Noxious Weed Survey of Peterson Air Force Base - 2014

NATURAL HERITAGE PROGRAM
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Fort Collins, Colorado 80523

December, 2014

CNHP's mission is to preserve the natural diversity of life by contributing the essential scientific foundation that leads to lasting conservation of Colorado's biological wealth.

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EXECUTIVE SUMMARY

In the summer of 2014, the Colorado Natural Heritage Program (CNHP) mapped noxious weeds at Peterson Air Force Base (PAFB) east of Colorado Springs, Colorado. This was the second sample year, with 2003 the first (Anderson et al. 2003). The project was undertaken to provide the PAFB Natural Resources Manager with information contributing to the development of a formal Integrated Weed Management Plan for all PAFB property in order to comply with the PAFB Integrated Natural Resources Management Plan, federal noxious weed laws, and Executive Order 13112.

Overall summary: Thirteen species of weeds were assessed on PAFB, one on the A list, eight on the B list, three on the C list and one on the watch list. Mapping was conducted during July 30 and September 24, 2014. ArcPad software (ESRI 2011), installed on a Yuma Trimble tablet with a built-in GPS receiver, was used to map weed occurrences and record attribute data while traversing PAFB. All 2003 weed locations were revisited and new locations were mapped. In 2014, three of the weeds mapped in 2003 had been eradicated and two new species were added. Thus, in 2014, a total of 10 extant species were mapped. These extant species occupied a total of 7.8 acres, with nearly 300 extant mapped locations (Figure 1). The occupied acres declined by 27% between 2003 and 2014 (10.7 and 7.8 acres, respectively); however, the total number of mapped locations remained nearly stable between 2003 and 2014 (333 and 297, respectively).

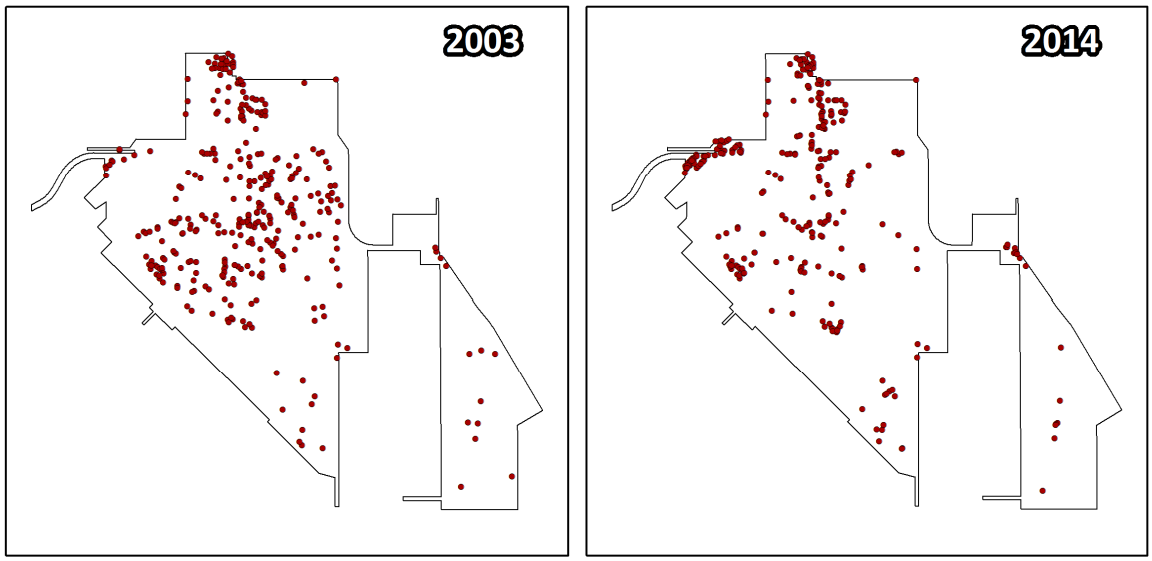

Figure 1. Distribution of known infestations at Peterson Air Force Base, 2003 versus 2014. There were 333 mapped locations in 2003 and 297 in 2014.

The following summarizes the changes in weed populations between 2003 and 2014:

- *Centaurea diffusa (*diffuse knapweed): **New in 2014** - two locations occupying less than 16 m^2
- *Cirsium arvense* (Canada thistle): **Increased** - 50% increase in area, from 1.6 to 2.4 acres
- *Cirsium vulgare* (bull thistle): **Eradicated**
- *Convolvulus arvensis* (field bindweed): Stable - no change
- *Elaeagnus angustifolia* (Russian olive): Decreased - 55% reduction in number of trees
- *Gypsophila paniculata* (baby's breath): **Eradicated**
- *Hypericum perforatum* (common St. Johnswort): Decreased - significant downward trend; one location remains
- *Linaria dalmatica* ssp. *dalmatica* (Dalmatian toadflax): **New in 2014** - one location in golf course
- *Linaria vulgaris* (yellow toadflax): **Increased** - significant increase but it still may be possible to control
- *Lythrum salicaria* (purple loosestrife): **Eradicated**
- *Saponaria officinalis* (bouncingbet): **Increased** - original site eradicated; however, new site mapped
- *Tamarix ramosissima* (tamarisk): Stable - one known individual
- *Tribulus terrestris* (puncturevine): Decreased - still problematic; however, may be possible to control

While noxious weeds remain widespread at PAFB, only a few species are dominant while the other species are found in just a few locations. In 2014, field bindweed, Canada thistle, and Russian olive comprised 97% of the weeded area, while the other 7 extant species occupied the remaining 3%. We recommend that the 7 species that occupy 3% of the base become a priority for future weed management as all of them are still possible to eradicate. In addition, we recommend continued weed management of the three dominant species, noting that eradication of these species is near impossible. Periodic mapping, e.g., once every 5 years, to assess management effectiveness as well as surveying for new weeds is highly recommended.

ACKNOWLEDGEMENTS

The help and generosity of many experts is gratefully acknowledged. This project would not have been possible without the support of our partners at Peterson Air Force Base and the U.S. Fish and Wildlife Service. Max Canestorp, our primary contact at PAFB, played a critical role in the success of this project. His assistance with project logistics and his time spent in the field orienting CNHP personnel was extremely valuable. Sandy Ingrassia helped our field technician acquire her badge and begin field work. Pam Sponholtz kept us informed on the administrative side of things, which helped us plan out the field season.

Katie Miller, CNHP's field technician, spent three weeks traversing PAFB in order to complete the mapping portion of this project. Katie proved herself to be a tireless field worker with an aptitude for GIS. Her enthusiasm and dedication to the project were admirable, and her excellent work serves as the foundation for this report. The work of Ron Abbott and David G. Anderson in 2003 was integral to guiding the 2014 mapping efforts and their experience was valuable for refining the mapping methodology employed in this project. David G. Anderson also provided guidance and insight from his past weed mapping and monitoring projects at the nearby U.S. Air Force Academy which proved useful for this report.

Michael Menefee provided editorial and technical assistance with report production. Mary Olivas, Carmen Morales, and others at CSU assisted with contract administration.

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OVERVIEW OF THE STUDY AREA

This overview is modified from Anderson et al. (2003).

Peterson Air Force Base (PAFB) is located in El Paso County, Colorado approximately seven miles east of downtown Colorado Springs (Map 1), and lies near the ecotone of the Southern Rocky Mountain and Central Shortgrass Prairie ecoregions. The main western portion of the base is a highly developed urban area, while Peterson East is almost entirely open native grassland. Elevation ranges from 5,900 to 6,200 feet.

Climate

The climate of Colorado Springs vicinity, including PAFB, is temperate. The area experiences typical high plains weather, which can be significantly modified by the mountains located approximately 15 miles to the west. Precipitation averages 16 inches/year with diverse annual variation that ranges from extreme droughts to extremely wet years. Year-round temperatures are moderate, with cool winters where most days reach above freezing but nights are below freezing. Summers are warm and may reach 100 deg F. High winds are common, especially in the spring time.

Geology

Strata underlying PAFB include the Pierre Shale, Fox Hills Sandstone, Laramie Formation and Dawson Arkose. The Dawson Arkose and Laramie Formation primarily contribute the gravelly soils of Peterson East and the moderately sloping land to the south (USDA, SCS 1975; PAFB 1996)

Soils

Two soils are present at Peterson East: Blakeland loamy sand and Blendon sandy loam (Figure 2). These are upland soil types composed of alluvial sand and gravels derived from recently deposited arkosic sandstone. Both soils have low water-retaining capacity and are well suited for deep-rooting grasses such as western wheatgrass (*Pascopyrum smithii),* sideoats grama (*Bouteloua curtipendula*), and needle-and-thread ((*Hesperostipa comata* (USDA, SCS 1975)). Sand Creek is dominated by two sandy soils: Ellicott loamy coarse sand and Truckton sandy loam.

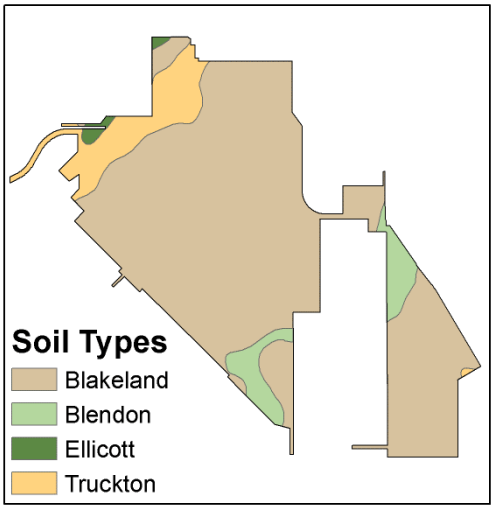
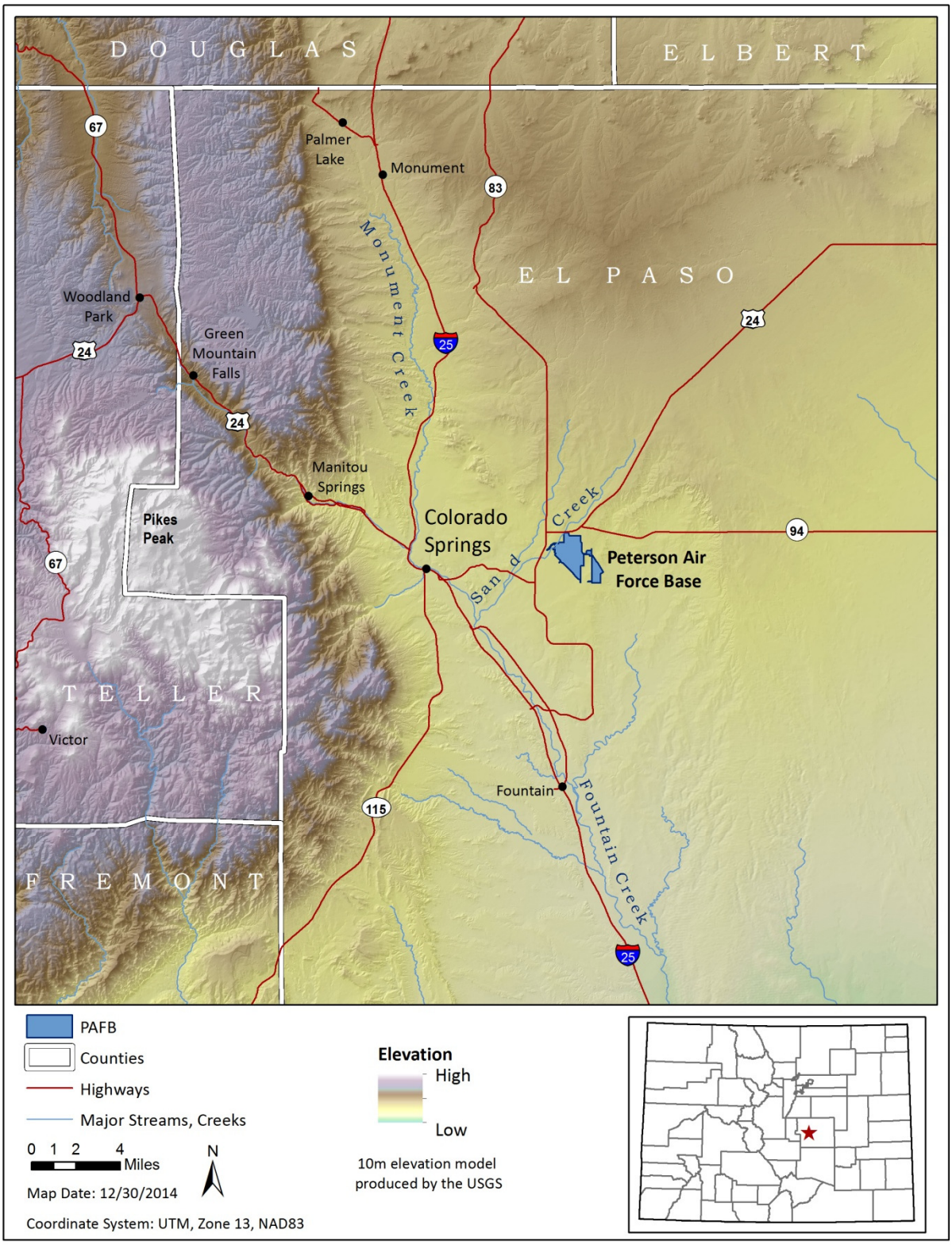


Figure 2. Soils at Peterson Air Force Base.



Map 1. Vicinity map for Peterson Air Force Base.

Vegetation and Flora

Most of PAFB consists of a mosaic of highly managed traditional turf shrub and tree landscaping, interspersed with lower-maintenance areas featuring swathes of rock mulch or xeric grasses and native forbs. Broad stands of irrigated bluegrass lawn are maintained along principal streets and boulevards, and around living quarters. Ponderosa pine (*Pinus ponderosa*), Austrian pine (*Pinus nigra*), green ash (*Fraxinus pennsylvanica*), Russian olive (*Elaeagnus angustifolia*), Siberian elm (*Ulmus pumila*) and other common horticultural species and varieties are planted to create a park-like setting; numerous species and varieties of shrubs are utilized for building foundation treatments.

An example of landscaping (*Photo by Ron Abbott*)

The natural vegetation of PAFB is discernible only at the comparatively undeveloped Peterson East, and comprises mid-grass and shortgrass prairie. Mid-grass prairie remnants are difficult to distinguish, due to the mowing regime practiced to one extent or another over the entire base. Needle-and-thread appears to be the dominant grass at Peterson East and the rough at the golf course. Buffalo grass (*Buchloe dactyloides*), and to a lesser extent blue grama (*Chondrosum gracile*), are present at Peterson East and on the main part of the base, the former especially planted in areas for low maintenance. Sixweeks fescue (*Vulpia octoflora),* western wheatgrass, and Indian ricegrass (*Achnatherum hymenoides)* can also be found locally.

Mowing regime (*Photo by Ron Abbott*)

METHODS

We selected the weed species that were mapped in 2003 (Anderson et al. 2003) as the basic weed list; however, once we were in the field we identified two additional List B noxious weeds that were not mapped in 2003 (Table 1 and Table 2).

Table 1. Colorado Weed Ranks. Management actions are required for A-C species on these lists, as explained below (Colorado Department of Agriculture 2014a).

List A	Species in Colorado that are designated by the Commissioner for eradication.
List B	Species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species.
List C	Species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species.
Watch List	Species that have been determined to pose a potential threat to the agricultural productivity and environmental values of the lands of the state. The Watch List is intended to serve advisory and educational purposes only. Its purpose is to encourage the identification and reporting of these species to the Commissioner in order to facilitate the collection of information to assist the Commissioner in determining which species should be designated as noxious weeds.

Table 2. Species mapped in 2003 and 2014, with their associated State Weed Rank.

USDA Code	Scientific Name	Common Name	CO Rank
CEDI3*	*Centaurea diffusa*	diffuse knapweed	B List
CIAR4	*Cirsium arvense*	Canada thistle	B list
CIVU	*Cirsium vulgare*	bull thistle	B list
COAR4	*Convolvulus arvensis*	field bindweed	C List
ELAN	*Elaeagnus angustifolia*	Russian olive	B List
GYPA	*Gypsophila paniculata*	baby's breath	Watch List
HYPE	*Hypericum perforatum*	common St. Johnswort	C List
LIDAD*	*Linaria dalmatica* ssp. *dalmatica*	Dalmatian toadflax	B List
LIVU2	*Linaria vulgaris*	yellow toadflax	B List
LYSA2	*Lythrum salicaria*	purple loosestrife	A list
SAOF4	*Saponaria officinalis*	bouncingbet	B list
TARA	*Tamarix ramosissima*	tamarisk	B List
TRTE	*Tribulus terrestris*	puncturevine	C List

*New in 2014

Data collected in the field followed the same methods used by the Colorado Natural Heritage Program (CNHP) to map weeds at the nearby U.S. Air Force Academy in 2002, 2007 and 2012; at Cheyenne Mountain Air Force Station in 2014; and at PAFB in 2003. These methods are repeatable to facilitate comparisons of weed populations throughout the years. The data meet the needs of the Colorado Department of Agriculture's statewide weed mapping effort (Colorado Department of Agriculture 2014a) and are attributed similar to the Montana Noxious Weed Survey Protocol (Cooksey and Sheley 1998). We also reviewed the North American Invasive Species Management Association mapping standards (NAISMA 2014). We conducted several days of onsite and offsite training with the field technician to ensure that field interpretation and mapping were consistent with methods used previously by Anderson et al. 2003. Additionally, the field technician participated in an online review of mobile GIS tools, familiarized herself with all List A and List B noxious weed species on Colorado's noxious weed list, and reviewed recent publications on weeds in the western United States.

All weed infestations were mapped in the field using ArcPad version 10.0.3 (ESRI 1995-2011), a portable version of GIS software that allows the user to create and edit spatial data remotely using a tablet computer. ArcPad was installed on a Trimble Yuma rugged tablet with a Windows 7 operating system and a built-in GPS receiver module. The Yuma tablet has advanced display capabilities, a rugged exterior to withstand adverse weather conditions, a stable operating system and hard drive, and a relatively large screen to help with navigation and data collection. The unit comes with an integrated SBAS (Satellite-Based Augmentation System) capable SiRFStarIII GPS (http://files-trl.trimble.com/docushare/dsweb/Get/Document-452035/86935-11_MCSTrimble_Yuma_DS_0112_LR.pdf). The GPS was generally found to be accurate to within 2-5 meters and the configuration of a built-in GPS receiver module prevented reoccurring loose connections. To ensure data accuracy during the collection process, SBAS was activated and warning systems were enabled in ArcPad to notify the user when the PDOP (Positional Dilution of Precision) exceeded 6 and the EPE (Estimated Probable Error) exceeded 8. Twenty points were averaged at each location, and 10 vertices were averaged for lines and polygons.

Weeds were mapped as points, lines or polygons. Linear features were mapped as lines and assigned a buffer width to estimate area. Irregularly shaped features greater than approximately 900 square meters (30m x 30m) were mapped as polygons. All other features were mapped as points and assigned a radius. Because weed distribution may change from year to year, and the GPS has inherent inaccuracies, infestations within 5 meters of each other were mapped as one feature. Dead weeds were marked as extant. If previously mapped infestations were not located, they were marked as eradicated, as opposed to deleted, in order to keep track of the soil seed bank and ensure future visits to historically infested areas. Weeds tend to fluctuate based on annual weather patterns and have been found to be absent one year, only to crop up in the same location or nearby during the next growing season.

Attributes were collected using customized field forms designed to minimize user error by maximizing look-up tables and field auto-population techniques. One free text field was maintained to document any observations deemed important, such as activities that could affect mapping results (e.g., recent mulching, mowing or spraying). The field technician had the option to

document number of individuals or density as number of individuals per square meter. If density was noted, the number of individuals was calculated in the office based on the assigned density and the size of the infestation. All of these attributes are included in the geodatabase accompanying this report.

Weed data were stored in a master file geodatabase in ArcGIS v10 (ESRI 1999-2010). The 2003 weed map, a compilation of weeds from the 2003 CNHP mapping project at PAFB, was used as a starting point for the 2014 mapping effort. All previously mapped infestations were revisited, and new weed occurrences were documented. At the end of each day, data were copied to external hard drives and uploaded onto CSU servers to prevent data loss. For detailed mapping instructions, refer to Appendix A.

Collection of weed data at PAFB was subject to limitations imposed by human resources, time, and safety. Weather patterns and environmental phenomena also influence results. Data were collected almost entirely by one person covering 1,200 acres over a 3-week period ranging from late July to late September. We had proposed to start field work in June, but contract agreements shifted the onset of field work to late July. On a daily basis, an approximate 80-acre area bounded by identifiable man-made features such as buildings, roads, and streets, was arbitrarily defined. The defined area was then surveyed by intensive search, or by grid transects with overlapping lines-of-sight. The goal each day was to make observations over as much of each 80 acre area as possible. Although detailed mapping in some areas was limited due to safety and security, such as the airport runway, the majority of the base was thoroughly surveyed. Additionally, some diffuse knapweed near Highway 24 and the Stewart Avenue entrance were mapped.

RESULTS

Seasonal precipitation patterns are often tightly correlated with weed abundance and are an important attribute of each mapping year. The 2003 and 2014 annual precipitation was slightly below average; however, the 2003 spring precipitation was above average and the summer precipitation was below average. In 2014, spring precipitation was below average and summer precipitation was above average (Figure 3).

