

2011 Vegetation Surveys

Introduction

Vegetation surveys are conducted at the Rocky Flats Site (Site) to provide information necessary for managing the natural resources. The Site comprises the Central Operable Unit (COU) and Peripheral Operable Unit (POU) (Figure 1). The objectives of the vegetation surveys in 2011 were to:

- Identify any 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 applications.
- Document and track herbicide applications in 2011.
- Document where revegetation activities were conducted in 2011.
- Conduct photomonitoring for visual documentation of changes in vegetation establishment at the Site.

This section pertains to general vegetation surveys. Revegetation monitoring to evaluate revegetation success across the Site is reported in the revegetation section of the annual report.

Methods

Weed Mapping

Mapping for selected weed species in the COU is a means of identifying high-priority treatment areas, monitoring the distribution of specific noxious weed species, discovering new weed species, and tracking the effectiveness of weed control. Weed mapping in the COU in 2011 was conducted both on foot and from a vehicle; binoculars were also used. Weed mapping was conducted when species were flowering or when they were most visible. Other species were mapped as fortuitous observations. The species mapped in the COU in 2011 included diffuse knapweed (*Centaurea diffusa*) and Dalmatian toadflax (*Linaria dalmatica*). Some species were mapped as fortuitous observations. These included Scotch thistle (*Onopordum acanthium*), leafy spurge (*Euphorbia uralensis*), whitetop (*Cardaria draba*), Russian olive (*Elaeagnus angustifolia*), salt cedar or tamarisk (*Tamarix ramosissima*), and jointed goatgrass (*Aegilops cylindrica*).

For mapping, infestation areas were classified into general density categories of high, medium, low, and scattered based on a subjective interpretation of the extent, visual density, need for control, and aggressive nature of the species. The high-density category indicated that an area was dominated by a nearly solid infestation or very high cover of the species. The medium-density category was used where the infestation provided less cover and was less homogeneous. The low-density category was used where individuals of the species were present in fewer numbers and were not visually dominating the landscape but were beginning to establish a foothold in the plant community and needed control. The scattered-density category indicated a sporadic occurrence of the species. The noxious weed populations and distributions were hand-drawn in the field and should not be interpreted as a precise outline of the distribution of these species. Attempts were made to visit the entire Site, but some infestations may have been missed.

Herbicide Applications and Revegetation Activities

Maps of herbicide applications and revegetation activities were prepared to show where the subcontractor applied herbicides and where interseeding activities took place during 2011. Maps were prepared in the Geographic Information System based on hand-drawn field maps.

Photographic Documentation

Photographs were taken at selected permanent photo points during summer 2011 to document and evaluate any changes resulting from climatic changes, natural resource management, or human activity. Photographs were compared to those taken previously. The time-series photographs can be viewed on the ecology DVD.

Results and Discussion

Site Flora

The complete list of plant species known to be at the Site at the end of 2011 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 633 species of plants. One new record of vascular plant species for the Site flora is reported. Honey locust (*Gleditsia triacanthos*), an ornamental tree, was collected from the former Building 850 area in the COU. The following taxonomic name will be used at the Site for the new plant species record¹:

Family	Scientific Name	Speccode	Common Name
Caesalpinaceae	<i>Gleditsia triacanthos</i> L.	GLTR1	Honey locust

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

Weed Mapping and Weed Control

Figures 2 and 3 show the 2011 weed distribution maps for diffuse knapweed and Dalmatian toadflax, respectively. Table 1 shows the estimated total acreage and acreage-by-density categories for each species, based on the mapping data from 2007 through 2011. The total area of the COU is approximately 1,308 acres. In 2011, diffuse knapweed was observed on approximately 158 acres at various levels of infestation. Dalmatian toadflax was mapped on approximately 49 acres in 2011. Both species have shown a steady decrease in acreage since 2009 and most of the acreage is in the low and scattered categories. 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. Some areas have also been treated with herbicides.

¹ 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.

Additional species that were mapped based on fortuitous observations in 2011 included Scotch thistle, leafy spurge, whitetop, Russian olive, salt cedar/tamarisk, and jointed goatgrass. Figure 4 shows the locations of these species as mapped in 2011. No acreages are provided for these species since the polygons simply show the general location of the infestations.

During 2011, approximately 300 acres were treated with herbicides at the Site via ground application (Figure 5). Table 2 lists the target species, the herbicides used, the application rates, and the approximate timing of the application during the year. (**Note:** Multiple herbicides are listed at some locations. This does not mean that each herbicide was used across that entire location. Rather, depending on site-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.)

Leafy spurge, a state-listed noxious weed, was documented for the first time at the Site in 2007. Those populations have been sprayed to control and eradicate the species. In 2011, another small, isolated population was found over ½ mile from the original population. This patch was also sprayed to prevent its spread. Hand control and weed-whacking were also used to control some small patches of Scotch thistle, tall mustard, salt cedar, and whitetop in 2011. No new species of noxious weeds were observed at the Site during 2011.

