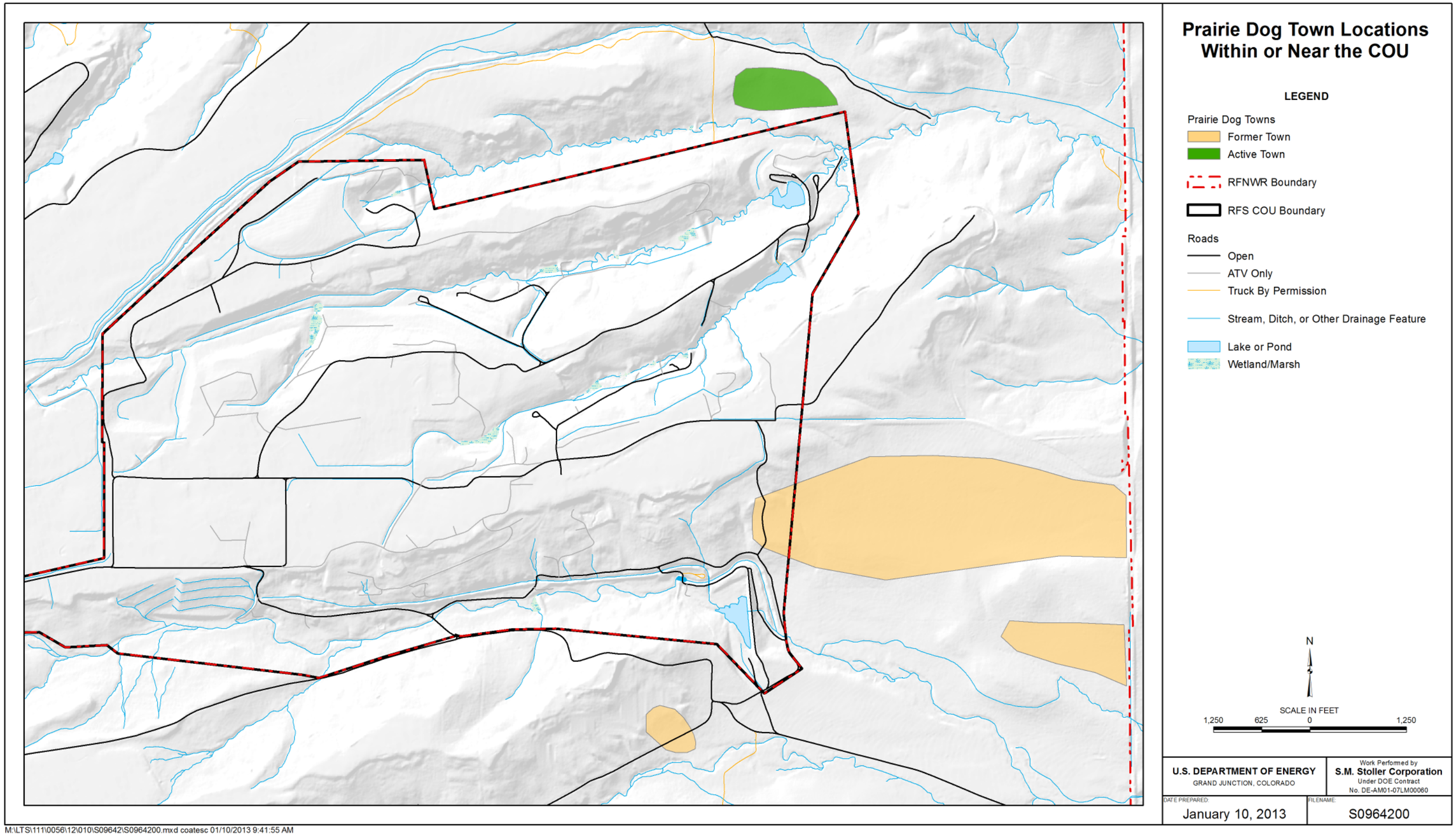

Figure 272. Prairie Dog Town Locations Within or Near the COU

No individual prairie dogs were observed roaming along the roads at the Site in 2012. 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 town north of the A-4 pond, inspectors have observed no signs of the prairie dogs' return at the previously occupied prairie dog towns. Fortuitous monitoring of these locations will continue throughout 2013 to determine whether the prairie dogs have returned.

3.2.3.2 Nest Box Monitoring

Four of the eight nest boxes in the COU showed evidence of nesting activity in 2012. Tree swallows (*Tachycineta bicolor*) occupied two nest boxes and house wrens (*Triglodytes aedon*) occupied two other nest boxes this year. Four new bluebird (*Sialia currucoides*) nest boxes and four new chickadee (*Poecile atricapillus*) nest boxes were installed in fall of 2012 and will be monitored in 2013. The locations of all the nest boxes in the COU are shown on Figure 273.

3.2.3.3 Raptor Nesting Observations

In 2012, no active raptor nests were observed within the COU.

3.2.4 Regulatory Mitigation Monitoring Summary

3.2.4.1 Preble's Meadow Jumping Mouse Mitigation Monitoring

The Preble's meadow jumping mouse 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 2012, vegetation monitoring and photopoint monitoring was conducted at various Preble's mouse mitigation locations in the COU. One area met success criteria in 2012 and concurrence was requested from USFWS that no further monitoring of this area was required. The results were summarized in an annual report that is due to USFWS by December 1 each year. Although the 2012 results are not discussed in this annual report, they are available in the *Preble's Meadow Jumping Mouse Mitigation Monitoring Report for Biological Opinion ES/LK-6-CO-04-F-012 (April 5, 2004) at the Rocky Flats Site, 2012 Annual Report* (DOE 2011g).

3.2.4.2 Wetland Mitigation Monitoring

During the cleanup and closure of the Site, approximately 7.8 acres of wetlands were disturbed. In order to maintain a "no net loss" of wetlands at the Site, several mitigation wetlands were constructed to create or reestablish 7.8 acres of wetlands. Additionally new seeps and wet areas have developed at several locations throughout the COU where wetlands are developing naturally. DOE also paid for the Standley Lake Wetland Mitigation Bank that could be used if in situ wetland mitigation did not provide the total number of needed acres onsite. The *Rocky Flats, Colorado, Site Wetland Mitigation Monitoring and Management Plan* (DOE 2006b) provides guidance for monitoring the mitigation wetlands and reporting. During 2012, a total of 36 potential wetland locations were monitored. Final wetland delineations were made at 23 of

these locations, all of which met all three wetland criteria (hydrophytic vegetation hydric soils, and wetland hydrology). At the remaining 13 locations, interim monitoring was conducted, and 8 of the locations met all three wetland criteria, while the remaining 5 did not meet one or more criteria. Additional details are not presented here, but are found in the *Rocky Flats, Colorado, Site, 2012 Annual Wetland Mitigation Monitoring Report* (DOE 2013). This report is due to EPA by March 1 each year.

An additional wetland mitigation monitoring report was also written and submitted to the USACE in 2012 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 2012 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, 2012 Annual Report* (DOE 2012c). This report is due to USACE by December 31 each year.

3.2.5 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 2012 documented the continuing establishment of vegetation at revegetation locations. Noxious weed control activities and additional revegetation activities were conducted during 2012 to improve and enhance the vegetation at the Site. 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 Site Environmental Evaluation for Projects (SEEPro) 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