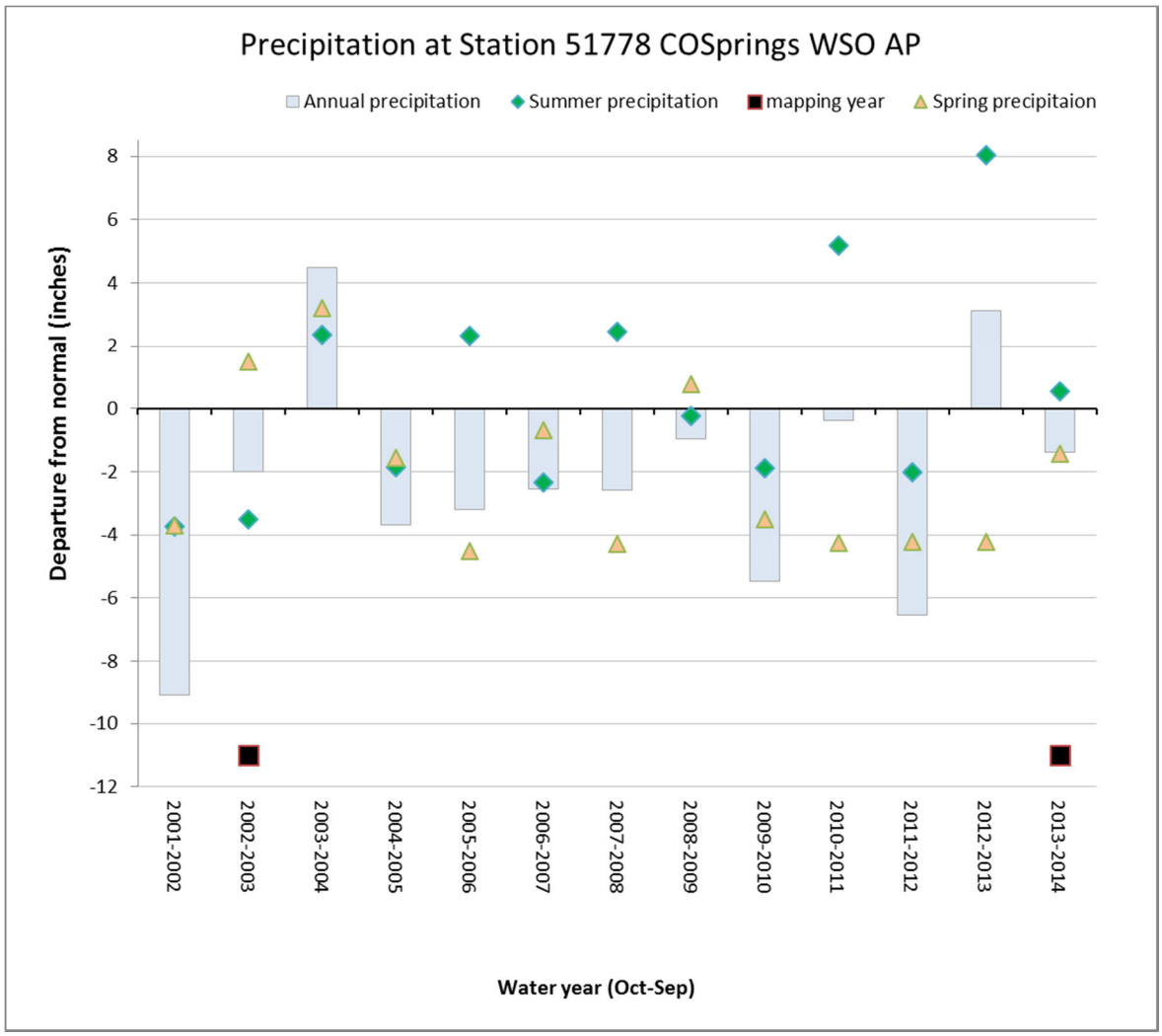


Figure 3. Annual (water year, Oct-Sep) and seasonal precipitation, 2001-2014, with departure from normal. Mapping years were 2003 and 2014.

In 2003, we mapped 11 species. Three species, bull thistle, baby's breath, and purple loosestrife, were mapped in 2003 and successfully eradicated by 2014. Diffuse knapweed and Dalmatian toadflax were added to the 2014 list (Table 2). All 2014 infestations are displayed in Map 2.

Occupied acres: Total area occupied by weeds declined in 2014, from 10.7 acres in 2003 to 7.8 acres in 2014. Canada thistle, field bindweed, and Russian olive were the most dominant weeds in both years and in 2014 they occupied approximately 7.5 acres or 97% of the occupied acres (Table 3).

Estimated number of shoots: The number of shoots was estimated at 33,489 in 2003 and more than tripled in 2014 to 104,238. Canada thistle, field bindweed, and yellow toadflax had the highest number of estimated shoots (Table 3). Yellow toadflax and Canada thistle had the largest change between 2003 and 2014 with over a 10-fold increase (Table 4).

Mapped extant features: The total number of extant features (mapped locations) remained fairly constant with 333 in 2013 and 297 in 2014 (Table 3 and Figure 4). While we documented 207 eradicated locations in 2014, the overall number of locations remained nearly constant, demonstrating the ability for weeds to shift locations.

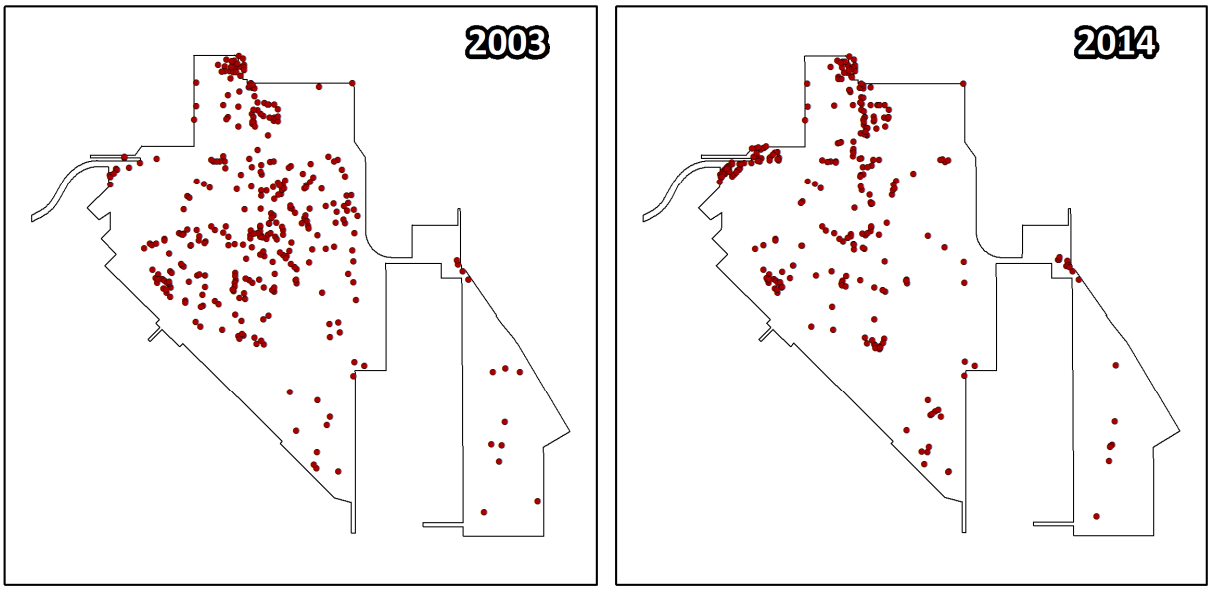


Figure 4. Distribution of known infestations at Peterson Air Force Base, 2003 versus 2014. There were 333 mapped locations in 2003 and 297 in 2014.

Since 2003, there were new developments built in the northeast corner on an area that was comprised of native grassland. While few weeds were mapped in this area in 2003 or 2014, we believe that weeds will invade over time (Figure 5).

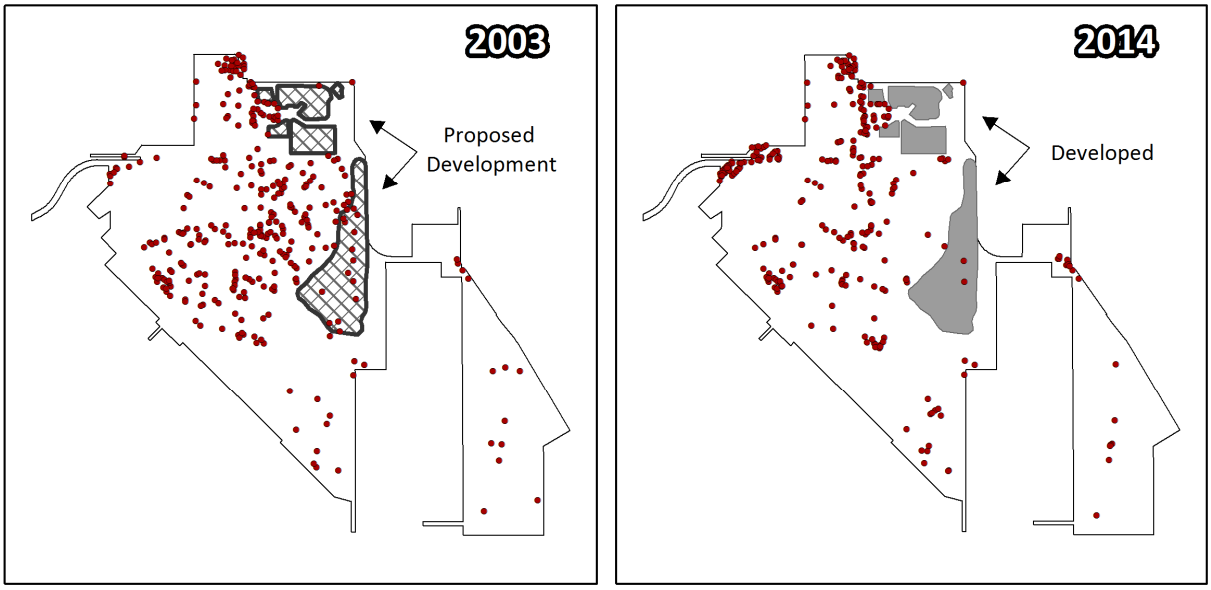
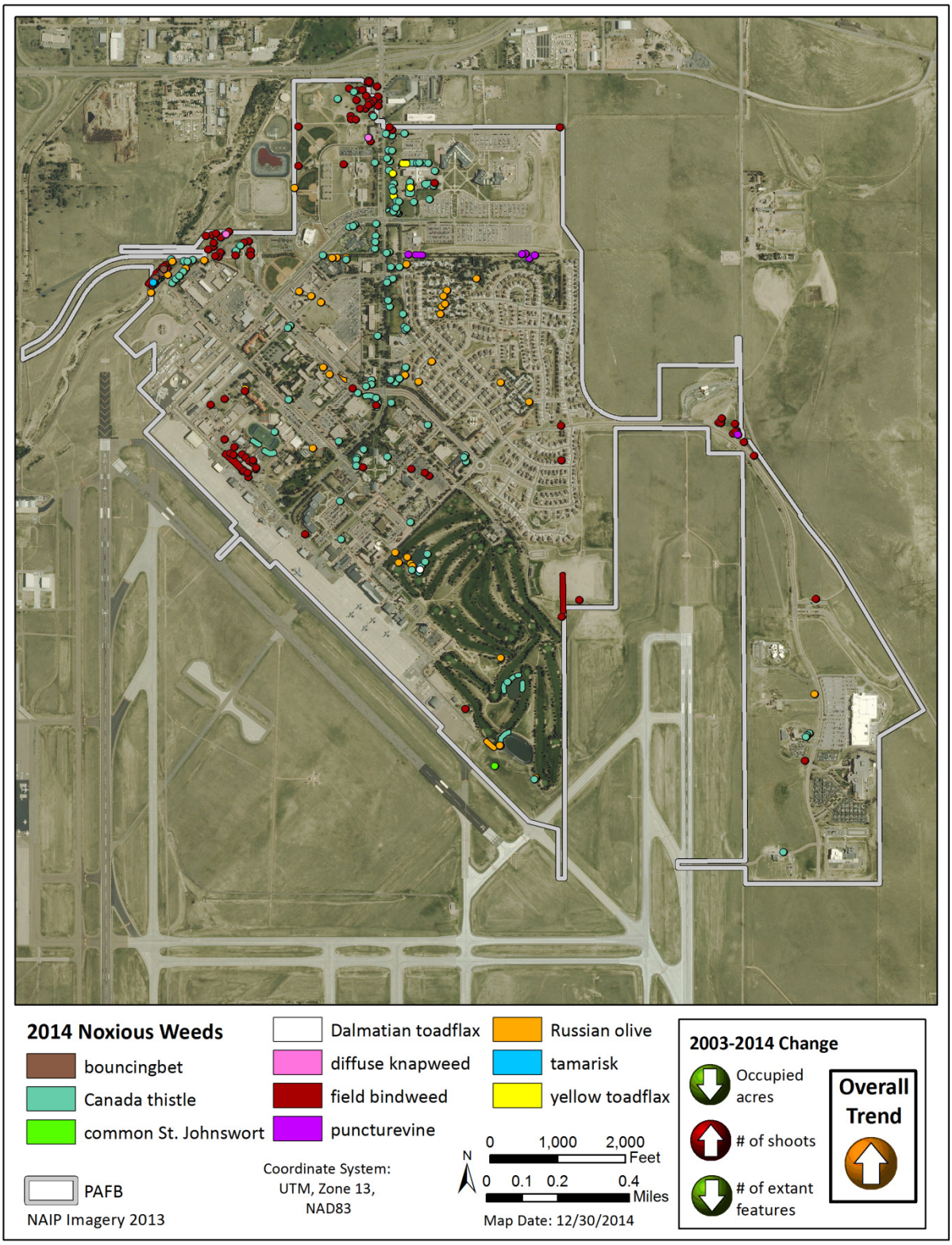


Figure 5. Major developments at Peterson Air Force Base after the 2003 Weed Mapping Project.



Map 2. Distribution of targeted noxious weed species at Peterson Air Force Base in 2014.

Table 3. Summary data for all mapped weed infestations at Peterson Air Force Base.

		2003					2014				
Scientific Name	**Common Name**	**Occupied Acres**	**Occupied Square Meters**	**Estimated # of Shoots**	**# of Extant Features**	**# of Eradicated Features**	**Occupied Acres**	**Occupied Square Meters**	**Estimated # of Shoots**	**# of Extant Features**	**# of Eradicated Features**
Centaurea diffusa *	diffuse knapweed	NA	NA	NA	NA	NA	<0.01	16	4	2	0
Cirsium arvense	Canada thistle	1.57	6,368	4,452	112	0	2.42	9,777	67,973	132	84
Cirsium vulgare +	bull thistle	0.02	101	105	2	0	0.00	0	0	0	2
Convolvulus arvensis	field bindweed	2.84	11,485	18,170	109	0	2.78	11,268	25,043	104	49
Elaeagnus angustifolia	Russian olive	5.75	23,266	120	89	0	2.29	9,270	69	40	54
Gypsophila paniculata +	baby's breath	0.05	201	6	4	0	0.00	0	0	0	4
Hypericum perforatum	common St. Johnswort	0.15	622	7,545	2	0	0.01	28	3	1	1
Linaria dalmatica ssp. *dalmatica* *	Dalmatian toadflax	NA	NA	NA	NA	NA	<0.01	3	50	1	0
Linaria vulgaris	yellow toadflax	0.02	79	393	1	0	0.09	366	9,139	4	1
Lythrum salicaria +	purple loosestrife	0.01	50	1	1	0	0.00	0	0	0	1
Saponaria officinalis	bouncingbet	0.01	50	201	1	0	0.01	31	10	4	1
Tamarix ramosissima	tamarisk	0.01	50	2	1	0	<0.01	13	1	1	1
Tribulus terrestris	puncturevine	0.24	968	2,494	11	0	0.15	603	1,946	8	9
		10.68	43,240	33,489	333	0	7.75	31,375	104,238	297	207

*Not present in 2003 +Eradicated in 2014

Table 4. Changes in weed distribution and abundance at Peterson Air Force Base 2003, 2014. Positive numbers indicate an increase and negative numbers indicate a decrease. Percent change of Occupied Acres may vary due to rounding. Color codes are defined as: green, < -5%; yellow, -5% to 10%; orange, 10% to 100%; red, >100%.

		Occupied Acres			Estimated # of Shoots			# of Extant Features			
Scientific Name	**Common Name**	2003	2014	% change 2003 - 2014	2003	2014	% change 2003 - 2014	2003	2014	% change 2003 - 2014	**Overall Trend**
Centaurea diffusa	diffuse knapweed	NA	<0.01	NA	NA	4	NA	NA	2	NA	Increase (New Species)
Cirsium arvense	Canada thistle	1.57	2.42	54%	4,452	67,973	1,427%	112	132	18%	Increase
Cirsium vulgare	bull thistle	0.02	0.00	-100%	105	0	-100%	2	0	-100%	Eradicated
Convolvulus arvensis	field bindweed	2.84	2.78	-2%	18,170	25,043	38%	109	104	-5%	Stable
Elaeagnus angustifolia	Russian olive	5.75	2.29	-60%	120	69	-43%	89	40	-55%	Decrease
Gypsophila paniculata	baby's breath	0.05	0.00	-100%	6	0	-100%	4	0	-100%	Eradicated
Hypericum perforatum	common St. Johnswort	0.15	0.01	-95%	7,545	3	-100%	2	1	-50%	Decrease
Linaria dalmatica ssp. *dalmatica*	Dalmatian toadflax	NA	<0.01	NA	NA	50	NA	NA	1	NA	Increase (New Species)
Linaria vulgaris	yellow toadflax	0.02	0.09	365%	393	9,139	2,225%	1	4	300%	Increase
Lythrum salicaria	purple loosestrife	0.01	0.00	-100%	1	0	-100%	1	0	-100%	Eradicated
Saponaria officinalis	bouncingbet	0.01	0.01	-37%	201	10	-95%	1	4	300%	Moderate Increase
Tamarix ramosissima	tamarisk	0.01	<0.01	-75%	2	1	-50%	1	1	0%	Stable
Tribulus terrestris	puncturevine	0.24	0.15	-38%	2,494	1,946	-22%	11	8	-27%	Decrease

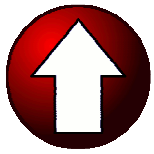
NOXIOUS WEED STATUS BY SPECIES

Most of the information on growth characteristics, control, and economic, ecological and other deleterious effects of noxious weeds within the following status descriptions is found in "Creating an Integrated Weed Management Plan" (Colorado Department of Agriculture and Colorado Natural Areas Program (CDA/CNAP) 2000).

With the exception of a few trouble spots, noxious weeds at PAFB seem well controlled by the management regime currently being practiced on base. Unless a particular management strategy is stated, it should be assumed that the recommendation by CNHP for noxious weed control should be the continuation of current management practice.

Species summaries are below:

Centaurea diffusa (diffuse knapweed)



Increasing and localized. A rapid response is likely to control this species.

List B Species

Photo by Michelle Washebek

Diffuse knapweed was not present in 2003; however, by 2014 there were two known locations, one near the north entrance station and the other one near the east entrance station (Map 3), occupying approximately 16 m^2 with a total of four shoots (Figure 6). We noted additional plants just north and outside of the east entrance station (not on map).

We rate this species as a high management concern due to 1) the high potential for spreading, 2) the ability to degrade rangeland and soils, and 3) the low number of locations and plants on the base. An early detection-rapid response is an action that is likely to succeed. At the nearby Air Force Academy this species spread rapidly once established and containment is unlikely (Lavender-Greenwell and Rondeau 2013).

Diffuse knapweed is a short-lived, non-creeping plant that spreads solely from seed. While it dies back during the winter months it re-sprouts from a taproot the following spring. Mature plants with seed heads break off at the soil surface and become tumbleweeds over winter, dispersing their

seed in the process. Mature plants can generate between hundreds to thousands of seeds per plant and the seeds can remain viable for more than 7 years. Knapweeds can easily spread from off-road vehicles carrying the seeds in the undercarriage. Pulling or herbicide treatment is recommended for small infestations.

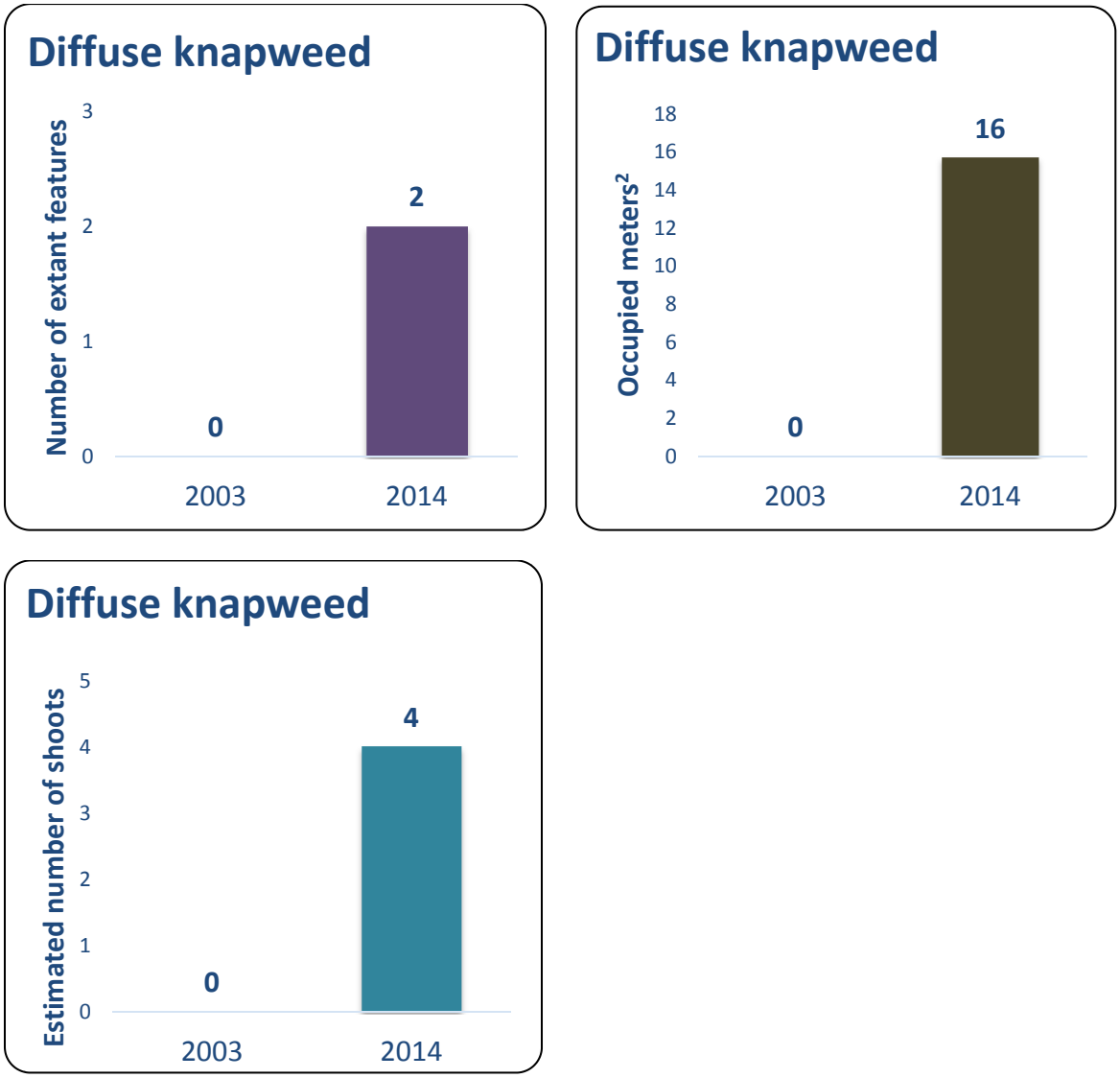
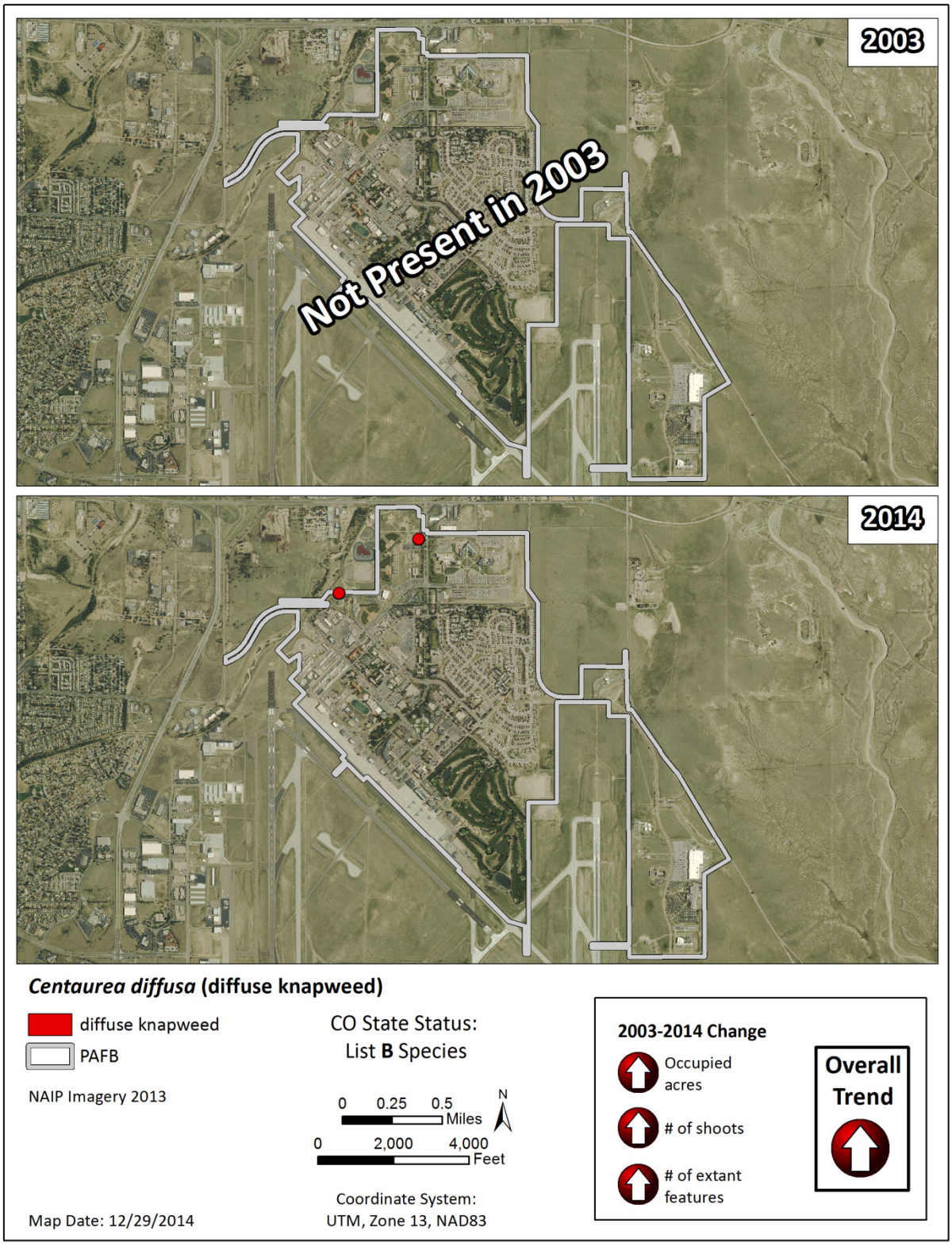
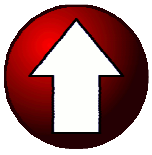


Figure 6. Diffuse knapweed trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 3. Distribution of diffuse knapweed at Peterson Air Force Base in 2003 and 2014.