Biocontrol insects continue to be used at the Site. In 2011, 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.

In 2011, the U.S. Environmental Protection Agency promulgated its *Final National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit (PGP) for Point Source Discharges From the Application of Pesticides*, 76 FR 68750-68756, November 7, 2011. In response to a 2009 U.S. Court of Appeals ruling (*National Cotton Council, et al. v. EPA*), the ruling, which became effective on October 31, 2011, requires NPDES permits for herbicide applications that result in discharges in or near “waters of the U.S.” The ruling will have an impact on herbicide applications at some U.S. Department of Energy Office of Legacy Management sites, although details regarding how the permit requirements may be implemented are still being addressed.

Revegetation Activities

During winter, spring, and fall 2011, interseeding was conducted to increase vegetation cover on approximately 36 acres at the Site (Figure 6). The seed was either broadcast by hand or using an all-terrain-vehicle broadcast seeder. Table 3 lists the activities at each location.

Volunteer Seed Collections

For the past several years, the Jefferson County Nature Association has been sponsoring volunteer seed-picking days to provide local ecotype seed and species, which are not available commercially, for inclusion in the revegetation efforts at the Site and other nearby revegetation projects. In 2011, approximately 9 pounds of forb seed and 32 pounds of graminoid seed was collected by volunteers and interseeded at various locations within the COU. The forb seed was interseeded into the forb “nursery” areas that were established in 2009.

Summary

Managing natural resources at the Site involved various tools in 2011, including weed control and revegetation activities. The threat from noxious weeds continues to be a significant issue at the Site, and weed control in both the revegetation areas and the natural areas remains a high priority within the COU. Approximately 300 acres in the COU were treated with herbicides in 2011 to control noxious weeds and improve the quality of the plant communities. Interseeding was conducted at several locations to continue to increase the vegetation cover and stand density. Photomonitoring continued to document the establishment of vegetation at the revegetation locations. Vegetation establishment has been good and, with proactive management, should be self-sustaining in the long term.

References

- GPFA (Great Plains Flora Association), 1986. *Flora of the Great Plains*, 2nd printing with 1991 supplement, University Press of Kansas, Lawrence, Kansas.
- Weber, W.A., 1976. *Rocky Mountain Flora, Colorado*, Associated University Press, Boulder, Colorado.
- Weber, W.A., 1990. *Colorado Flora: Eastern Slope*, University Press of Colorado, Niwot, Colorado.
- Weber, W.A., and R.C. Wittmann, 1992. *Catalog of the Colorado Flora: A Biodiversity Baseline*, University Press of Colorado, Niwot, Colorado.
- Weber, W.A., and R.C. Wittmann, 2001. *Colorado Flora: Western Slope*, 3rd edition, University Press of Colorado, Niwot, Colorado.

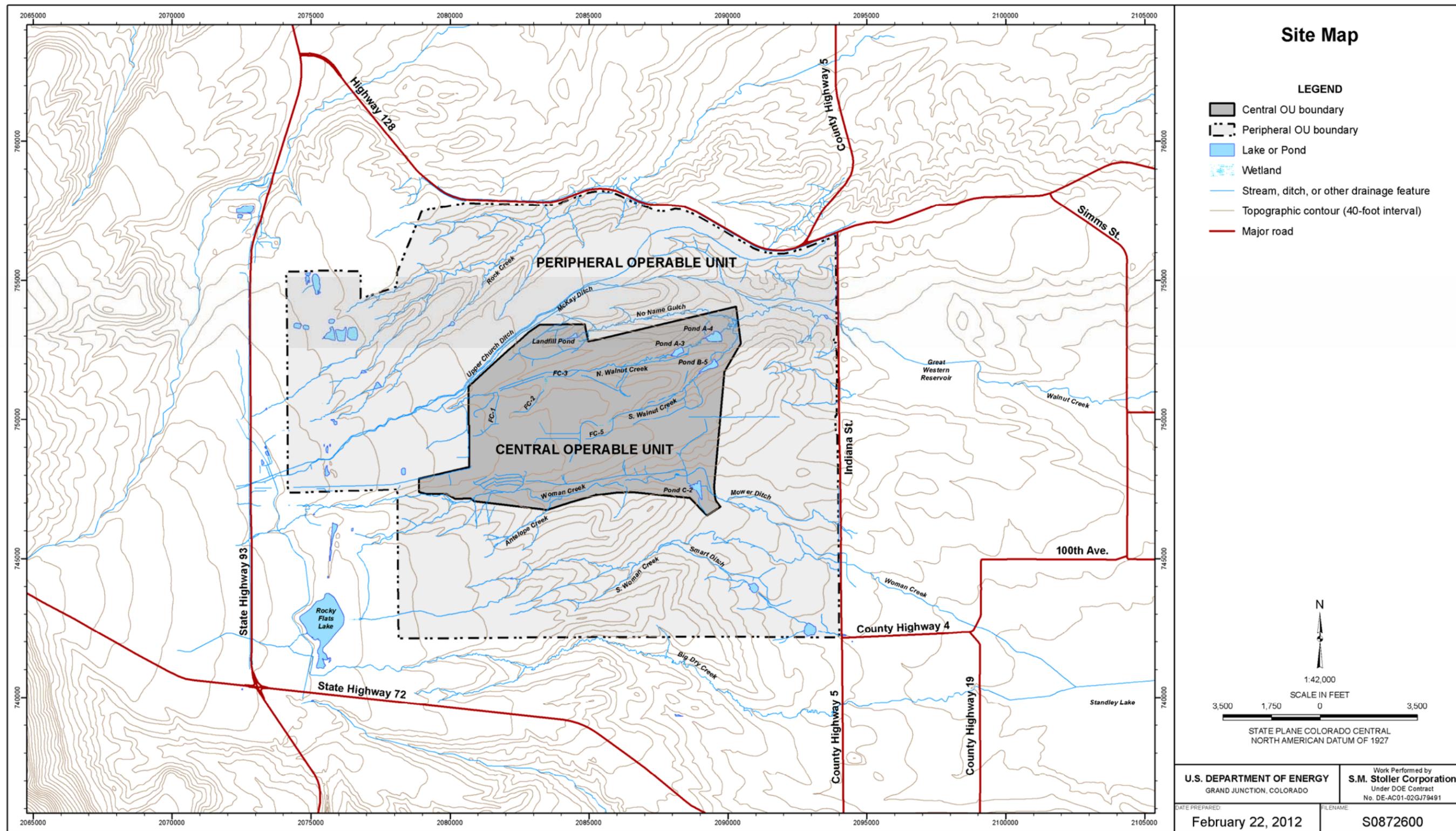
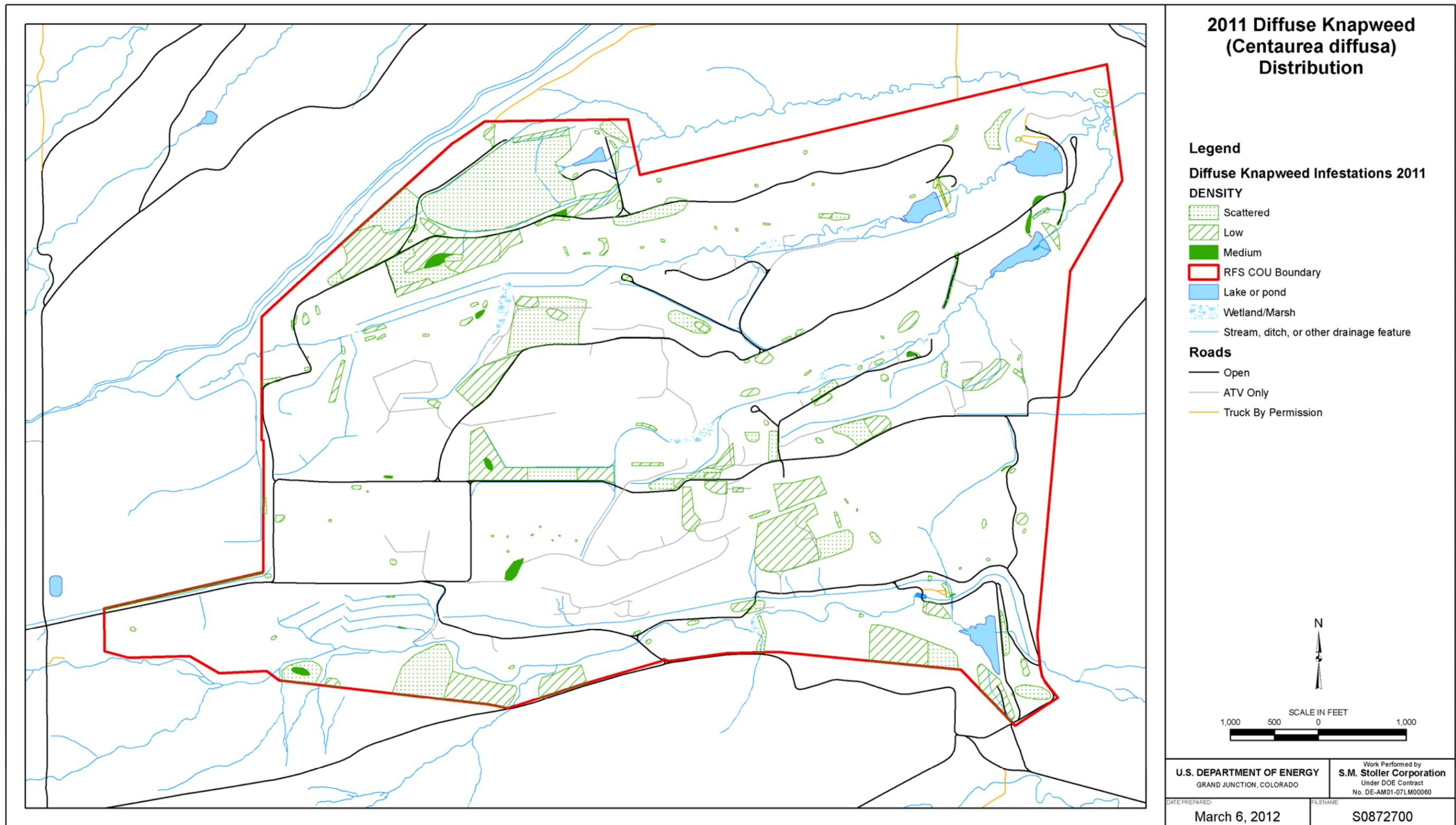