Cirsium arvense (Canada thistle)



Increasing and spreading into new areas. Mostly found in wetter areas.

List B Species

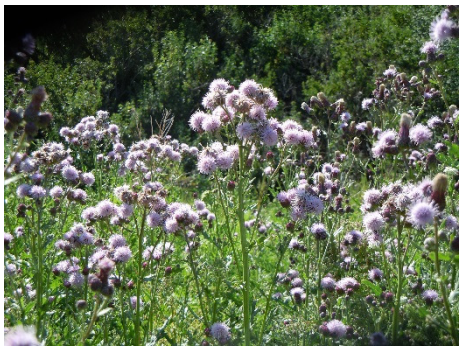


Photo by Matt Lavin

In 2014, Canada thistle was the second most abundant weed on PAFB (field bindweed was the most abundant) and occupied nearly 2.5 acres. Two large infestations on the north part of the base account for over 40% of the total shoots (Figure 7). The area increased by 50% from 1.6 acres to 2.4 acres between 2003 and 2014 (Figure 8). The estimated number of shoots increased even more, from approximately 4,000 to nearly 70,000 shoots. The number of new mapped locations in 2014 outpaced the number of eradicated locations (84), with total extant mapped locations rising from 112 to 132 features (Figure 8 and Map 4).

Eradication is highly unlikely and therefore this species is considered a moderate priority weed species due to its widespread distribution and density. Management of this species in high priority areas may still warrant action and reduce the spread.

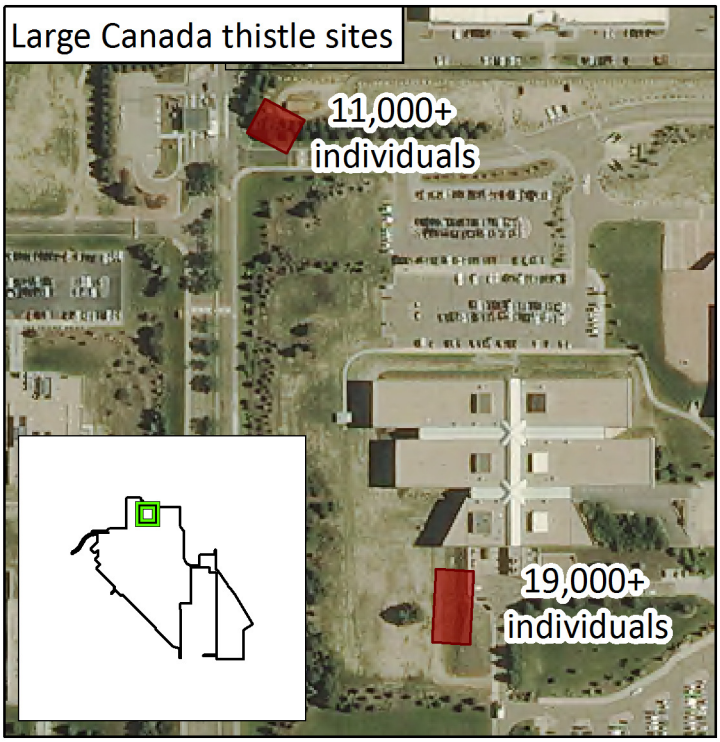
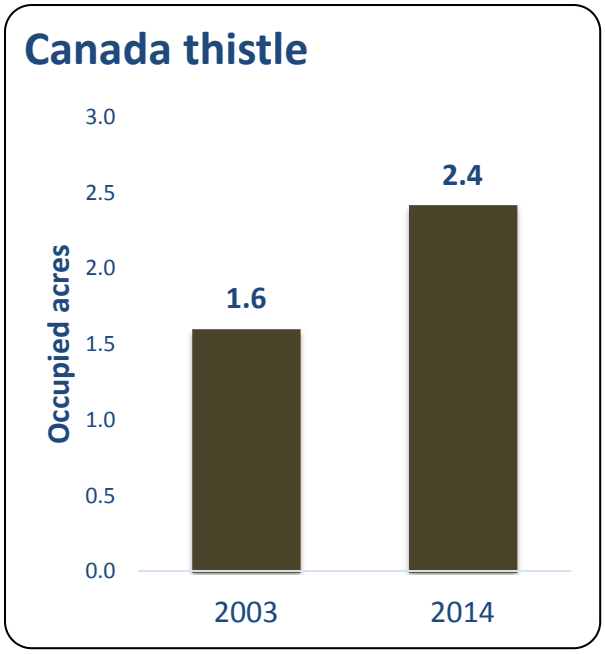
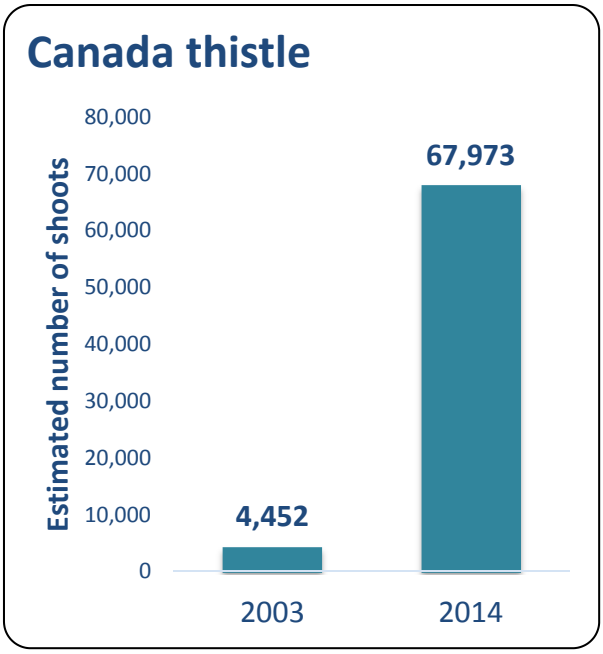


Figure 7. Large Canada thistle sites





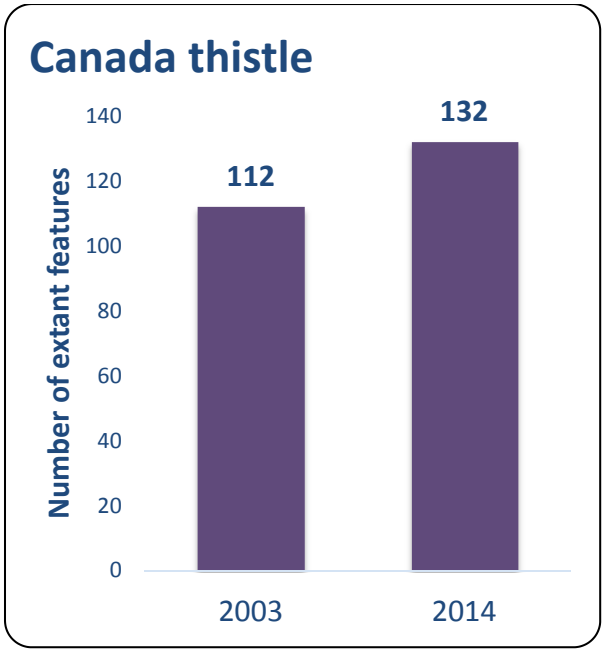
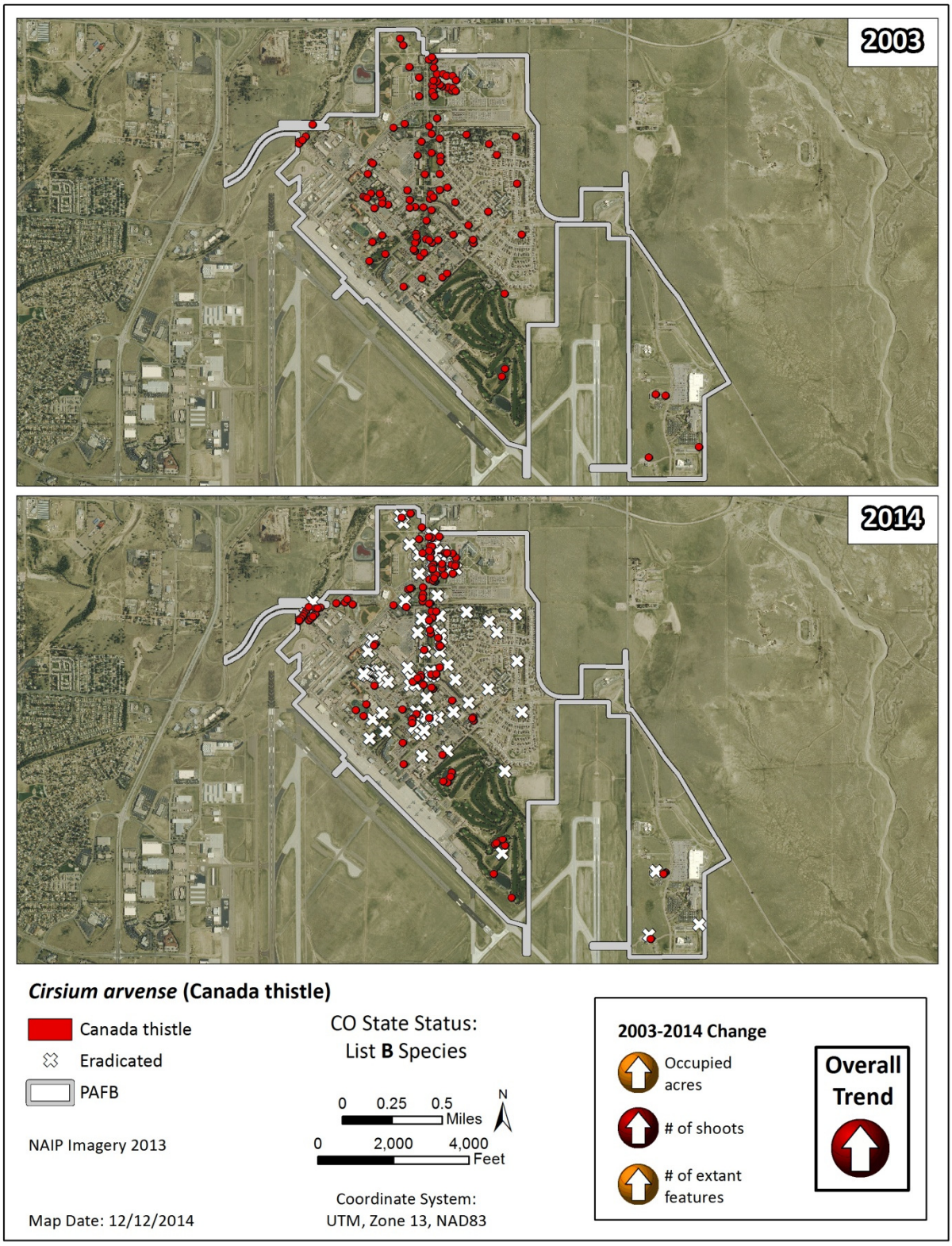
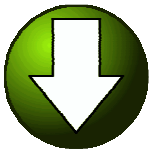


Figure 8. Canada thistle trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 4. Distribution of Canada thistle at Peterson Air Force Base in 2003 and 2014.

Cirsium vulgare (bull thistle)



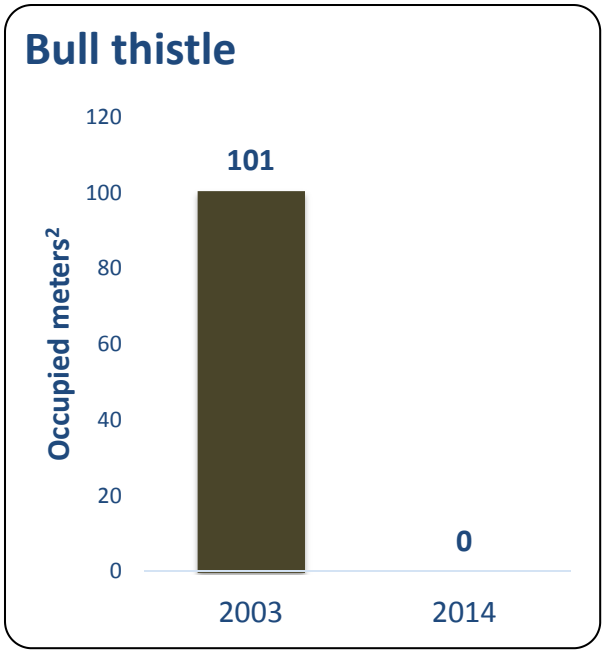
Success! All occurrences were eradicated.

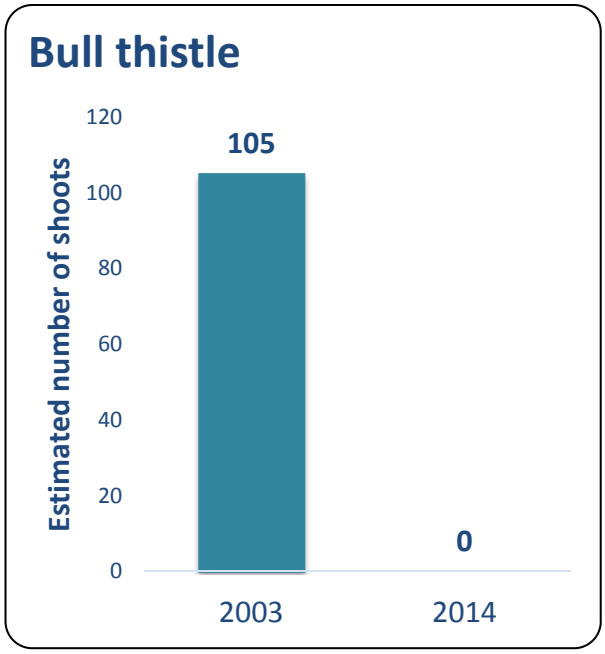
List B Species

Photo by Michelle Washebek

Bull thistle appears to be successfully eradicated from PAFB (Map 5). In 2003, two sites occupied a total area of 100 m^2 with an estimated 105 stems. By 2014 these two sites had no plants, nor were any new occurrences detected (Figure 9).

Bull thistle is a tall biennial or short-lived perennial. A long taproot may develop during the rosette stage, making this species hard to hand pull. In general, the seeds are short-lived and last up to four years in the soil seed bank. If any new sites are located on the Base, we suggest a rapid response to reduce spread.





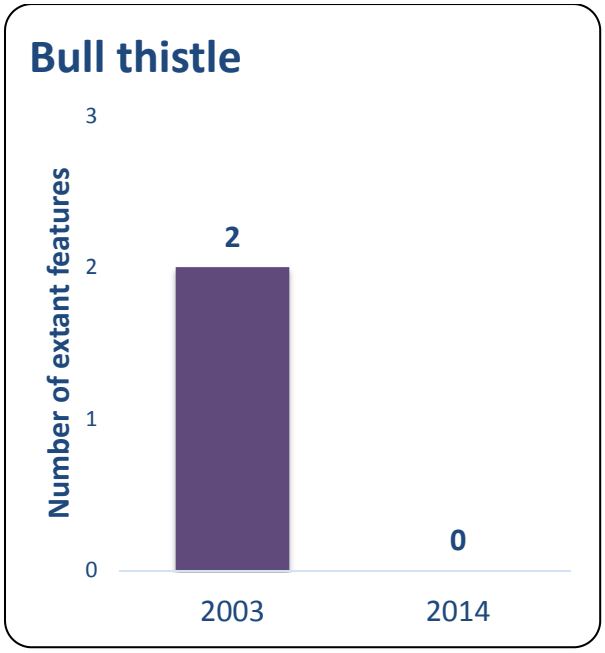
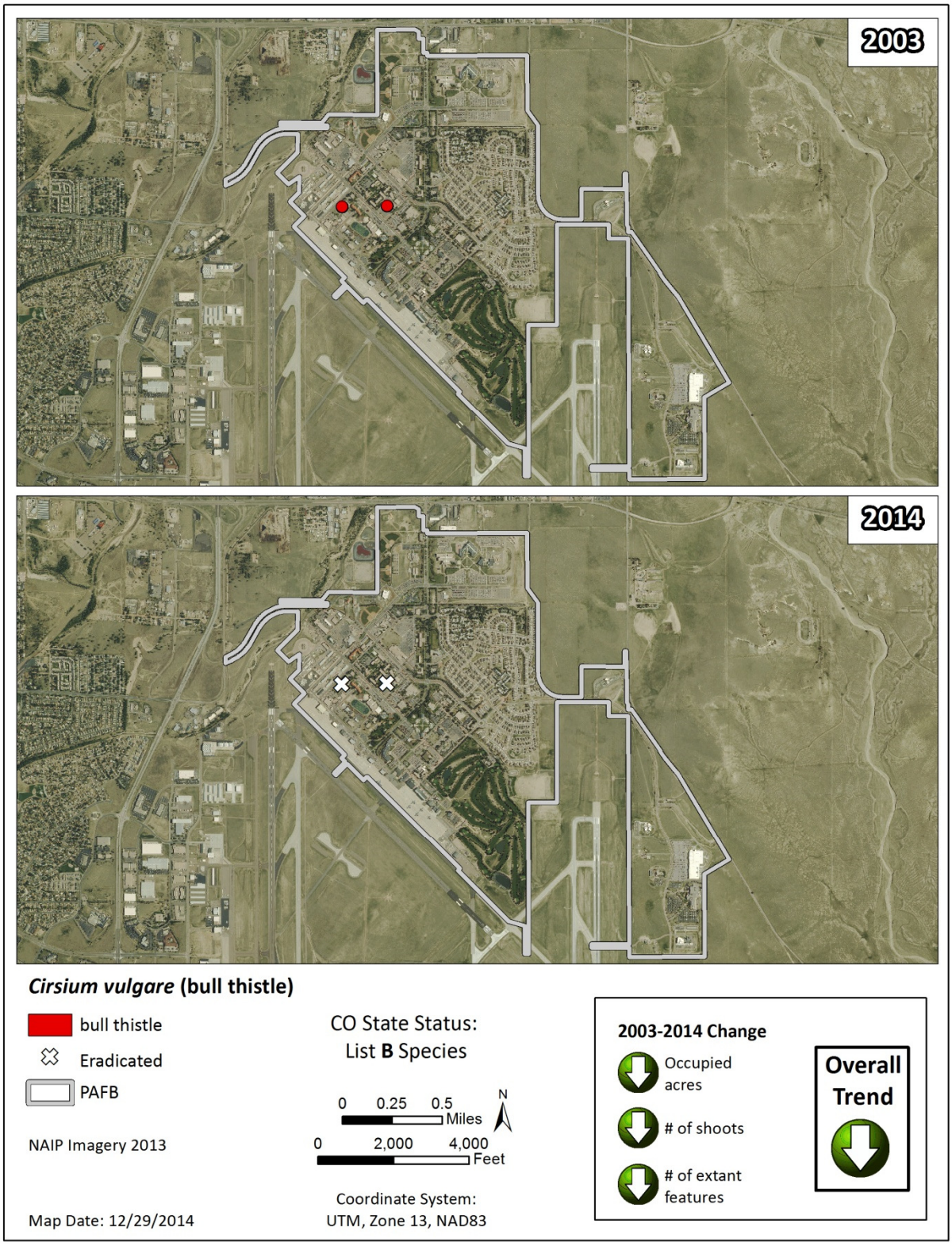


Figure 9. Bull thistle trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 5. Distribution of bull thistle at Peterson Air Force Base in 2003 and 2014.

Convolvulus arvensis (field bindweed)

Stable, but widespread. Very hard to eradicate.