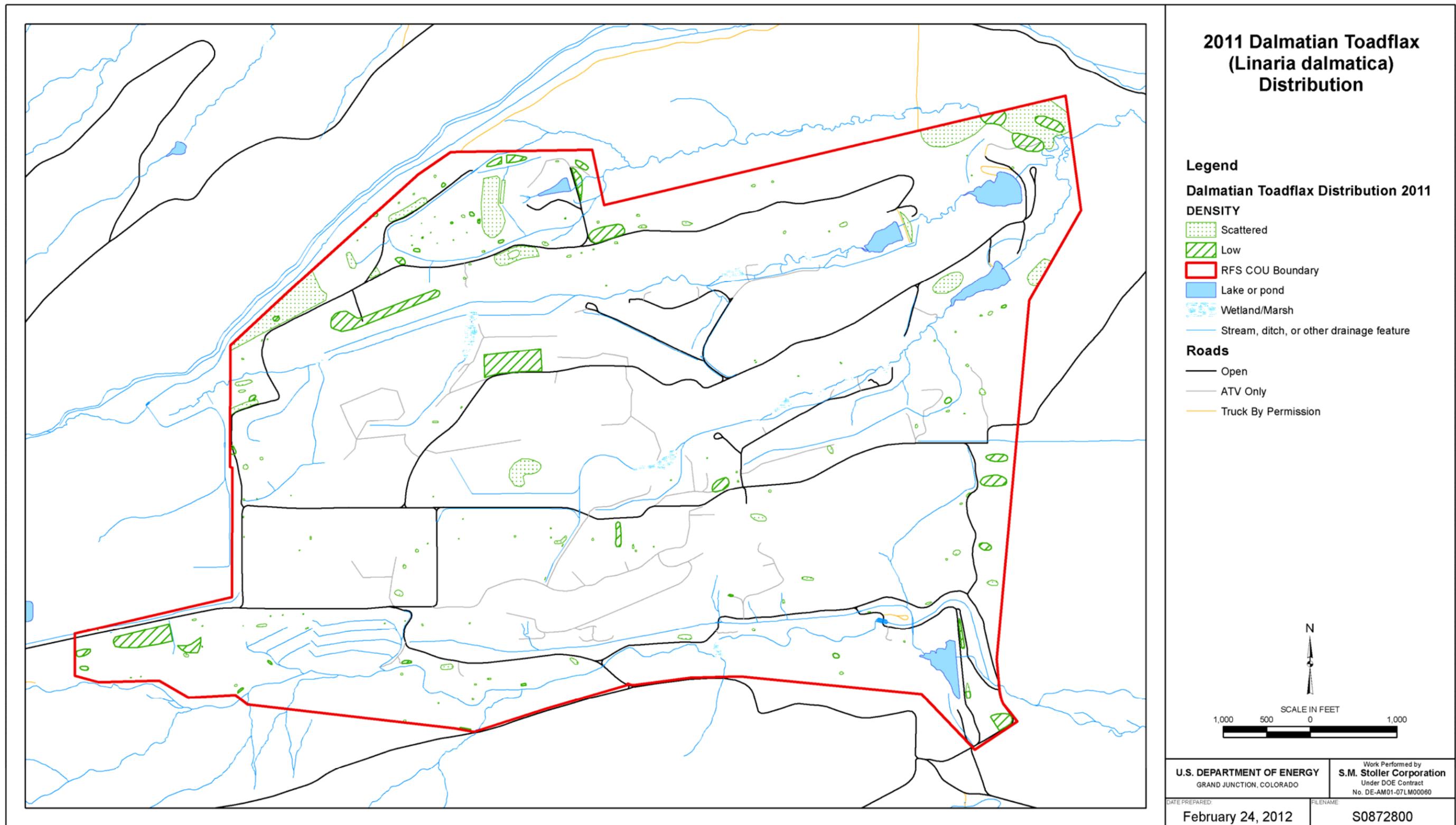