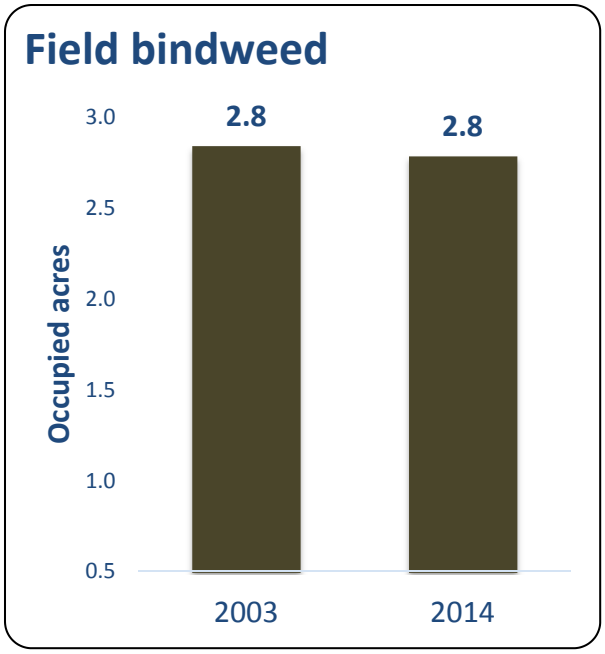
List C Species

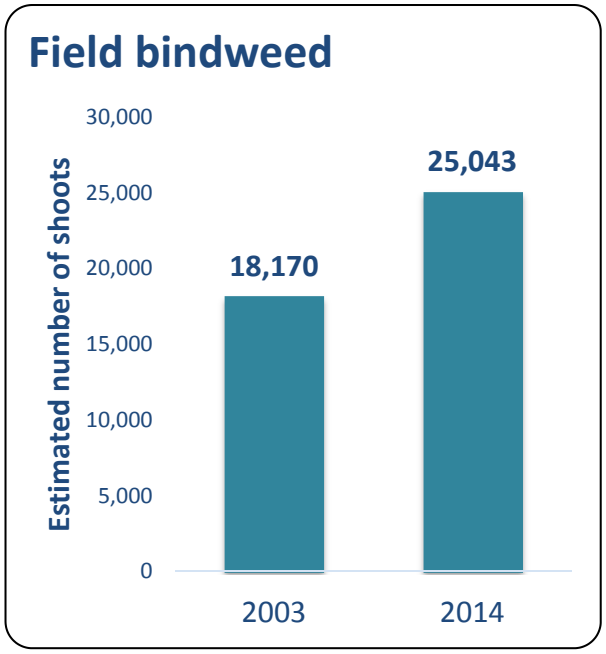
Photo by Michael Kappel

This species was the most abundant weed on PAFB in 2014 and the second most abundant weed in 2003 (Canada thistle was the most abundant in 2003). Nearly all of the metrics changed very little between 2003 and 2014. Occupied acres remained identical while estimated number of shoots was approximately 1/3 higher. While 49 of the 2003 locations were extirpated, the overall number of locations remained fairly stable with 109 and 104 in the respective years (Figure 10 and Map 6).

This species is considered a moderate priority for management as it is 1) widespread on the base and 2) very resistant to control.

Field bindweed is a hardy perennial that has both deep vertical roots (reaching depths of up to 20 feet) and shallow horizontal lateral roots which allow this plant to survive droughts or rapidly grow with small rainfall events. Seeds may remain viable for at least 40 years (Colorado Department of Agriculture 2014b).





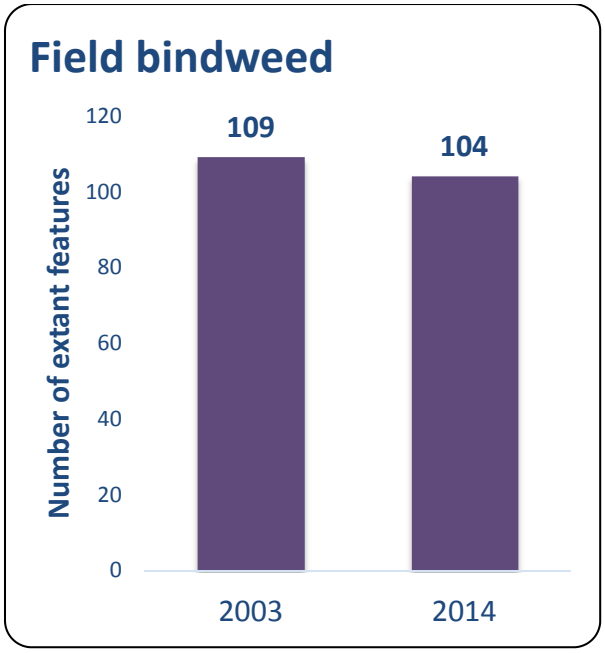
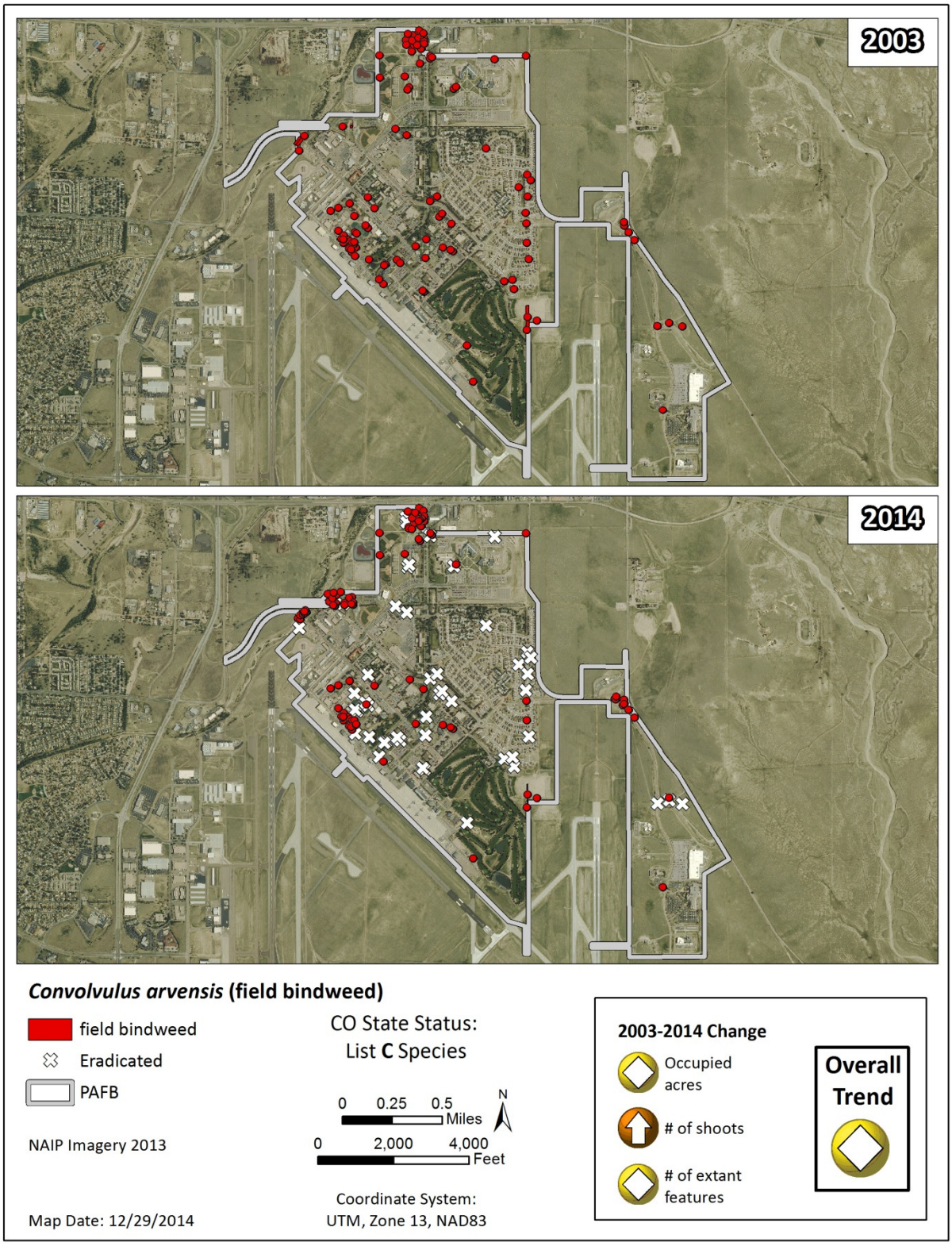
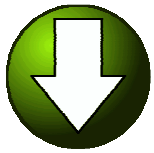


Figure 10. Field bindweed trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 6. Distribution of field bindweed at Peterson Air Force Base in 2003 and 2014.

Elaeagnus angustifolia (Russian olive)



Good success at eradicating approximately 55% of the trees. Continued eradication efforts are needed.

List B Species

Photo by Katie Miller

Peterson Air Force Base has had good success at reducing Russian olive with all of the metrics exhibiting a downward trend. The number of occupied acres decreased by 60% between 2003 and 2014 from 5.7 to 2.3, respectively (Figure 11). The number of trees (called shoots in our graphs) also decreased by nearly half from 120 to 69 trees and there are now only 40 locations rather than the 89 that were found in 2003 (Figure 11 and Map 7).

Russian olive is a common landscaping plant on the base, especially within base housing. This weedy tree is becoming a serious problem along the Front Range and elsewhere in Colorado, invading wetlands and out-competing native species.

The comparatively slow growth rate and small number of trees make complete elimination from the base an attainable goal. With continued effort by PAFB, this species could be eliminated or greatly reduced over the next few years. We recommend a program that eliminates most, if not all, of the remaining trees.

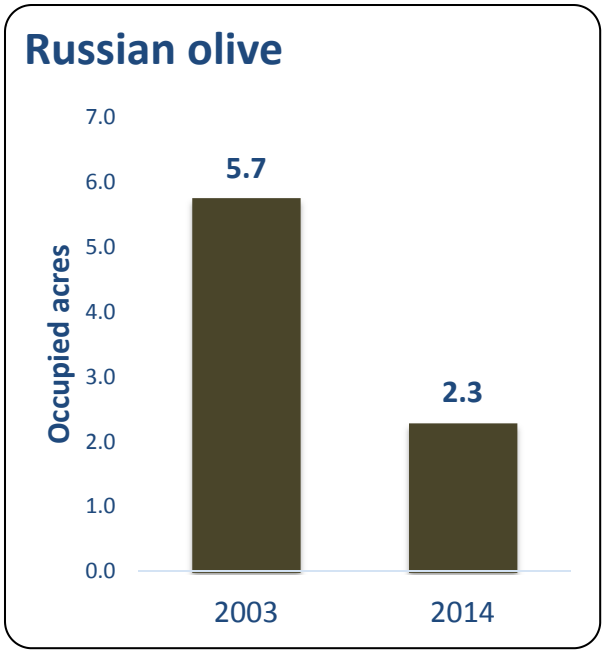
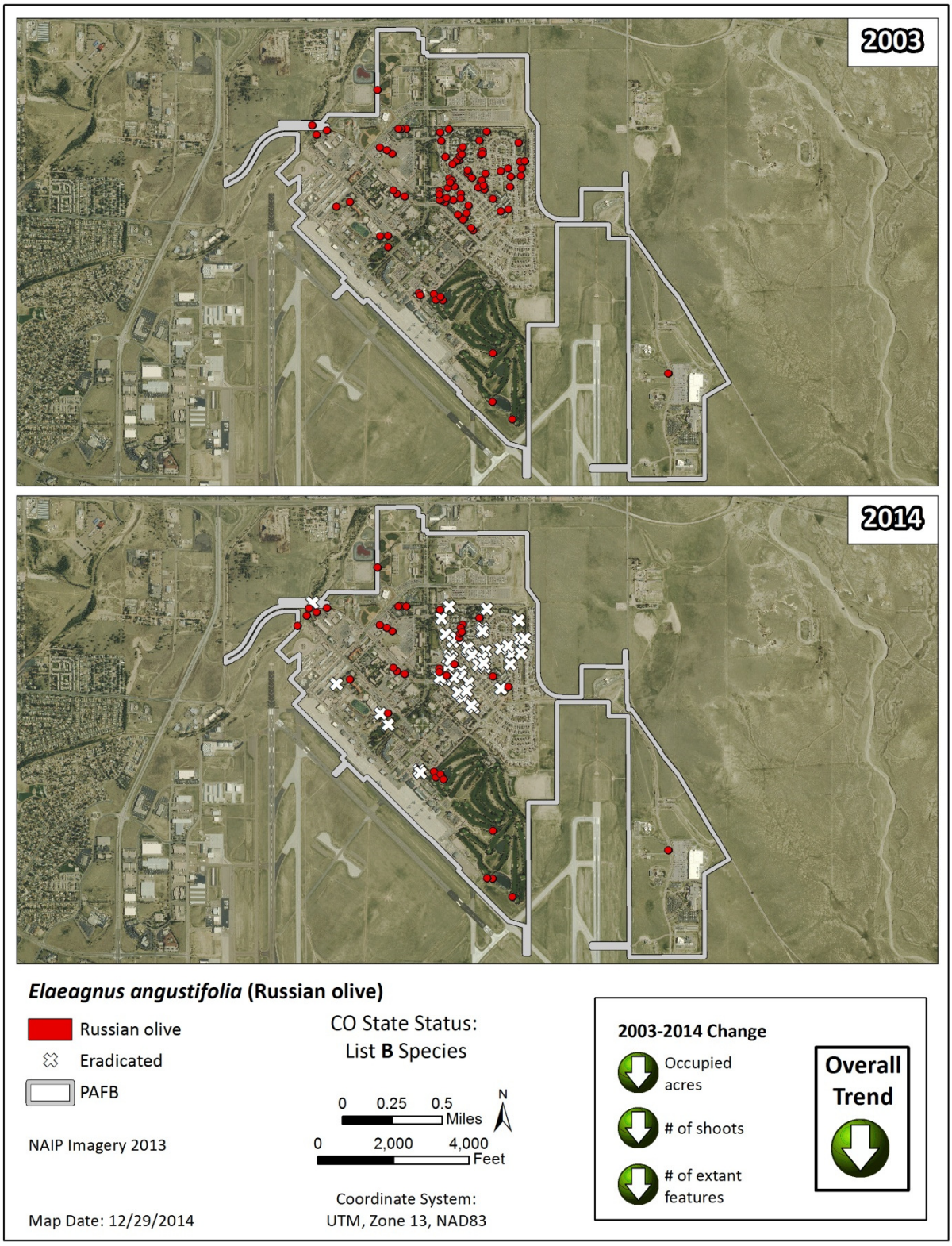


Figure 11. Russian olive trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 7. Distribution of Russian olive at Peterson Air Force Base in 2003 and 2014.

Gypsophila paniculata (baby's breath)

Success! All occurrences were eradicated.

Watch List Species

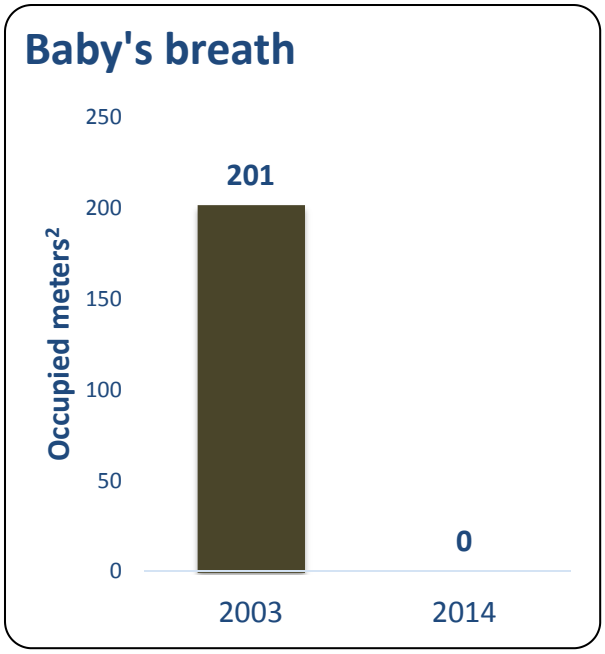
Photo by Thayne Tuason

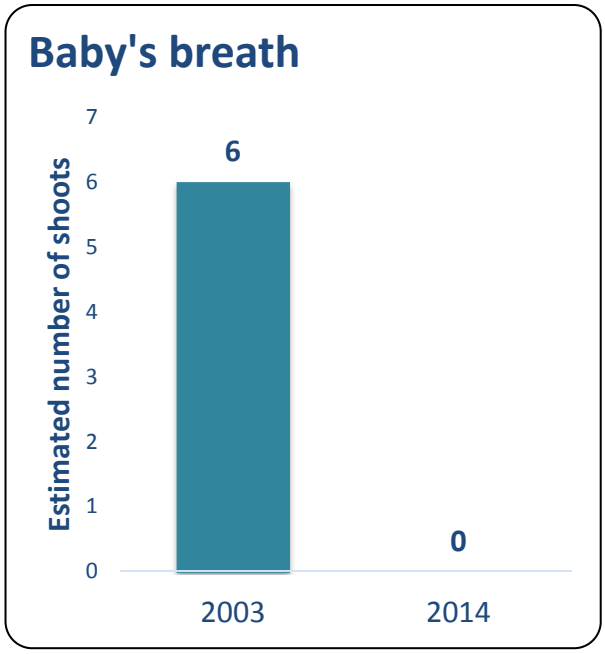
Baby's breath had been successfully eradicated from PAFB by 2014. In 2003, there were four known locations with approximately 6 plants occupying 200 m^2 and by 2014 no plants were found at any area within PAFB (Figure 12 and Map 8).

While this species appears to be eradicated from the base, we recommend that management keep watching for additional infestations. An early detection-rapid response protocol will keep this species under control.

This species is a typical plant found in flower arrangements or bouquets that are bought from florists. The spread of this weed in Colorado has been on the increase and it is most likely due to improper disposal of flower arrangements. We recommend that education become part of the management tool kit. If a note could be added to all floral arrangements that suggest proper ways to dispose of flowers then we may see fewer new infestations.

This species is a prolific seed producer, producing up to 14,000 seeds per plant (Rutledge and McLendon 1996, Royer and Dickinson 1999).





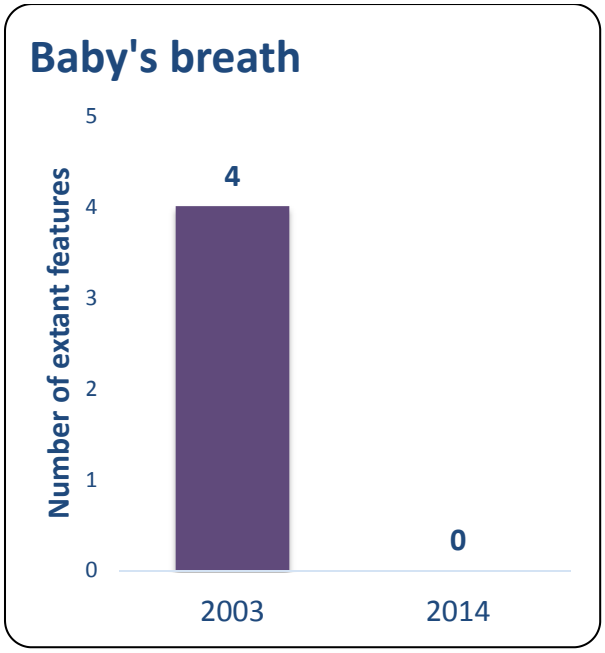
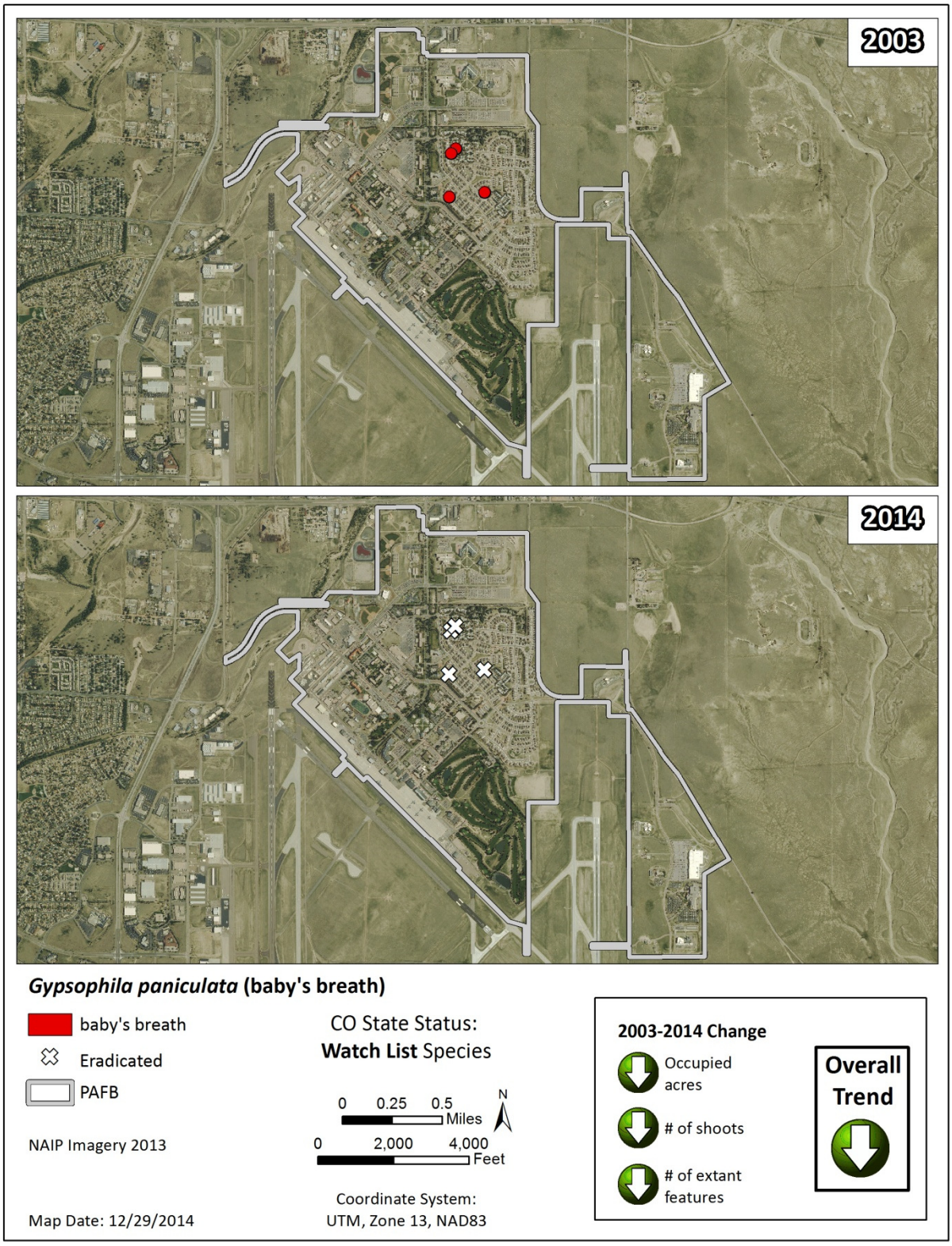
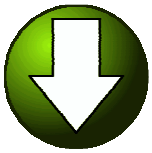


Figure 12. Baby's breath trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 8. Distribution of baby's breath at Peterson Air Force Base in 2003 and 2014.

Hypericum perforatum (common St. Johnswort)



Significant downward trend; however, continued effort is needed.