Figure 1. Rocky Flats Site Map.



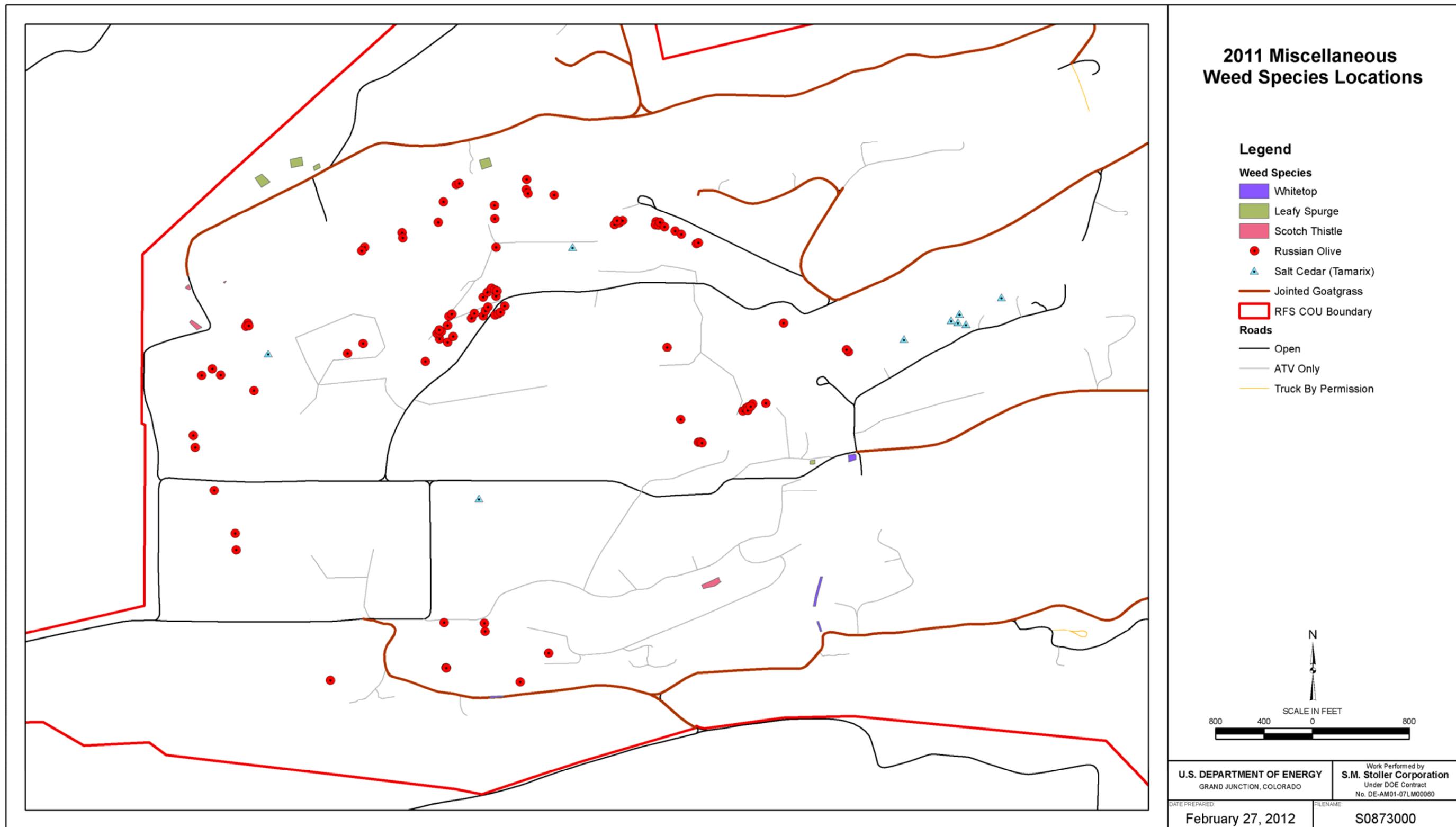
\\Gulfenvprojects\EBMLTS\11110056\121009\S08727\S0872700.mxd brownc 03/06/2012 8:59:39 AM

Figure 2. 2011 Diffuse Knapweed (*Centaurea diffusa*) Distribution.