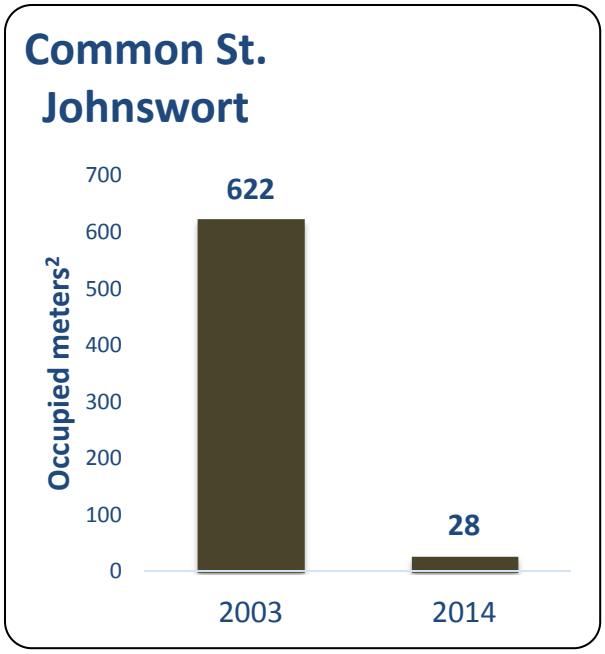
List C Species

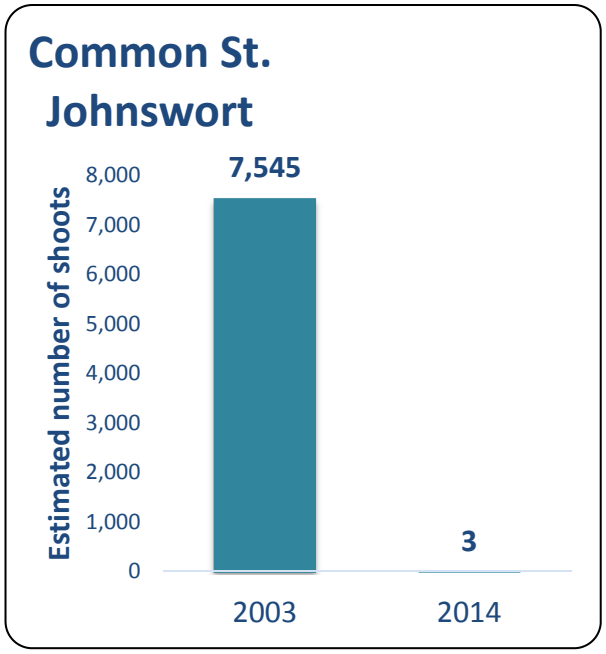
Photo by Michelle Washebek

Common St. Johnswort was nearly eradicated at PAFB by 2014. In 2003 there were two locations, both near the airport (Map 9), that consisted of one small and one large infestation. By 2014, the large infestation had been eradicated however the small one was still occupied (Map 9). The remaining site had only 3 shoots in 2014 (Figure 13).

This species is considered of high management priority for multiple reasons including 1) the small number of sites and individuals that are present at the base and 2) the ability for this species to spread once established.

One plant can produce thousands of seeds and the seeds can survive in the soil bank for at least 20 years. The root system consists of a large taproot and fibrous roots near the surface. The plant reproduces by seeds or short runners. Therefore consistent monitoring of any historic site is recommended. At the Air Force Academy, a large infestation was eradicated in 2005 and annual monitoring did not detect any plants until 2014, when approximately a dozen plants sprouted. The most likely source for this re-infestation was from the seed bank (Rondeau and Lavender-Greenwell, in prep.).





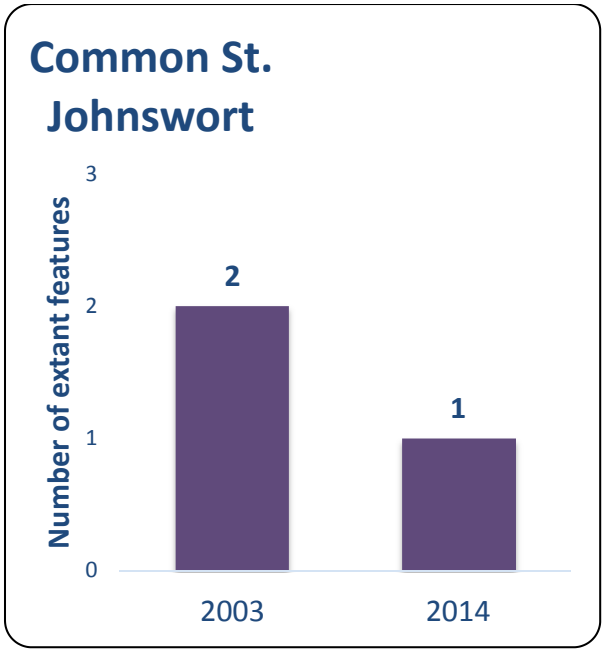
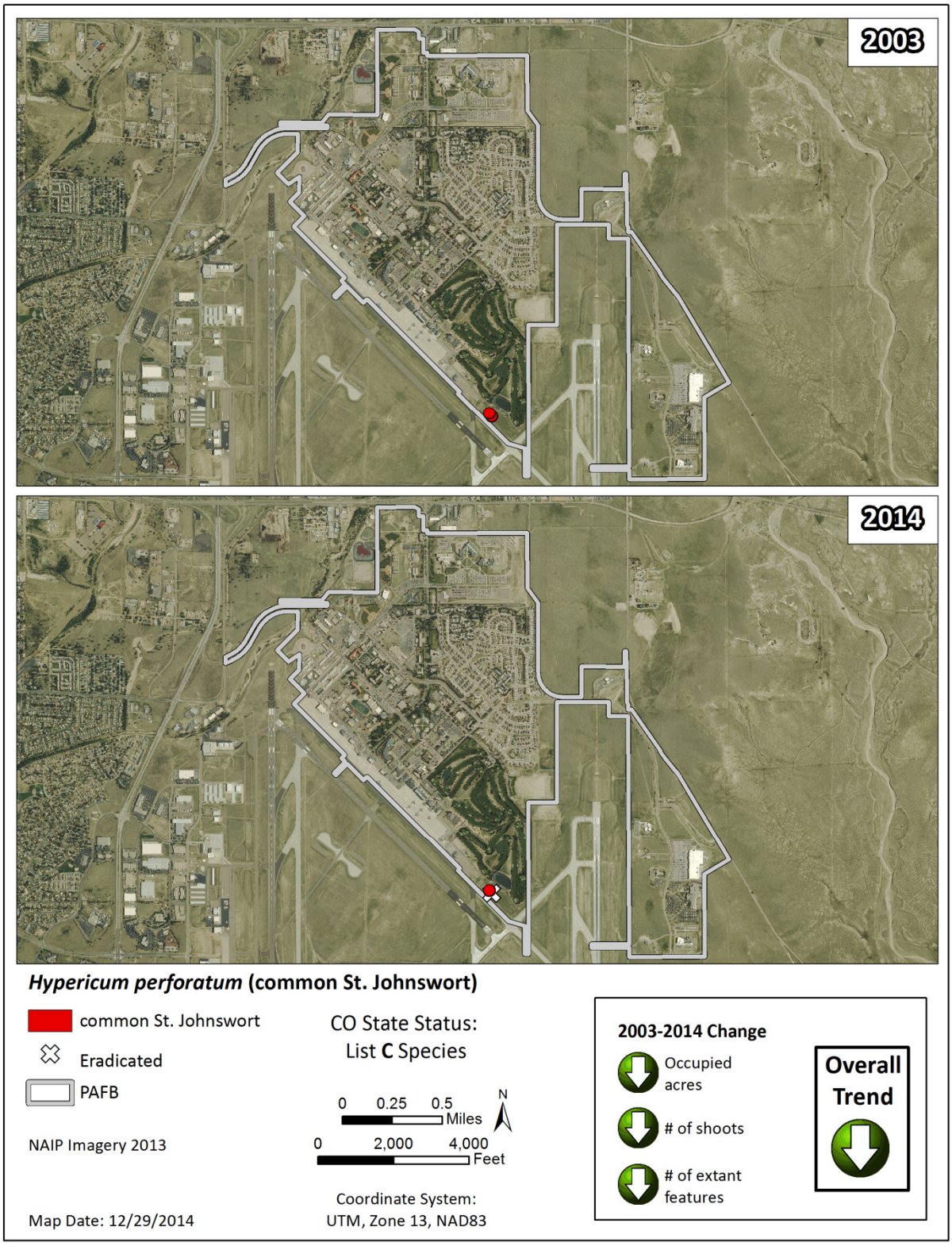


Figure 13. Common St. Johnswort trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 9. Distribution of common St. Johnswort at Peterson Air Force Base in 2003 and 2014.

Linaria dalmatica ssp. *dalmatica* (Dalmatian toadflax)

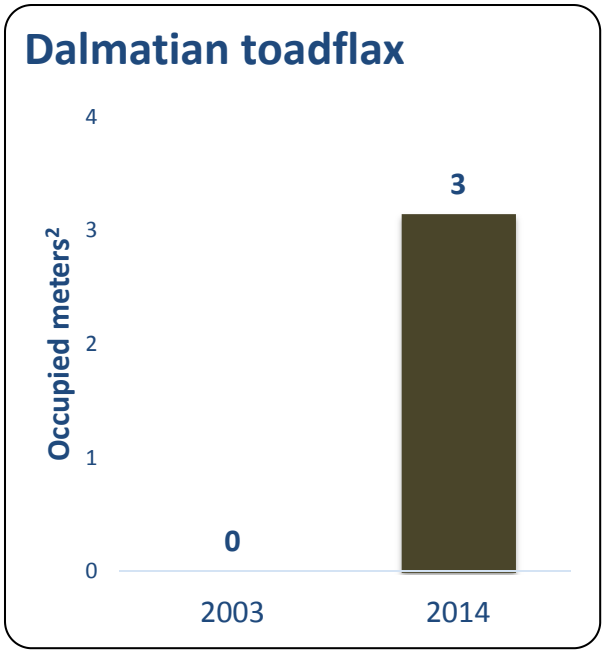
Increasing and localized. A rapid response is likely to control this species.

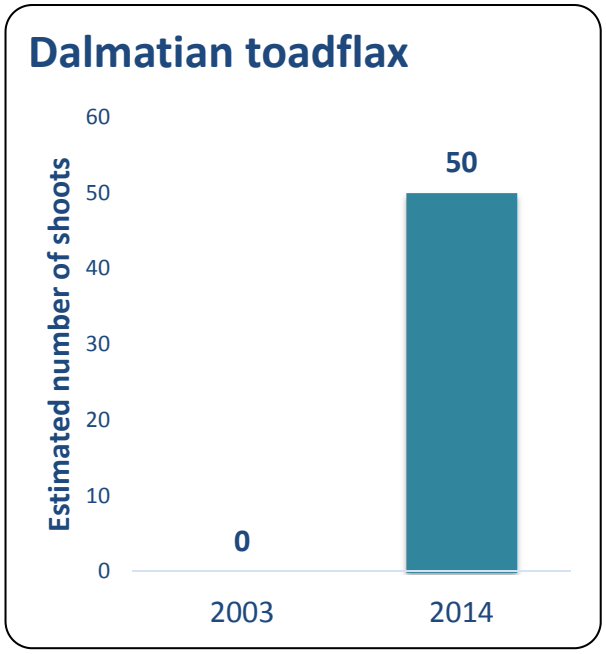
List B Species

Wikipedia Photo

Dalmatian toadflax was not known to occur at PAFB in 2003; however, in 2014 we located it at one site within the golf course (Map 10). The infestation is small and occupies 3 m^2 and had approximately 50 shoots (Figure 14).

This is a high priority management species due to 1) occupying only one site, 2) a small infestation and 3) if it is not controlled the likelihood of the species spreading is high. Dalmatian toadflax is a short-lived perennial that can reproduce from seeds or creeping rootstocks. A mature plant can produce up to 500,000 seeds and the seeds can remain viable for at least 10 years (Colorado Department of Agriculture 2014b). Once established it degrades rangelands. A rapid response to eradicating this species will likely be the most cost-effective management action.





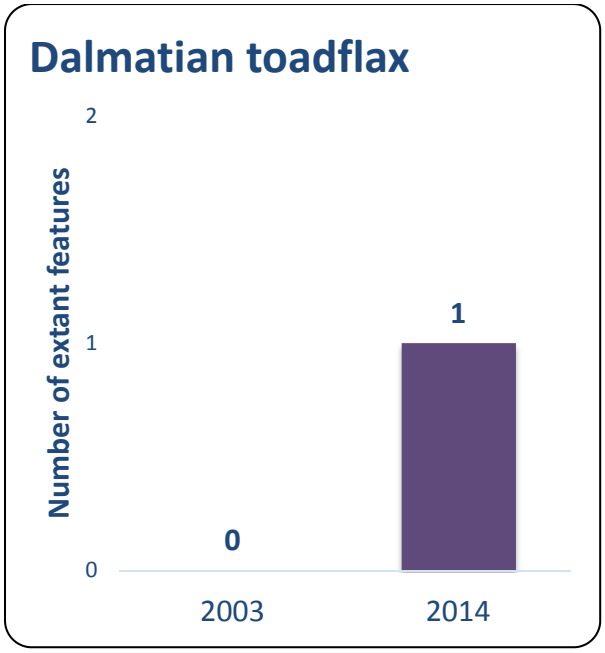
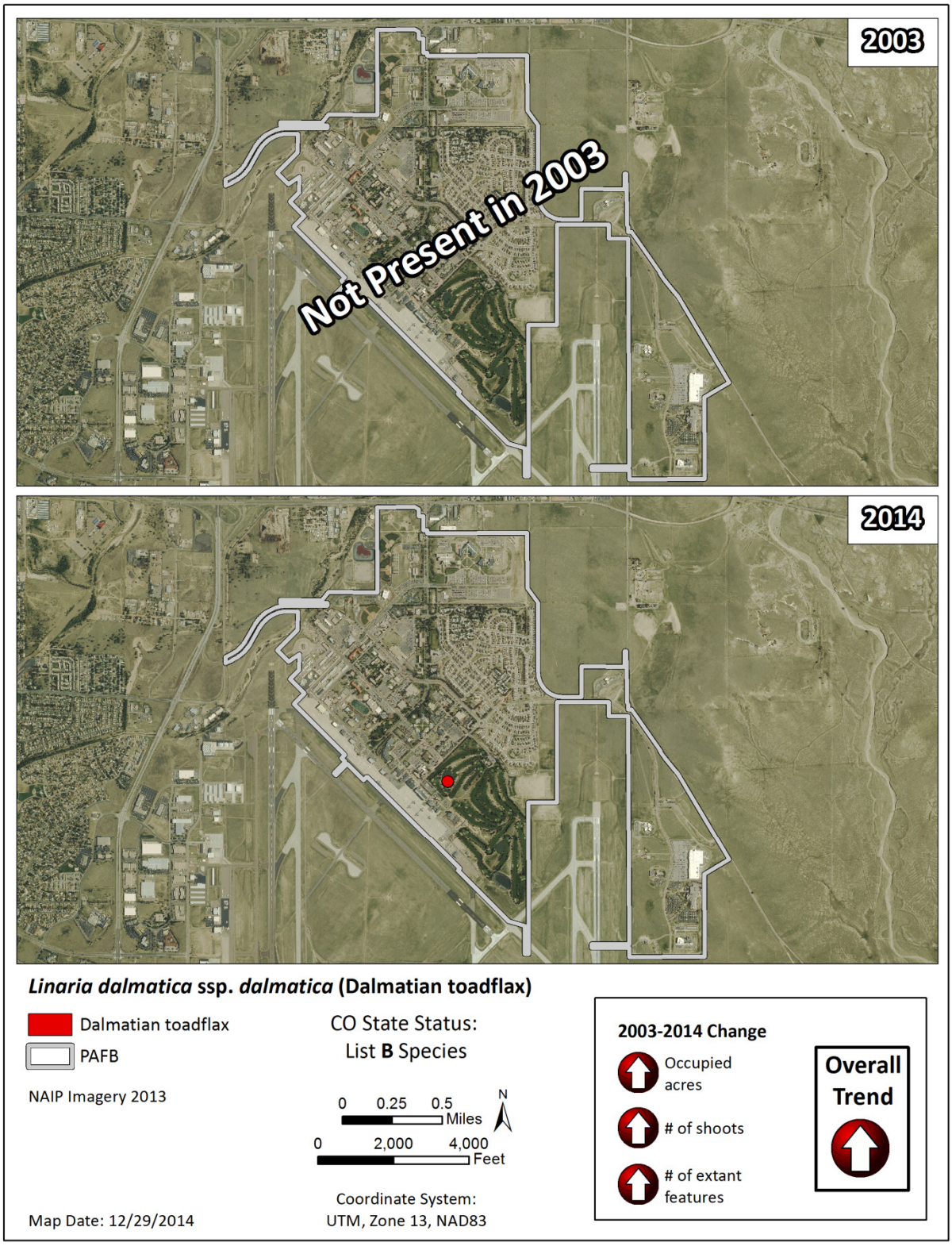
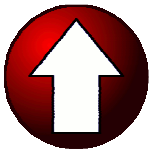


Figure 14. Dalmatian toadflax trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 10. Distribution of Dalmatian toadflax at Peterson Air Force Base in 2003 and 2014.

Linaria vulgaris (yellow toadflax)



Increasing, yet eradication is still attainable.

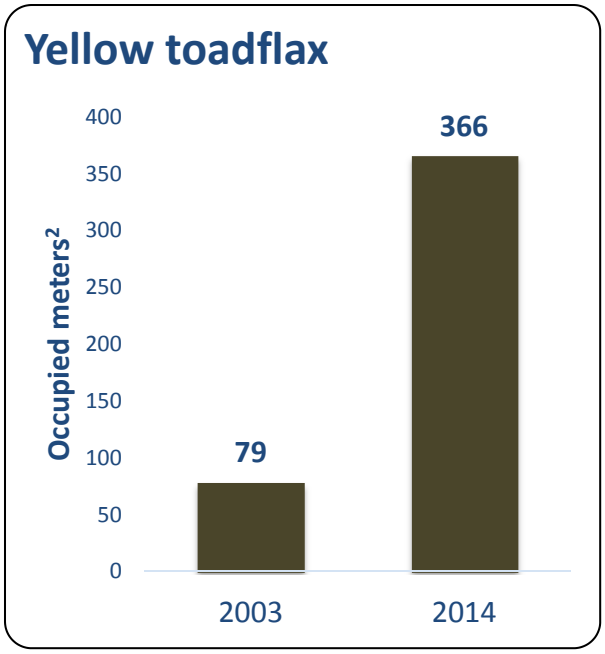
List B Species

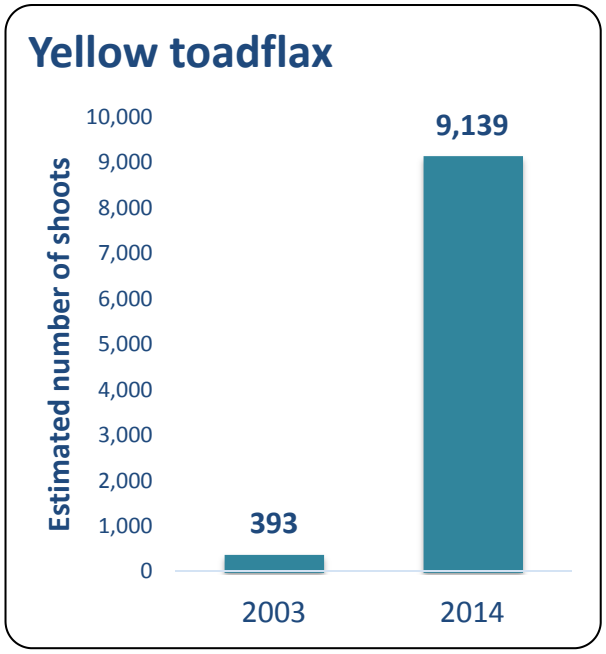
Photo by Michelle Washebek

Yellow toadflax occurred at only one site in 2003, near the north entrance. While that site was eradicated, the species spread. By 2014, there were four distinct locations very close to the original infestation (Map 11). As of 2014, these four locations occupied approximately 360 m^2 with nearly 10,000 shoots (Figure 15).

This species is a high priority management species as it 1) occupies a small area, 2) is quickly spreading, and 3) is currently found in one area. The likelihood of eradicating this species is still high, however due diligence will be needed to contain this species as it has been known to spread fairly rapidly.

This species is a perennial that escaped from the ornamental trade. It develops an extensive root system, making control options varied. Yellow toadflax displaces desirable plant communities reducing ecological diversity and rangeland value.





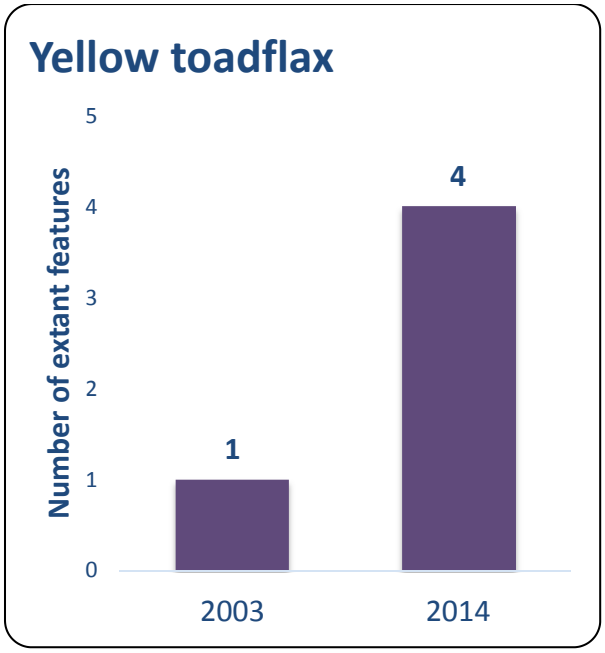
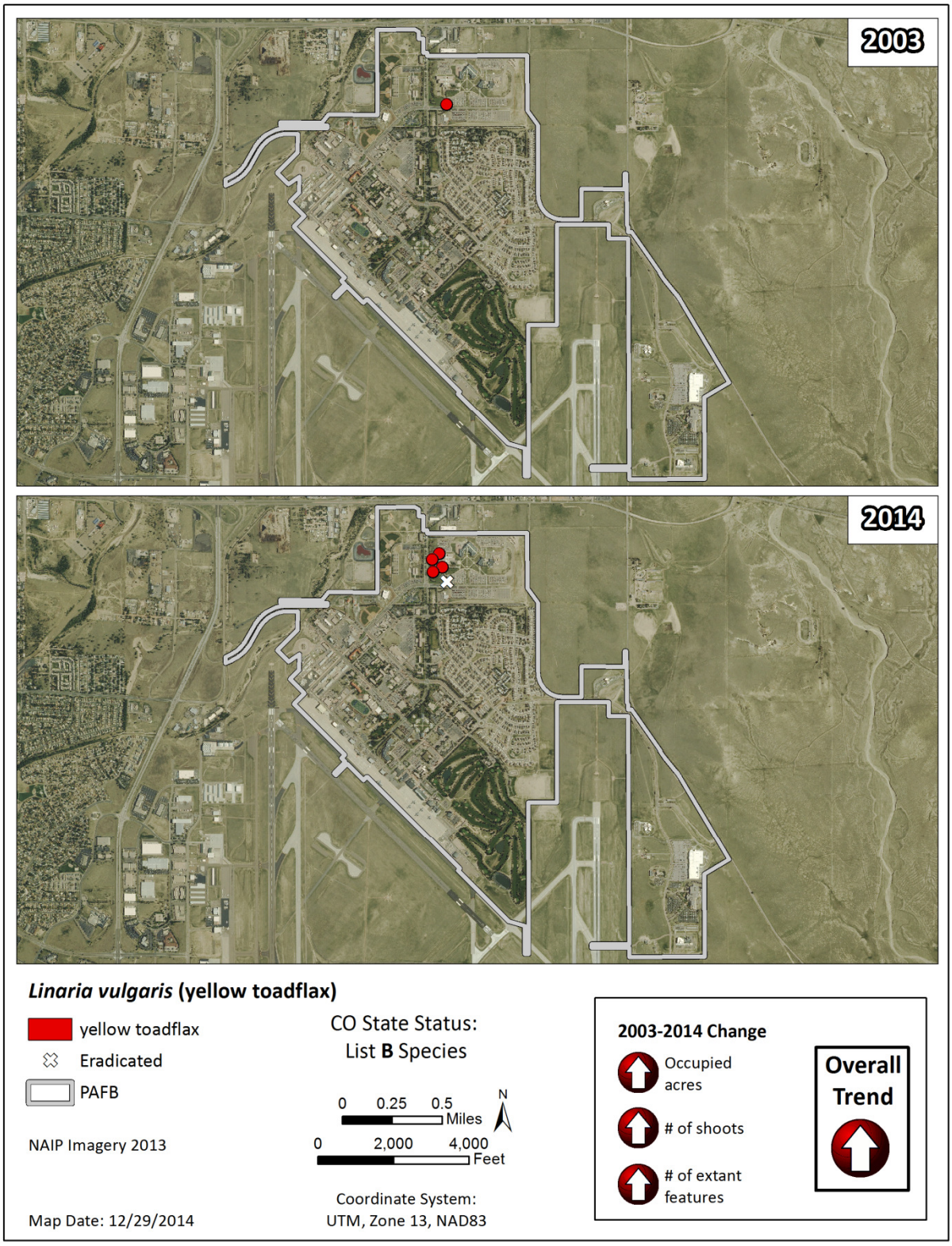
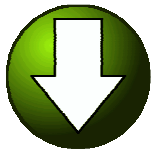


Figure 15. Yellow toadflax trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 11. Distribution of yellow toadflax at Peterson Air Force Base in 2003 and 2014.