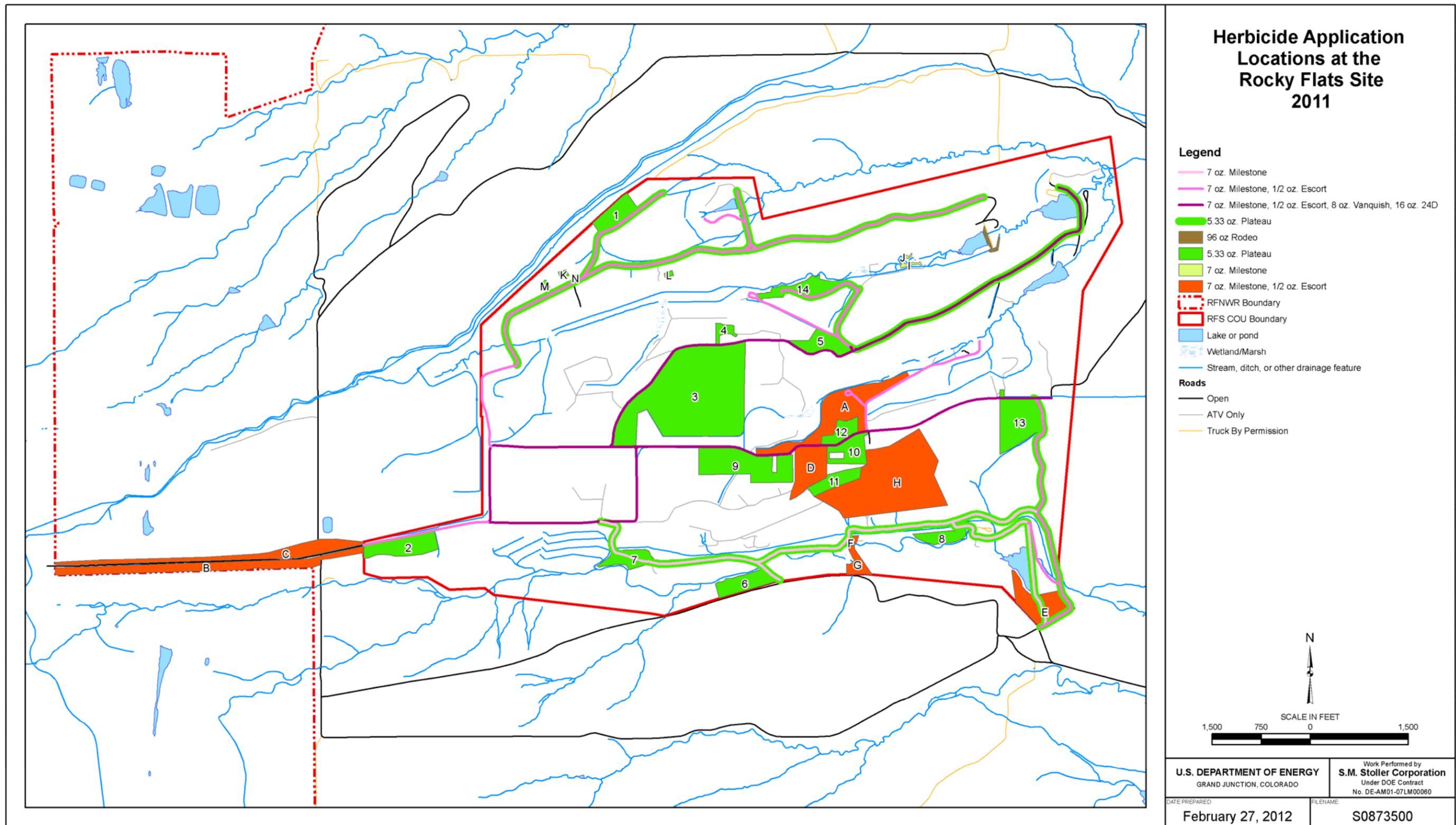
\\Gulfenvprojects\EBMLTS\11110056\121009\S08728\S0872800.mxd brownc 02/24/2012 11:00:17 AM

Figure 3. 2011 Dalmatian Toadflax (*Linaria dalmatICA*) Distribution.