Lythrum salicaria (purple loosestrife)

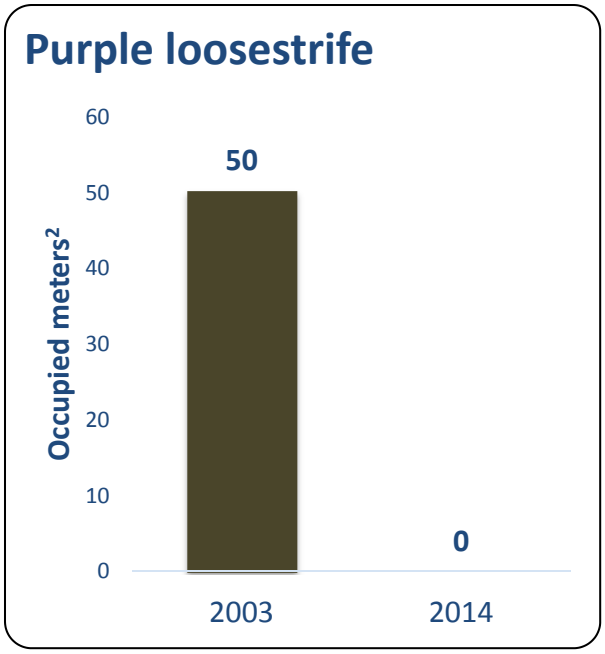


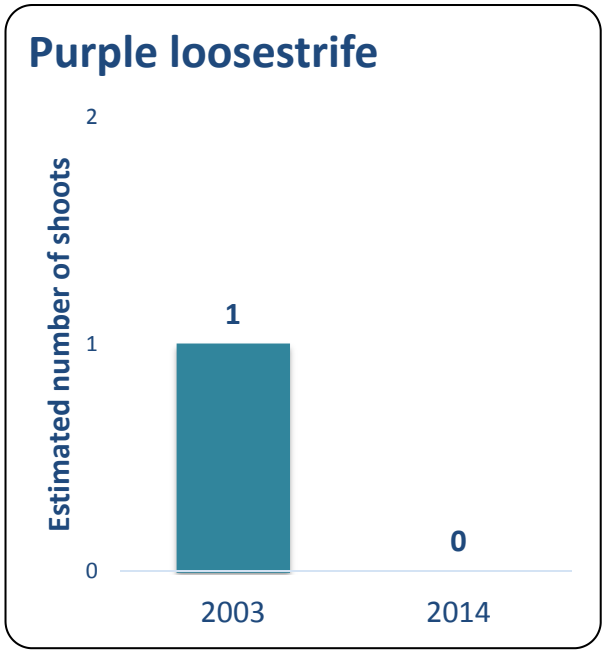
Success! All occurrences were eradicated. Continue to monitor.

List A Species

Photo by Lisa Ruokis

Purple loosestrife appears to be successfully eradicated from PAFB. In 2003, there was one plant found in the northeast quarter (Map 12) and by 2014 no plants were mapped (Fig 16). This species is very aggressive and has been known to destroy wetlands in the eastern United States. Colorado currently has very few infestations and this species is of high management concern. While PAFB appears to be rid of this species we recommend that any new occurrences be eliminated upon first detection.





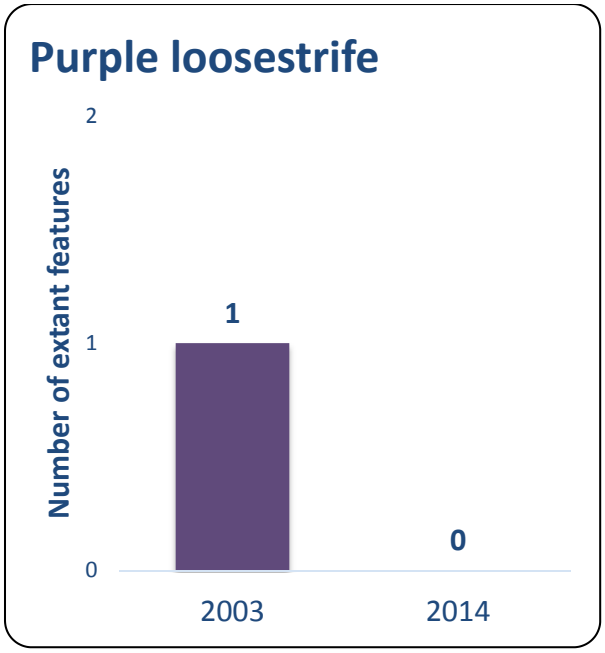
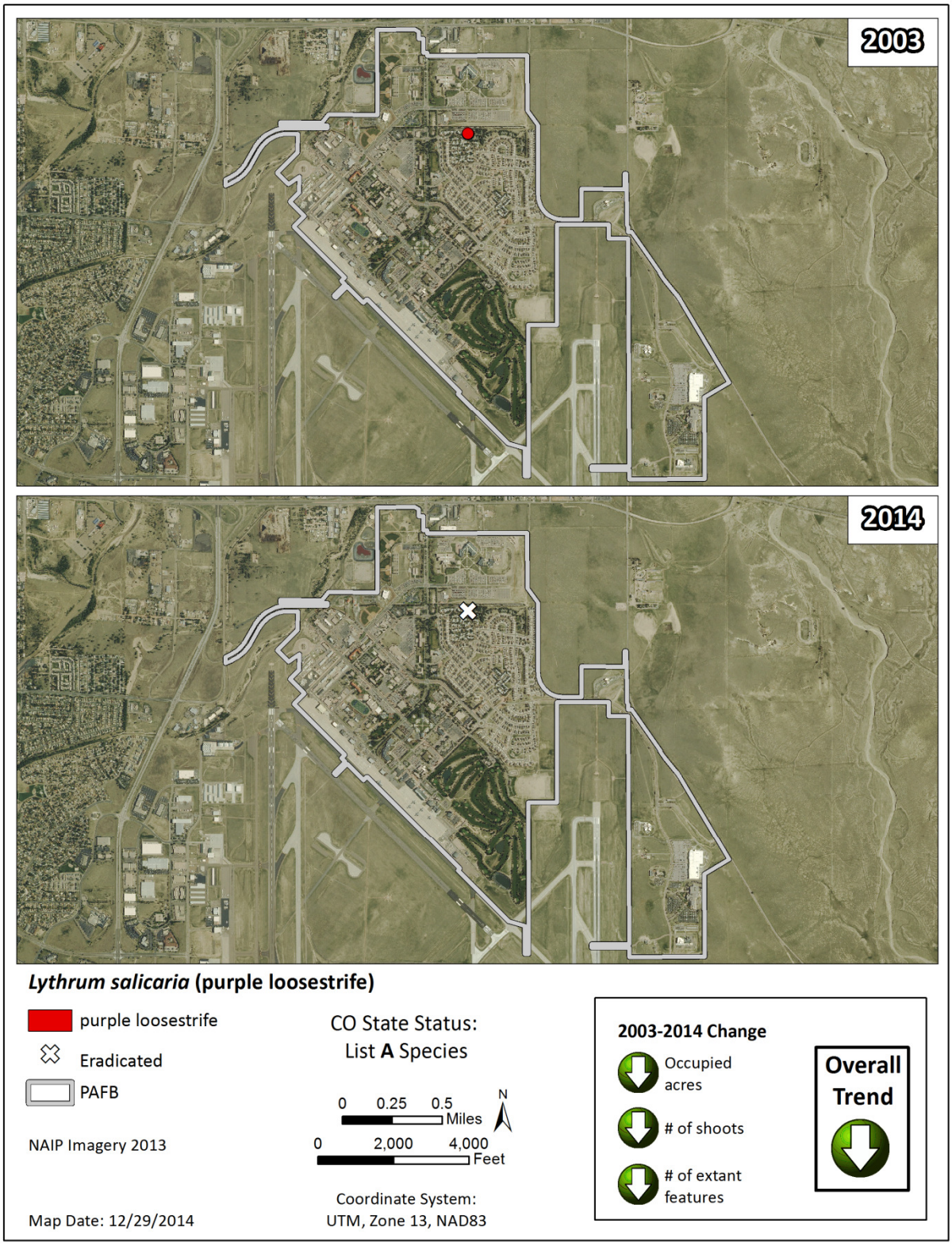


Figure 16. Purple loosestrife trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 12. Distribution of purple loosestrife at Peterson Air Force Base in 2003 and 2014.

Saponaria officinalis (bouncingbet)

Original site eradicated; however, a new site was occupied. A rapid response is likely to control this species.

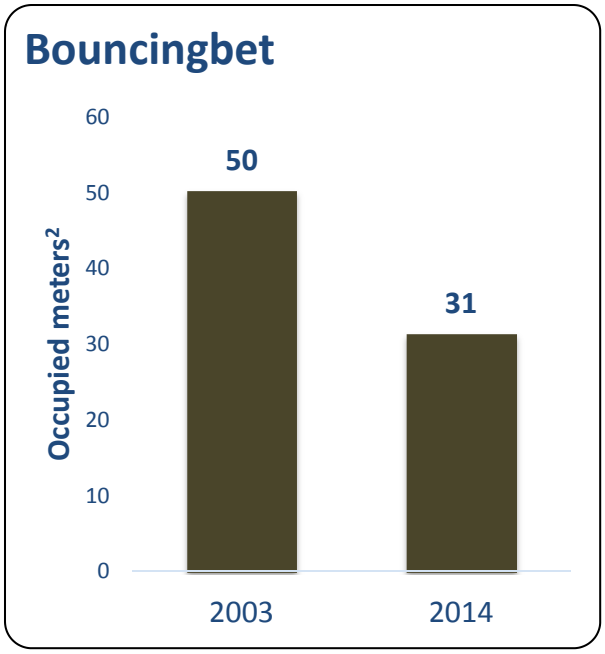
List B Species

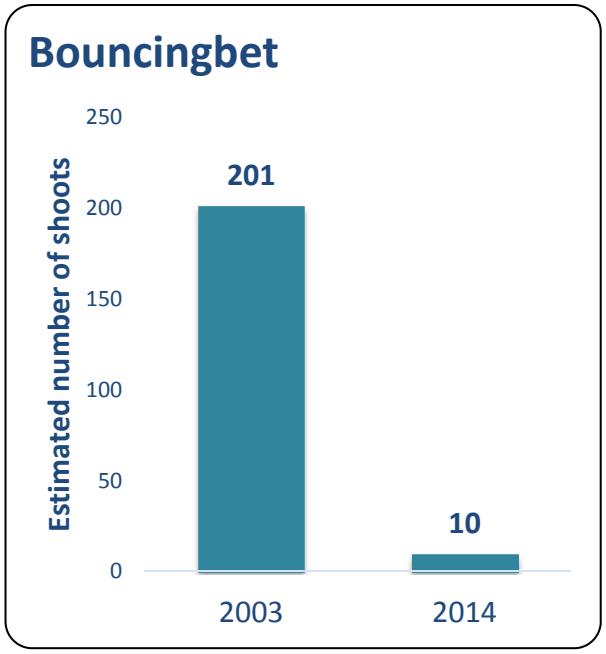
Photo by Katie Miller

Bouncingbet was known from one occurrence in 2003, near the central part of the base, and in 2014 it was found in a new area (Map 13). The original site was successfully eradicated; however, the new site is a fair distance from the original site and had four distinct locations (Figure 17 and Map 13). In 2014, the species occupied 31 m^2 with approximately 10 shoots (Figure 17).

This species is considered a high priority management species due to 1) the small area occupied, 2) few individuals, and 3) the high likelihood of successfully eradicating this species.

Bouncingbet was brought in as an ornamental plant; however, its toxicity to animals and humans make this an undesirable plant. It is currently listed as a state noxious weed and is no longer an ornamental plant found in nurseries. Bouncingbet is a long-lived perennial which can propagate from either seeds or rootstock. Due diligence will be necessary to keep this species from spreading.





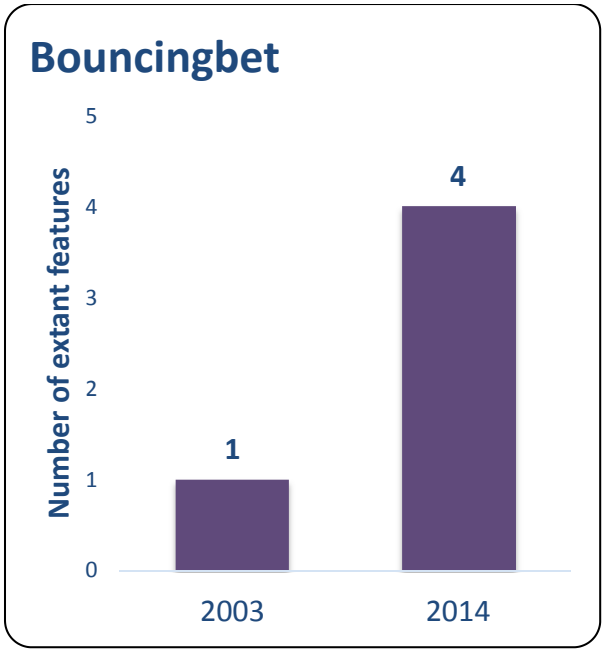
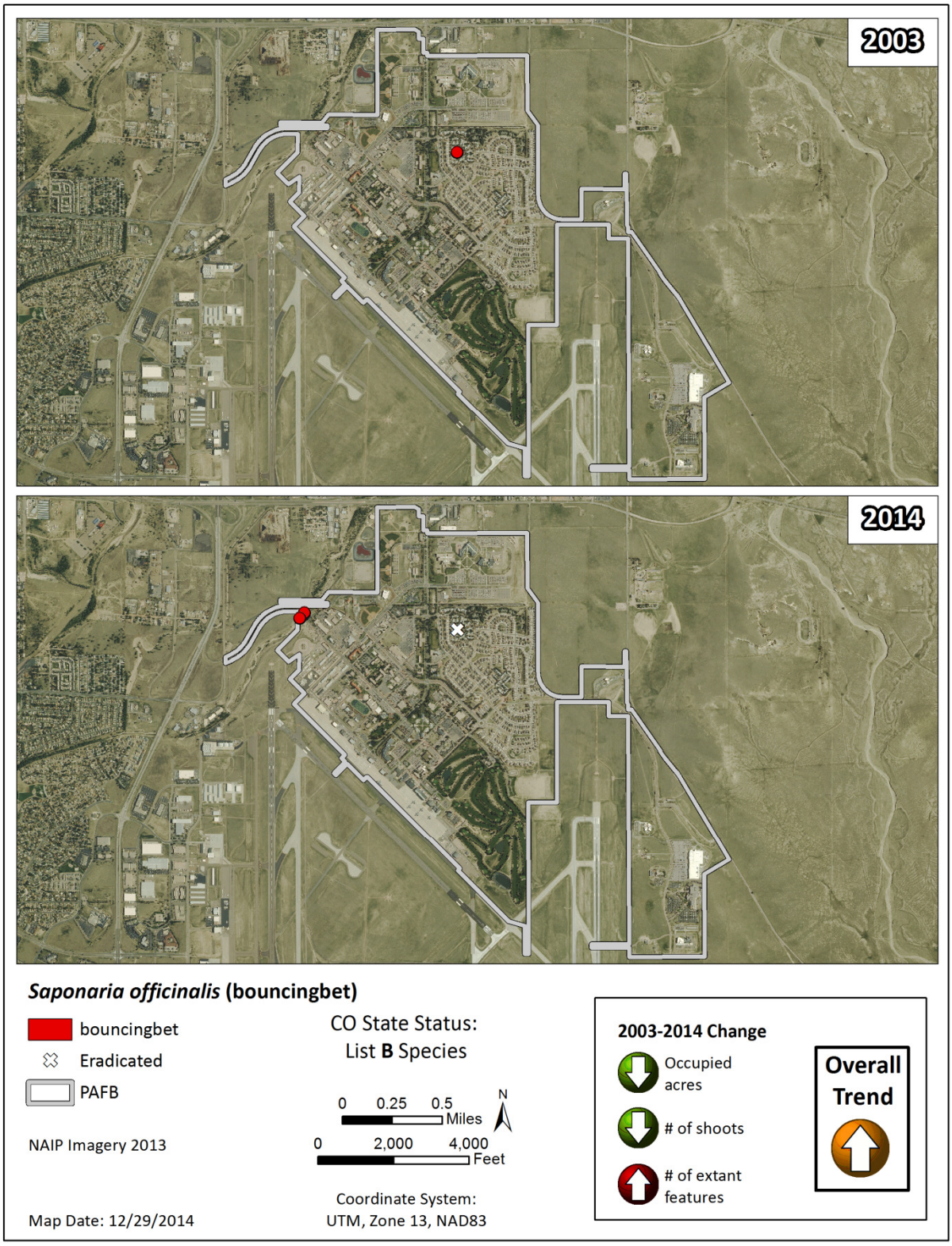


Figure 17. Bouncingbet trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 13. Distribution of bouncingbet at Peterson Air Force Base in 2003 and 2014.

Tamarix ramosissima (tamarisk)

Stable; however, nearby Sand Creek has an ample seed source.

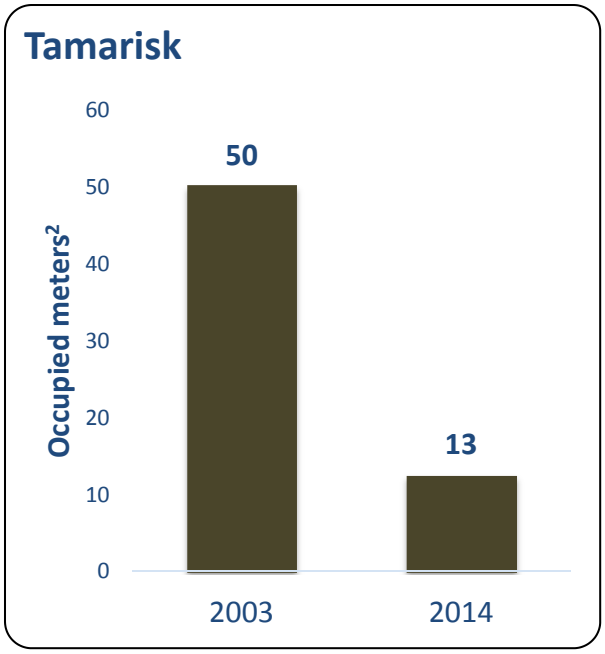
List B Species

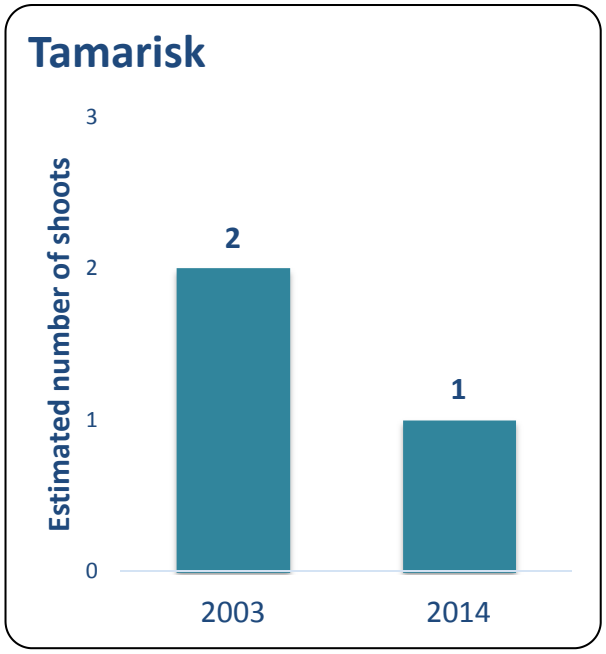
Photo by Renée Rondeau

Tamarisk is primarily a riparian species and is known to occur along Sand Creek, just outside of PAFB. In 2014, within PAFB we found only one live tree (Figure 18 and Map 14). The one tree that existed within the base in 2003 was eradicated.

On a statewide basis, however, tamarisk has proven to be an enormous threat to wetland systems, and is a growing problem within otherwise natural wetlands of the southern portion of the Front Range in Colorado. For the same reason presented in connection with Russian olive, tamarisk should be eradicated from PAFB, and Colorado Springs Municipal Airport should be encouraged to do all it can to eliminate the plant from the portion of Sand Creek that it maintains.

Because Sand Creek is a source for tamarisk invasion, we recommend continued monitoring and any new occurrences be controlled upon detection. It may be worthwhile to coordinate eradication efforts on Sand Creek with adjacent land managers in order to reduce re-infestation.