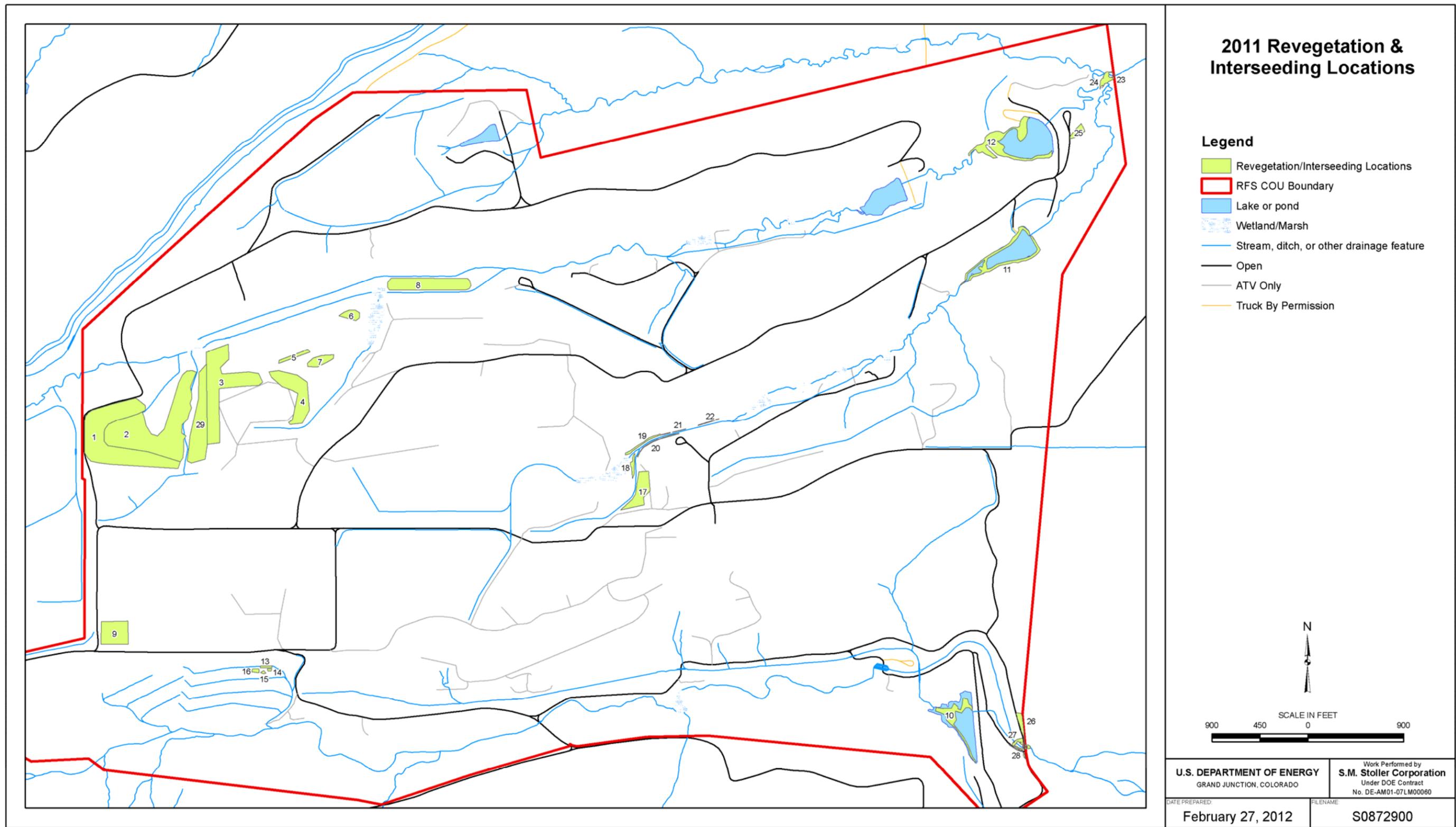
\\Gulfenvprojects\EBMLTS\11110056\121009\S08730\S0873000.mxd brownc 02/27/2012 12:32:57 PM

Figure 4. 2011 Miscellaneous Weed Species Locations.



\\Gulfenv\projects\EBMLT\S\11110056\121009\S08735\S0873500.mxd brownc 02/27/2012 2:22:25 PM

Figure 5. 2011 Herbicide Application Locations at the Rocky Flats Site.



\\Gulfenvprojects\EBMLTS\11110056\121009\S08729\S0872900.mxd brownc 02/27/2012 9:44:43 AM

Figure 6. 2011 Revegetation and Interseeding Locations.

Table 1. COU Noxious Weed Acreage Summary (2007-2011)

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
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

The total acreage of the COU is 1308 acres.

Table 2. FY2011 Herbicide Application Summary

Location	Target Species*	Treatment** (Rate/Acre)	Actual Acreage Treated***	Time of Year Treated
1	CEDI1	7 oz. Milestone, 1/2 oz. Escort	4.4	Spring 2011
2	CEDI1, VETH1	7 oz. Milestone, 1/2 oz. Escort	6.6	Spring 2011
3	CEDI1, VETH1	7 oz. Milestone, 1/2 oz. Escort	53.0	Spring 2011
4	CEDI1	7 oz. Milestone, 1/2 oz. Escort	1.5	Spring 2011
5	CEDI1, DACA1	7 oz. Milestone, 1/2 oz. Escort	4.5	Spring 2011
6	CEDI1, VETH1, LIDA1	7 oz. Milestone, 1/2 oz. Escort	4.8	Spring 2011
7	CEDI1	7 oz. Milestone, 1/2 oz. Escort	3.9	Spring 2011
8	CEDI1, CACH1, VETH1	7 oz. Milestone, 1/2 oz. Escort	2.8	Spring 2011
9	CEDI1	7 oz. Milestone, 1/2 oz. Escort	14.5	Spring 2011
10	CEDI1, DACA1	7 oz. Milestone, 1/2 oz. Escort	4.5	Spring 2011
11	CEDI1	7 oz. Milestone, 1/2 oz. Escort	4.5	Spring 2011
12	CEDI1, VETH1, COAR1	7 oz. Milestone, 1/2 oz. Escort	3.0	Spring 2011
13	CEDI1, VETH1	7 oz. Milestone, 1/2 oz. Escort	10.5	Spring 2011
14	CEDI1, HEMA1, CIAR1, VETH1	7 oz. Milestone, 1/2 oz. Escort	4.7	Spring 2011
Spring Roads	CEDI1, MEOF1, CADR1, CIAR1, VETH1	7 oz. Milestone, 1/2 oz. Escort, 8 oz. Vanquish, 16 oz. 2,4D	50.7	Spring 2011
Riprap Dam Faces	Total Kill	96 oz. Rodeo	0.6	Spring 2011
A	CEDI1, VETH1, CIAR1	7 oz. Milestone, 1/2 oz. Escort	15.0	Fall 2011
B	CEDI1, VETH1	7 oz. Milestone, 1/2 oz. Escort	13.5	Fall 2011
C	CEDI1, VETH1	7 oz. Milestone, 1/2 oz. Escort	11.0	Fall 2011
D	CEDI1, VETH1, CIAR1	7 oz. Milestone, 1/2 oz. Escort	7.0	Fall 2011
E	CEDI1, VETH1	7 oz. Milestone, 1/2 oz. Escort	8.0	Fall 2011
F	CEDI1, VETH1, CIAR1	7 oz. Milestone, 1/2 oz. Escort	0.6	Fall 2011
G	CEDI1, VETH1, CIAR1	7 oz. Milestone, 1/2 oz. Escort	2.5	Fall 2011
H	CEDI1, VETH1, CIAR1	7 oz. Milestone, 1/2 oz. Escort	34.0	Fall 2011
I	CIAR1	7 oz. Milestone	0.4	Fall 2011
J	CIAR1	7 oz. Milestone	0.2	Fall 2011
K	EUUR1	5.33 oz. Plateau	0.1	Fall 2011
L	EUUR1	5.33 oz. Plateau	0.1	Fall 2011
M	EUUR1	5.33 oz. Plateau	0.1	Fall 2011
N	EUUR1	5.33 oz. Plateau	0.1	Fall 2011
O	EUUR1	5.33 oz. Plateau	0.1	Fall 2011
Fall Roads	AECY1	5.33 oz. Plateau	32.6	Fall 2011
Total Area Treated in 2011			299.9	