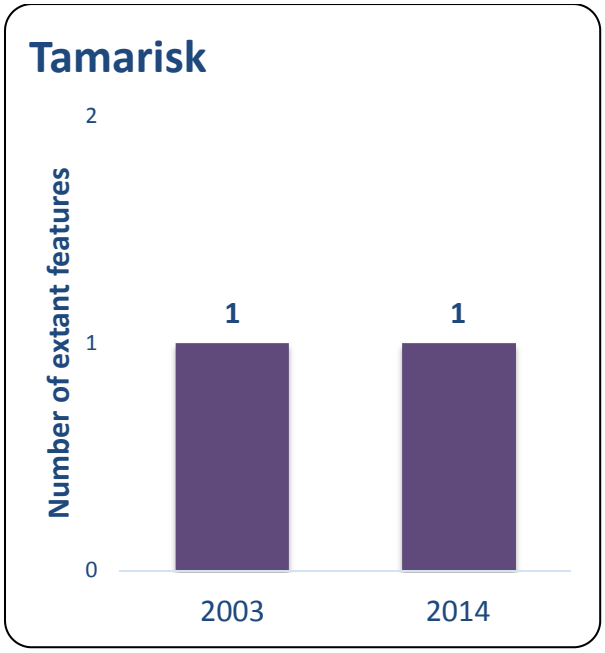
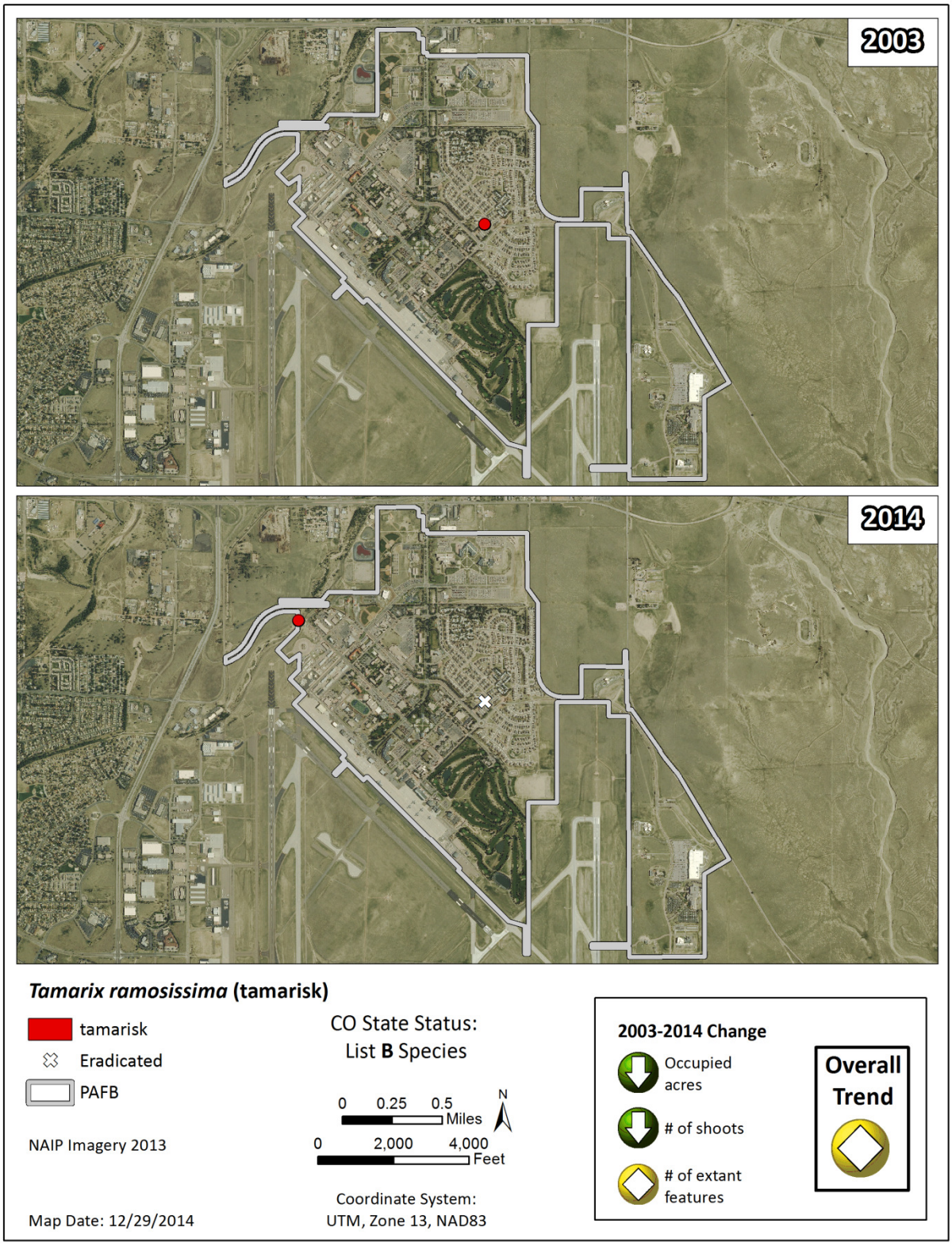
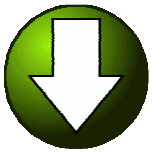


Figure 18. Tamarisk trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 14. Distribution of tamarisk at Peterson Air Force Base in 2003 and 2014.

Tribulus terrestris (puncturevine)



Decreasing, but still problematic. Eradication is still possible.

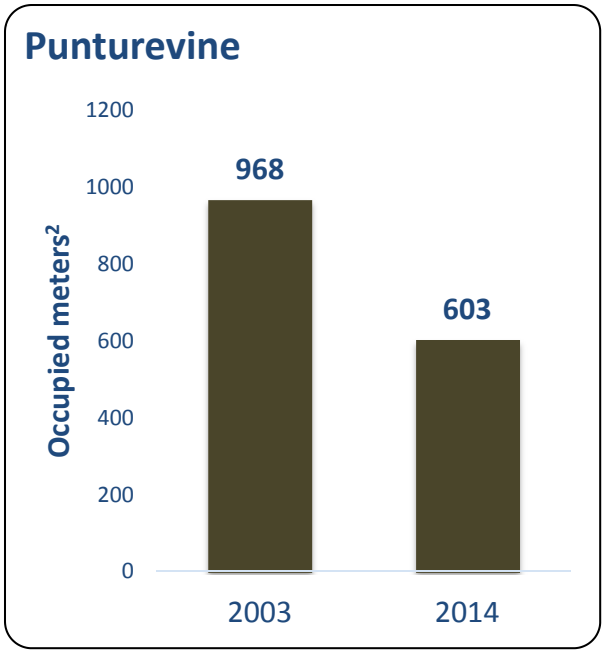
List C Species

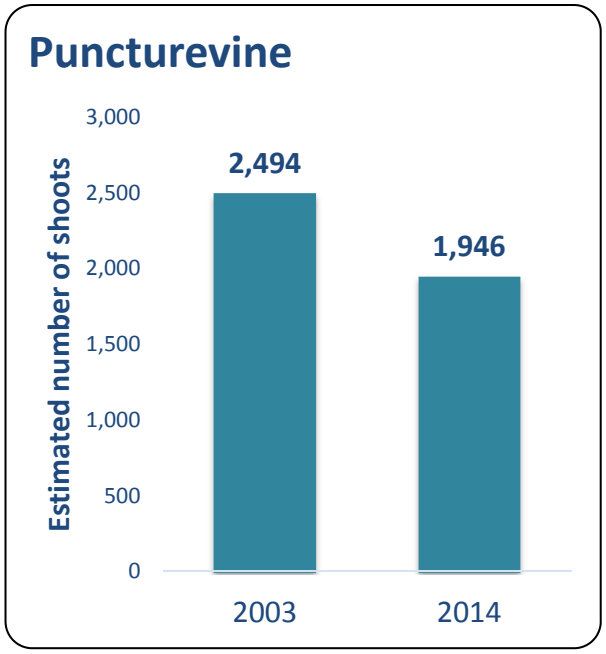
Photo by Bernard Dupont

Puncturevine occupied 11 distinct locations in 2003, of which 9 were eradicated by 2014 (Map 15). The species spread into one new location near the east entrance and expanded from the locations on the road east of the athletic fields (Map 15). In 2014, it occupied approximately 600 m^2 with nearly 2,000 shoots estimated (Figure 19). This species can be aggressive and can do well in arid environments.

We consider this a high priority weed management species as it 1) occupies a small area, 2) has a small number of sites, and 3) past eradication efforts have been successful. We recommend that historic (eradicated) sites be visited each year as viable seeds are likely to be in the soil bank.

This species is a prostrate, mat-forming summer annual. The fruit has several sharp and hard spines, often called a burr, and can remain viable for 4 to 5 years (Colorado Department of Agriculture 2014b). These burrs can easily puncture a bicycle tube or go through the bottom of thin-soled pair of shoes. The stiff spines of puncturevine fruit promote easy dispersal; therefore, continuous rigorous suppression of this weed at PAFB is recommended to discourage distribution onto surrounding areas.





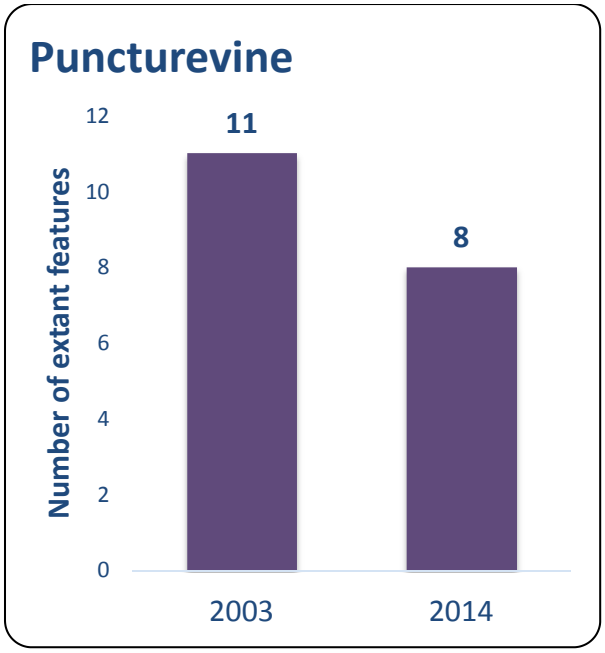
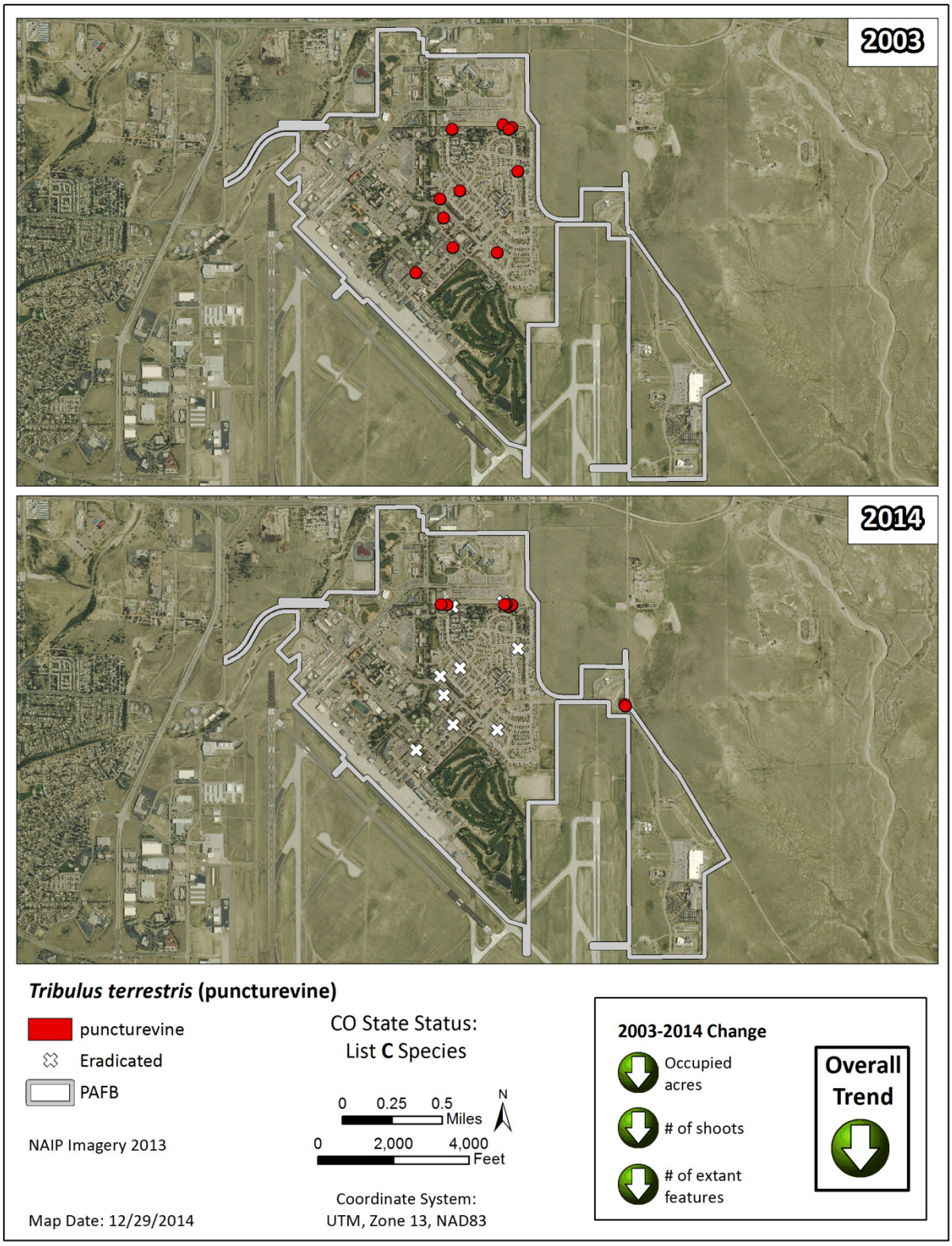


Figure 19. Puncturevine trend. Number of locations, occupied area, and number of shoots, 2003 and 2014.



Map 15. Distribution of puncturevine at Peterson Air Force Base in 2003 and 2014.

DISCUSSION AND GENERAL MANAGEMENT RECOMMENDATIONS (MODIFIED FROM ANDERSON ET AL. 2003)

Peterson Air Force Base has very few acres that are undeveloped and therefore very few acres in native grasslands; however, the area east of PAFB is dominated by native grassland. One of the primary reasons to manage weeds at PAFB is to reduce the chances of weeds invading the native grassland nearby.

In order to assist with weed management priorities we attributed each weed with an invisibility or invasiveness character and suggest an overall management priority (Table 5). The management priorities developed for the noxious weed species found at PAFB are derived from occurrence and cover information from the 2003 and 2014 surveys, from an understanding of the biotic potential of each species, and from the level of control judged to be reasonably attainable on base.

For example, field bindweed and Canada thistle are among the three weeds at PAFB with the highest cover, and are among the top ten prioritized weeds in Colorado. They reproduce vigorously both from seed and by vegetative means, are fast growing, and highly invasive, making them serious potential threats. However, complete eradication of these two weeds from base is an unrealistic goal, and the current management regime is maintaining some level of control. In 2003, Russian olive possessed the greatest area covered of all noxious weeds on base, and poses a serious threat to more-natural wetland systems in the surrounding community. Russian olive is slow growing and could be completely, and permanently, eliminated from base. Therefore, Russian olive has been assigned a high priority for management, while field bindweed and Canada thistle are given a moderate management priority.

Table 5. Weed invasiveness and suggested priority for management.

Scientific Name	Common Name	Invasiveness at PAFB	Suggested Priority for Management
Centaurea diffusa	diffuse knapweed	High	High
Cirsium vulgare	bull thistle	Moderate	High
Elaeagnus angustifolia	Russian olive	Low	High
Gypsophila paniculata	baby's breath	Moderate	High
Hypericum perforatum	common St. Johnswort	Moderate	High
Linaria dalmatica ssp. *dalmatica*	Dalmatian toadflax	Moderate	High
Linaria vulgaris	yellow toadflax	High	High
Lythrum salicaria	purple loosestrife	Low	High
Saponaria officinalis	bouncingbet	Low	High
Tamarix ramosissima	tamarisk	Low	High
Tribulus terrestris	puncturevine	Moderate	High
Cirsium arvense	Canada thistle	High	Moderate
Convolvulus arvensis	field bindweed	High	Moderate

Other weed species are such serious threats to PAFB and/or the natural systems of the surrounding community that they have been assigned high priority despite very low cover and number of occurrences on base. For example, diffuse knapweed, Dalmatian toadflax, yellow toadflax, and tamarisk all reproduce vigorously from seed or by vegetative means and are fast growing and highly invasive. However, quick, decisive action could completely eliminate them from PAFB because their number of occurrences is so low. Therefore, these species are assigned high management priority to mitigate future weed management burdens on PAFB and the surrounding community.

Especially in comparison to other facilities such as U.S. Air Force Academy, PAFB is in exceptionally good condition with regard to noxious weeds. While potentially serious noxious weeds are common at PAFB, most of those occurrences involve low cover and/or very small numbers of shoots; additionally, a number of species that are problematic at other locations are completely absent from PAFB.

The fundamental strategy of PAFB personnel for management of noxious weeds, then, should be two-fold: 1) prevent establishment of new noxious weed species on base, and 2) simultaneously, keep the noxious weed species currently present suppressed at low numbers, or even eliminate them entirely. To accomplish this, the following general recommendations are made:

> Maintain vigilance toward the presence of small pioneer populations of noxious weed species not previously found at PAFB, and rapidly eradicate those populations when discovered.

The best strategy toward noxious weeds is always to prevent their establishment in the first place, and PAFB finds itself in a position of luxury of being able to entirely avoid certain noxious weeds ever becoming the serious problem they are elsewhere (the recent discovery of two small occurrences of diffuse knapweed at PAFB is a case in point). A stipulation might be included now and in the future in the contract of the landscape maintenance company that at least one staff person be retained who is knowledgeable in recognition of noxious weeds to provide early warning of future problems (Mann pers. comm. 2003a).

> Be aware of plantings around base housing, and develop a policy for removal of noxious weed species inadvertently planted by base personnel.

Again, the presence on base of a knowledgeable contract worker capable of identifying noxious weeds in the landscape would be helpful. Base housing areas should be inspected at least once a year. If problem plantings cannot be eliminated immediately, removal can be accomplished when base personnel are transferred.

> Continue the rigorous management of noxious weeds currently practiced at PAFB.

Overall, the current management of noxious weeds at PAFB by grounds maintenance personnel is outstanding. Timely mowing, spraying and pulling by hand have been highly successful and largely responsible for the low cover and/or small numbers of shoots found in most weed occurrences on

base. It must be understood, however, that while such practices do eliminate many individual weeds, others simply continue indefinitely in a suppressed condition. In addition, some weeds invariably grow in overlooked or hard-to-get-to locations, such as within shrub beds or beneath trees. At a certain point after establishment, total eradication of a noxious weed species becomes impossible, and the realistic goal then must shift to managing that weed at some acceptably low level. Two of the most common noxious weed species at PAFB, field bindweed and Canada thistle, are now in this category. The potential always exists, however, for suppressed weeds to rebound and become a serious problem in the future if diligence is not maintained.

Make elimination of Russian olive from base a management goal.

In conjunction with the preceding suggested approach toward Canada thistle and field bindweed, total removal of Russian olive would bring the three most serious noxious weeds at PAFB to an excellent level of control. While Russian olive might not hold the potential for becoming the problem at PAFB that it is in other parts of Colorado, PAFB would be setting a good example by undertaking total removal, and would be making a positive contribution to conservation of the natural environment of the broader Colorado Springs community. Given the maturity of base landscaping, total removal would be comparatively painless. Russian olive comprises only a small percentage of the trees at PAFB. Removal could be accomplished in stages and the lost trees gradually replaced (Mann pers. comm. 2003b) by any number of beautiful, and more appropriate species.

Encourage better management of noxious weeds at Colorado Springs Municipal Airport, and coordinate PAFB noxious weed management with those efforts.

Peterson Air Force Base has a vested interest in the management of noxious weeds along portions of Sand Creek, and other areas nearby, which are currently the responsibility of the Colorado Springs Municipal Airport. Peterson Air Force Base may one day assume a greater management role (through purchase or otherwise) over more of Sand Creek, or elsewhere close by; inheriting the weed problems that exist in these areas now will complicate future management. Even if such expansion does not occur, the presence of significant numbers of noxious weeds on property immediately adjacent to the base can only serve as a source of continual re-infestation, despite the best efforts of base personnel. Ultimately the management of noxious weeds becomes a community concern from which all derive benefit. Colorado Springs Municipal Airport faces a challenge in managing noxious weeds along Sand Creek and within the south retention basin because of the presence of water. For this reason, the noxious weeds in these two locations might be good candidates for biocontrol.

Repeat the mapping of noxious weeds at PAFB in five years.

Regardless of the management options selected by natural resources management and grounds maintenance personnel, periodically re-mapping the weeds on base is important for evaluating the effectiveness of management choices (Mann pers. comm. 2003c).

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APPENDIX

Appendix A. Mapping Instructions

Weeds of the same species that are within 5 meters of each other will be mapped as one feature. Since weeds are mobile from year to year, and the GPS has inherent inaccuracies, we will consider these the same infestation. If you cannot locate an existing feature in the exact location, but there is a weed of the same species within 5 meters, move the existing point (or line, polygon, etc.) to the current location and update the attributes (radius, number of individuals, etc.). If there is no weed within 5 meters of a mapped location, do not delete it. Instead, mark it as eradicated and set number of individuals to 0 (we will filter these out of the dataset before calculating area when computing metrics for the report). This way, we keep track of the soil seed bank and ensure historically infested areas are resurveyed in the future. Occurrences will only be deleted if they change feature type, e.g. a point to a polygon, to avoid duplicating occurrences. For example, if several points are now best represented by a polygon, delete the points and draw a new polygon. If a point is now best represented by a line, delete the point and draw a new line. Use deletions with caution however. The above scenarios work best if an occurrence has increased in size, not decreased. If an occurrence has significantly decreased in size (i.e. a large polygon is now best represented by a point), it is best to mark the polygon as eradicated and map a new point, keeping in mind that we want to keep track of the seed bank for future field work. These types of decisions require good and consistent judgment on the part of the field technician. It is helpful to scope out an area before mapping in ArcPad to visualize the conceptual feature type (point, line or polygon).

There will be situations where the mapped location of a feature has not changed, but you will need to update the attributes. At minimum, you will need to set the current date and click on the Standard Info tab of the field form to make sure your name is entered as the Examiner. Even if nothing has changed, we still need to know that this information is current as of 2014 and verified by you. This will probably be infrequent, as number of individuals/density, radius, or cover class is likely to be different. Be sure to check the comments on the Standard Info tab and make sure they are still applicable. The date has to be physically clicked on every existing record to populate the current date. New features will automatically have the current date. The Standard Info tab has to be activated in order to populate your name as the examiner. You must choose Ok to save changes. Choosing the X will cancel your changes.