* Species Codes: CACH1 = Tall Mustard, CADR1 = Whitetop, CEDI1 = Diffuse knapweed, CIAR1 = Canada thistle, COAR1 = Field Bindweed, DACA1 = Wild Carrot, EUUR1 = Leafy Spurge, HEMA1 = Dame's Rocket, LIDA1 = Dalmatian Toadflax, MEOF1 = Yellow Sweetclover, VETH1 = Common Mullein

** 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.

*** Acreages based on billing statements, not original GPS locations provided to subcontractor.

Table 3. 2011 Revegetation Location Summary

Location	Seeding Date	Approximate Acreage	Seed Mix*	Seeding Method
1	9/28/2011	5.5	Mesic seed mix + PAVI1/ Volunteer collected seed	Broadcast seeded
2	9/28/2011	6.4	Mesic seed mix + PAVI1	Broadcast seeded
3	2/22/2011	6.3	Xeric seed mix	Broadcast seeded
4	2/22/2011	1.9	Xeric seed mix	Broadcast seeded
5	2/22/2011	0.2	Xeric seed mix	Broadcast seeded
6	2/22/2011	0.3	Mesic seed mix + PAVI1	Broadcast seeded
7	2/22/2011	0.4	Xeric seed mix	Broadcast seeded
8	5/5/2011	1.9	Mesic seed mix + PAVI1	Broadcast seeded
9	2/22/2011	1.3	Xeric seed mix	Broadcast seeded
10	11/30/2011	0.7	Mesic seed mix + PAVI1	Broadcast seeded
11	11/24/2011	0.9	Mesic seed mix + PAVI1	Broadcast seeded
12	11/25/2011	1.6	Mesic seed mix + PAVI1	Broadcast seeded
13	5/17/2011	0.0	Mesic seed mix	Broadcast seeded
14	5/17/2011	0.0	Mesic seed mix	Broadcast seeded
15	5/17/2011	0.0	Mesic seed mix	Broadcast seeded
16	5/17/2011	0.0	Mesic seed mix	Broadcast seeded
17	11/30/2011	0.9	Mesic seed mix + PAVI1	Broadcast seeded
18	11/29/2011	0.1	Mesic seed mix + PAVI1	Broadcast seeded
19	11/29/2011	0.1	Mesic seed mix + PAVI1	Broadcast seeded
20	11/29/2011	0.1	Mesic seed mix + PAVI1	Broadcast seeded
21	11/29/2011	0.0	Mesic seed mix + PAVI1	Broadcast seeded
22	11/29/2011	0.0	Mesic seed mix + PAVI1	Broadcast seeded
23	9/23/2011	0.0	Mesic seed mix + PAVI1/ Wetland mix	Broadcast seeded
24	9/23/2011	0.2	Mesic seed mix + PAVI1/ Wetland mix	Broadcast seeded
25	9/23/2011	0.2	Mesic seed mix + PAVI1	Broadcast seeded
26	9/23/2011	0.2	Mesic seed mix + PAVI1/ Wetland mix	Broadcast seeded
27	9/23/2011	0.1	Mesic seed mix + PAVI1/ Wetland mix	Broadcast seeded
28	9/23/2011	0.0	Mesic seed mix + PAVI1	Broadcast seeded
29	9/28/2011	6.3	Mesic seed mix + PAVI1	Broadcast seeded
	Total Acres	36.0		

*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)