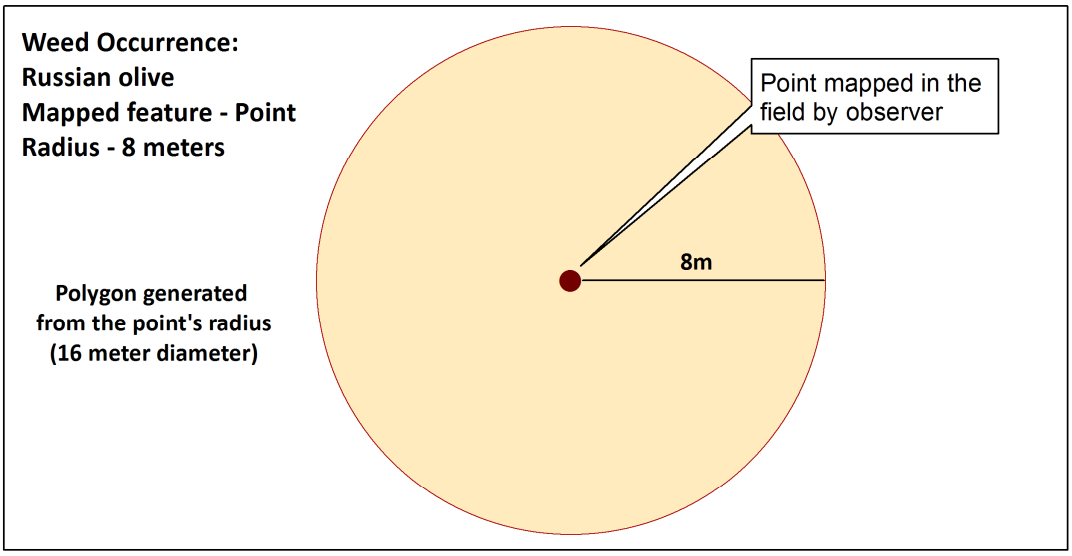
The weed map provides PAFB with an assessment how well their management treatments are working on noxious weeds. Two things we need to know are size and total number of individuals. Every point will have a radius and every line will have a buffer distance assigned (which will be applied to both sides of the line) so we can calculate area. No buffer distances are applied to polygons. Since the buffer distance assigned to lines will be applied to both sides of the line, in some instances it might be helpful to apply an offset equal to the buffer distance before you map the line to avoid walking through the center of the infestation. This will allow you to walk the edge of the line, yet map the line in the center of the infestation using the GPS receiver. Every point, line and polygon will have EITHER number of individuals or density filled out, based on which is easier to document in the field. Density represents

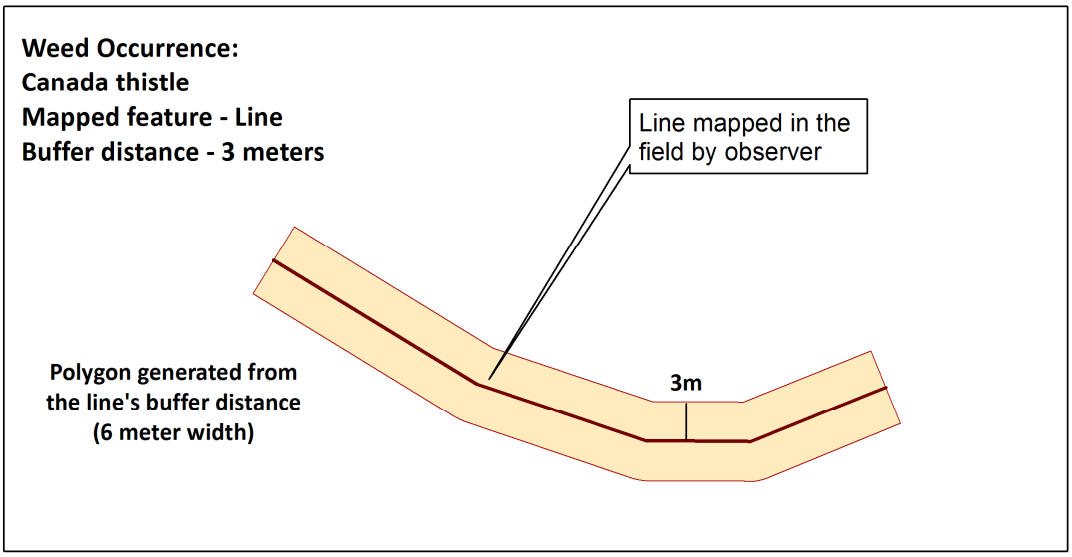
number of individuals per square meter. Ultimately, we will calculate number of individuals from density but you can pick which field to use for any given occurrence.

Map irregularly shaped features over approximately 900 square meters (e.g., 30m x 30m) as polygons as opposed to points. If large features are relatively circular, just map them as points and apply a large buffer distance. Linear features will be mapped as lines, but anything less than 5m in length should be mapped as a point.

For each mapped feature, complete the following attributes in ArcPad: species, number of individuals OR density, radius (for points) OR buffer distance (for lines), cover class, pattern, comments and status (extant or eradicated).

Buffered points and lines will be converted to polygons in the final weed geodatabase. See examples below.





Appendix B. Coordinates of Weed Infestations

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-355	Centaurea diffusa	diffuse knapweed	3	Extant	38.8324	-104.7096
Pt-384	Centaurea diffusa	diffuse knapweed	1	Extant	38.8363	-104.7022
Ln-11	Cirsium arvense	Canada thistle	3,021	Extant	38.8311	-104.7127
Ln-13	Cirsium arvense	Canada thistle	11,869	Extant	38.8365	-104.7011
Ln-14	Cirsium arvense	Canada thistle	19,323	Extant	38.8342	-104.7000
Ln-15	Cirsium arvense	Canada thistle	2,917	Extant	38.8344	-104.6991
Ln-17	Cirsium arvense	Canada thistle	1,226	Extant	38.8353	-104.6997
Ln-18	Cirsium arvense	Canada thistle	338	Extant	38.8140	-104.6943
Ln-19	Cirsium arvense	Canada thistle	121	Extant	38.8144	-104.6945
Ln-20	Cirsium arvense	Canada thistle	281	Extant	38.8143	-104.6948
Ln-21	Cirsium arvense	Canada thistle	459	Extant	38.8141	-104.6952
Ln-22	Cirsium arvense	Canada thistle	667	Extant	38.8119	-104.6953
Ln-24	Cirsium arvense	Canada thistle	469	Extant	38.8309	-104.7119
Ln-6	Cirsium arvense	Canada thistle	470	Extant	38.8258	-104.7018
Ln-7	Cirsium arvense	Canada thistle	741	Extant	38.8239	-104.7081
Ln-8	Cirsium arvense	Canada thistle	3,037	Extant	38.8235	-104.7074
Poly-4	Cirsium arvense	Canada thistle	1,706	Extant	38.8255	-104.7009
Poly-6	Cirsium arvense	Canada thistle	150	Extant	38.8334	-104.7012
Poly-7	Cirsium arvense	Canada thistle	4,326	Extant	38.8345	-104.7008
Pt-10	Cirsium arvense	Canada thistle	12	Extant	38.8257	-104.7064
Pt-104	Cirsium arvense	Canada thistle	12	Extant	38.8270	-104.7003
Pt-	Cirsium	Canada thistle	15	Extant	38.8265	-104.7011

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
142	arvense					
Pt-144	Cirsium arvense	Canada thistle	10	Extant	38.8264	-104.7008
Pt-149	Cirsium arvense	Canada thistle	6	Extant	38.8257	-104.7018
Pt-150	Cirsium arvense	Canada thistle	628	Extant	38.8259	-104.7028
Pt-177	Cirsium arvense	Canada thistle	8	Extant	38.8311	-104.7010
Pt-178	Cirsium arvense	Canada thistle	6	Extant	38.8316	-104.7012
Pt-180	Cirsium arvense	Canada thistle	50	Extant	38.8297	-104.7012
Pt-186	Cirsium arvense	Canada thistle	393	Extant	38.8236	-104.7025
Pt-200	Cirsium arvense	Canada thistle	20	Extant	38.8255	-104.7010
Pt-207	Cirsium arvense	Canada thistle	50	Extant	38.8234	-104.6972
Pt-208	Cirsium arvense	Canada thistle	50	Extant	38.8233	-104.6973
Pt-209	Cirsium arvense	Canada thistle	15	Extant	38.8231	-104.6971
Pt-215	Cirsium arvense	Canada thistle	75	Extant	38.8207	-104.7000
Pt-233	Cirsium arvense	Canada thistle	40	Extant	38.8200	-104.7036
Pt-245	Cirsium arvense	Canada thistle	25	Extant	38.8364	-104.7009
Pt-246	Cirsium arvense	Canada thistle	15	Extant	38.8365	-104.7013
Pt-248	Cirsium arvense	Canada thistle	70	Extant	38.8353	-104.6996
Pt-249	Cirsium arvense	Canada thistle	30	Extant	38.8353	-104.6995
Pt-250	Cirsium arvense	Canada thistle	12	Extant	38.8353	-104.6991
Pt-251	Cirsium arvense	Canada thistle	300	Extant	38.8350	-104.6987
Pt-259	Cirsium arvense	Canada thistle	100	Extant	38.8345	-104.7000
Pt-265	Cirsium arvense	Canada thistle	80	Extant	38.8344	-104.7009
Pt-269	Cirsium arvense	Canada thistle	10	Extant	38.8342	-104.7009

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-273	Cirsium arvense	Canada thistle	200	Extant	38.8353	-104.7018
Pt-313	Cirsium arvense	Canada thistle	300	Extant	38.8072	-104.6807
Pt-316	Cirsium arvense	Canada thistle	100	Extant	38.8120	-104.6794
Pt-322	Cirsium arvense	Canada thistle	39	Extant	38.8305	-104.7133
Pt-338	Cirsium arvense	Canada thistle	50	Extant	38.8309	-104.7129
Pt-339	Cirsium arvense	Canada thistle	50	Extant	38.8306	-104.7130
Pt-340	Cirsium arvense	Canada thistle	35	Extant	38.8304	-104.7133
Pt-361	Cirsium arvense	Canada thistle	50	Extant	38.8317	-104.7099
Pt-362	Cirsium arvense	Canada thistle	7	Extant	38.8317	-104.7091
Pt-365	Cirsium arvense	Canada thistle	15	Extant	38.8319	-104.7088
Pt-369	Cirsium arvense	Canada thistle	50	Extant	38.8316	-104.7083
Pt-373	Cirsium arvense	Canada thistle	10	Extant	38.8262	-104.7023
Pt-374	Cirsium arvense	Canada thistle	3	Extant	38.8263	-104.7020
Pt-375	Cirsium arvense	Canada thistle	20	Extant	38.8265	-104.7020
Pt-376	Cirsium arvense	Canada thistle	6	Extant	38.8265	-104.7006
Pt-379	Cirsium arvense	Canada thistle	63	Extant	38.8379	-104.7038
Pt-380	Cirsium arvense	Canada thistle	15	Extant	38.8382	-104.7029
Pt-385	Cirsium arvense	Canada thistle	200	Extant	38.8363	-104.7021
Pt-388	Cirsium arvense	Canada thistle	25	Extant	38.8243	-104.7071
Pt-389	Cirsium arvense	Canada thistle	25	Extant	38.8286	-104.7064
Pt-390	Cirsium arvense	Canada thistle	60	Extant	38.8287	-104.7063
Pt-391	Cirsium arvense	Canada thistle	300	Extant	38.8314	-104.7033
Pt-	Cirsium	Canada thistle	141	Extant	38.8372	-104.7019

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
392	arvense					
Pt-393	Cirsium arvense	Canada thistle	70	Extant	38.8215	-104.7037
Pt-394	Cirsium arvense	Canada thistle	20	Extant	38.8246	-104.6991
Pt-395	Cirsium arvense	Canada thistle	1,571	Extant	38.8295	-104.7011
Pt-433	Cirsium arvense	Canada thistle	3	Extant	38.8311	-104.7006
Pt-434	Cirsium arvense	Canada thistle	10	Extant	38.8317	-104.7011
Pt-435	Cirsium arvense	Canada thistle	25	Extant	38.8337	-104.6998
Pt-436	Cirsium arvense	Canada thistle	10	Extant	38.8337	-104.7006
Pt-437	Cirsium arvense	Canada thistle	40	Extant	38.8337	-104.7007
Pt-438	Cirsium arvense	Canada thistle	20	Extant	38.8335	-104.7007
Pt-439	Cirsium arvense	Canada thistle	20	Extant	38.8332	-104.7006
Pt-440	Cirsium arvense	Canada thistle	10	Extant	38.8333	-104.7007
Pt-441	Cirsium arvense	Canada thistle	5	Extant	38.8333	-104.7009
Pt-442	Cirsium arvense	Canada thistle	30	Extant	38.8334	-104.7008
Pt-444	Cirsium arvense	Canada thistle	4	Extant	38.8343	-104.7009
Pt-446	Cirsium arvense	Canada thistle	1,257	Extant	38.8350	-104.7011
Pt-447	Cirsium arvense	Canada thistle	754	Extant	38.8354	-104.7011
Pt-448	Cirsium arvense	Canada thistle	754	Extant	38.8355	-104.7012
Pt-449	Cirsium arvense	Canada thistle	251	Extant	38.8358	-104.7011
Pt-450	Cirsium arvense	Canada thistle	1,257	Extant	38.8358	-104.7009
Pt-451	Cirsium arvense	Canada thistle	8	Extant	38.8365	-104.7003
Pt-453	Cirsium arvense	Canada thistle	40	Extant	38.8338	-104.6990
Pt-454	Cirsium arvense	Canada thistle	50	Extant	38.8344	-104.6988

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-455	Cirsium arvense	Canada thistle	50	Extant	38.8345	-104.6988
Pt-458	Cirsium arvense	Canada thistle	100	Extant	38.8119	-104.6795
Pt-459	Cirsium arvense	Canada thistle	15	Extant	38.8119	-104.6795
Pt-470	Cirsium arvense	Canada thistle	63	Extant	38.8142	-104.6950
Pt-471	Cirsium arvense	Canada thistle	141	Extant	38.8102	-104.6937
Pt-472	Cirsium arvense	Canada thistle	50	Extant	38.8314	-104.7113
Pt-473	Cirsium arvense	Canada thistle	10	Extant	38.8313	-104.7116
Pt-474	Cirsium arvense	Canada thistle	40	Extant	38.8313	-104.7118
Pt-477	Cirsium arvense	Canada thistle	10	Extant	38.8304	-104.7133
Pt-478	Cirsium arvense	Canada thistle	10	Extant	38.8306	-104.7132
Pt-479	Cirsium arvense	Canada thistle	50	Extant	38.8308	-104.7130
Pt-480	Cirsium arvense	Canada thistle	10	Extant	38.8233	-104.7028
Pt-481	Cirsium arvense	Canada thistle	10	Extant	38.8232	-104.7028
Pt-482	Cirsium arvense	Canada thistle	10	Extant	38.8231	-104.7029
Pt-483	Cirsium arvense	Canada thistle	5	Extant	38.8230	-104.7029
Pt-484	Cirsium arvense	Canada thistle	8	Extant	38.8306	-104.7009
Pt-485	Cirsium arvense	Canada thistle	50	Extant	38.8305	-104.7012
Pt-486	Cirsium arvense	Canada thistle	3	Extant	38.8304	-104.7012
Pt-487	Cirsium arvense	Canada thistle	5	Extant	38.8285	-104.7003
Pt-488	Cirsium arvense	Canada thistle	3	Extant	38.8286	-104.7002
Pt-489	Cirsium arvense	Canada thistle	5	Extant	38.8286	-104.7003
Pt-490	Cirsium arvense	Canada thistle	1	Extant	38.8292	-104.7004
Pt-	Cirsium	Canada thistle	565	Extant	38.8328	-104.7029

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
491	arvense					
Pt-492	Cirsium arvense	Canada thistle	565	Extant	38.8327	-104.7032
Pt-493	Cirsium arvense	Canada thistle	63	Extant	38.8327	-104.7030
Pt-494	Cirsium arvense	Canada thistle	251	Extant	38.8328	-104.7018
Pt-495	Cirsium arvense	Canada thistle	141	Extant	38.8323	-104.7018
Pt-496	Cirsium arvense	Canada thistle	251	Extant	38.8322	-104.7019
Pt-497	Cirsium arvense	Canada thistle	141	Extant	38.8321	-104.7018
Pt-498	Cirsium arvense	Canada thistle	565	Extant	38.8318	-104.7018
Pt-500	Cirsium arvense	Canada thistle	25	Extant	38.8187	-104.7000
Pt-501	Cirsium arvense	Canada thistle	25	Extant	38.8186	-104.6996
Pt-502	Cirsium arvense	Canada thistle	100	Extant	38.8187	-104.6996
Pt-504	Cirsium arvense	Canada thistle	100	Extant	38.8188	-104.6995
Pt-505	Cirsium arvense	Canada thistle	10	Extant	38.8190	-104.6993
Pt-506	Cirsium arvense	Canada thistle	100	Extant	38.8194	-104.6992
Pt-507	Cirsium arvense	Canada thistle	100	Extant	38.8240	-104.7038
Pt-508	Cirsium arvense	Canada thistle	126	Extant	38.8309	-104.7118
Pt-509	Cirsium arvense	Canada thistle	10	Extant	38.8307	-104.7120
Pt-510	Cirsium arvense	Canada thistle	50	Extant	38.8306	-104.7122
Pt-511	Cirsium arvense	Canada thistle	2,356	Extant	38.8304	-104.7124
Pt-69	Cirsium arvense	Canada thistle	75	Extant	38.8315	-104.7046
Pt-79	Cirsium arvense	Canada thistle	75	Extant	38.8283	-104.7017
Pt-1	Cirsium arvense	Canada thistle	0	Eradicated	38.8290	-104.7066
Pt-106	Cirsium arvense	Canada thistle	0	Eradicated	38.8272	-104.6995

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-108	Cirsium arvense	Canada thistle	0	Eradicated	38.8261	-104.6988
Pt-111	Cirsium arvense	Canada thistle	0	Eradicated	38.8254	-104.6958
Pt-12	Cirsium arvense	Canada thistle	0	Eradicated	38.8260	-104.7056
Pt-13	Cirsium arvense	Canada thistle	0	Eradicated	38.8263	-104.7056
Pt-141	Cirsium arvense	Canada thistle	0	Eradicated	38.8264	-104.7012
Pt-145	Cirsium arvense	Canada thistle	0	Eradicated	38.8274	-104.6931
Pt-151	Cirsium arvense	Canada thistle	0	Eradicated	38.8263	-104.7030
Pt-152	Cirsium arvense	Canada thistle	0	Eradicated	38.8257	-104.7031
Pt-158	Cirsium arvense	Canada thistle	0	Eradicated	38.8308	-104.6932
Pt-16	Cirsium arvense	Canada thistle	0	Eradicated	38.8259	-104.7051
Pt-172	Cirsium arvense	Canada thistle	0	Eradicated	38.8303	-104.6957
Pt-174	Cirsium arvense	Canada thistle	0	Eradicated	38.8295	-104.6949
Pt-176	Cirsium arvense	Canada thistle	0	Eradicated	38.8310	-104.6978
Pt-179	Cirsium arvense	Canada thistle	0	Eradicated	38.8282	-104.7003
Pt-181	Cirsium arvense	Canada thistle	0	Eradicated	38.8291	-104.7002
Pt-182	Cirsium arvense	Canada thistle	0	Eradicated	38.8294	-104.7002
Pt-183	Cirsium arvense	Canada thistle	0	Eradicated	38.8307	-104.7002
Pt-185	Cirsium arvense	Canada thistle	0	Eradicated	38.8238	-104.7025
Pt-187	Cirsium arvense	Canada thistle	0	Eradicated	38.8233	-104.7024
Pt-188	Cirsium arvense	Canada thistle	0	Eradicated	38.8232	-104.7025
Pt-189	Cirsium arvense	Canada thistle	0	Eradicated	38.8227	-104.7027
Pt-190	Cirsium arvense	Canada thistle	0	Eradicated	38.8226	-104.7026
Pt-	Cirsium	Canada thistle	0	Eradicated	38.8224	-104.7017

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
192	arvense					
Pt-194	Cirsium arvense	Canada thistle	0	Eradicated	38.8234	-104.7016
Pt-196	Cirsium arvense	Canada thistle	0	Eradicated	38.8232	-104.7010
Pt-198	Cirsium arvense	Canada thistle	0	Eradicated	38.8221	-104.7021
Pt-199	Cirsium arvense	Canada thistle	0	Eradicated	38.8234	-104.7004
Pt-2	Cirsium arvense	Canada thistle	0	Eradicated	38.8289	-104.7065
Pt-201	Cirsium arvense	Canada thistle	0	Eradicated	38.8248	-104.7015
Pt-206	Cirsium arvense	Canada thistle	0	Eradicated	38.8237	-104.6990
Pt-214	Cirsium arvense	Canada thistle	0	Eradicated	38.8209	-104.6996
Pt-218	Cirsium arvense	Canada thistle	0	Eradicated	38.8237	-104.7056
Pt-220	Cirsium arvense	Canada thistle	0	Eradicated	38.8232	-104.7065
Pt-222	Cirsium arvense	Canada thistle	0	Eradicated	38.8223	-104.7053
Pt-223	Cirsium arvense	Canada thistle	0	Eradicated	38.8218	-104.7068
Pt-238	Cirsium arvense	Canada thistle	0	Eradicated	38.8206	-104.7019
Pt-239	Cirsium arvense	Canada thistle	0	Eradicated	38.8322	-104.7005
Pt-241	Cirsium arvense	Canada thistle	0	Eradicated	38.8366	-104.7009
Pt-244	Cirsium arvense	Canada thistle	0	Eradicated	38.8364	-104.7008
Pt-247	Cirsium arvense	Canada thistle	0	Eradicated	38.8354	-104.6999
Pt-254	Cirsium arvense	Canada thistle	0	Eradicated	38.8344	-104.6990
Pt-255	Cirsium arvense	Canada thistle	0	Eradicated	38.8344	-104.6994
Pt-257	Cirsium arvense	Canada thistle	0	Eradicated	38.8342	-104.6991
Pt-258	Cirsium arvense	Canada thistle	0	Eradicated	38.8342	-104.6987
Pt-260	Cirsium arvense	Canada thistle	0	Eradicated	38.8346	-104.7002

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-261	Cirsium arvense	Canada thistle	0	Eradicated	38.8349	-104.7005
Pt-262	Cirsium arvense	Canada thistle	0	Eradicated	38.8354	-104.7005
Pt-263	Cirsium arvense	Canada thistle	0	Eradicated	38.8359	-104.7008
Pt-264	Cirsium arvense	Canada thistle	0	Eradicated	38.8349	-104.7008
Pt-266	Cirsium arvense	Canada thistle	0	Eradicated	38.8341	-104.7008
Pt-267	Cirsium arvense	Canada thistle	0	Eradicated	38.8338	-104.7007
Pt-268	Cirsium arvense	Canada thistle	0	Eradicated	38.8340	-104.7009
Pt-270	Cirsium arvense	Canada thistle	0	Eradicated	38.8346	-104.7010
Pt-271	Cirsium arvense	Canada thistle	0	Eradicated	38.8318	-104.7035
Pt-272	Cirsium arvense	Canada thistle	0	Eradicated	38.8338	-104.7022
Pt-274	Cirsium arvense	Canada thistle	0	Eradicated	38.8359	-104.7031
Pt-293	Cirsium arvense	Canada thistle	0	Eradicated	38.8237	-104.6927
Pt-294	Cirsium arvense	Canada thistle	0	Eradicated	38.8195	-104.6943
Pt-296	Cirsium arvense	Canada thistle	0	Eradicated	38.8134	-104.6946
Pt-3	Cirsium arvense	Canada thistle	0	Eradicated	38.8282	-104.7069
Pt-314	Cirsium arvense	Canada thistle	0	Eradicated	38.8082	-104.6763
Pt-317	Cirsium arvense	Canada thistle	0	Eradicated	38.8121	-104.6803
Pt-319	Cirsium arvense	Canada thistle	0	Eradicated	38.8318	-104.7121
Pt-4	Cirsium arvense	Canada thistle	0	Eradicated	38.8265	-104.7074
Pt-5	Cirsium arvense	Canada thistle	0	Eradicated	38.8267	-104.7058
Pt-519	Cirsium arvense	Canada thistle	0	Eradicated	38.8281	-104.7016
Pt-520	Cirsium arvense	Canada thistle	0	Eradicated	38.8267	-104.7011
Pt-	Cirsium	Canada thistle	0	Eradicated	38.8265	-104.7008

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
522	arvense					
Pt-525	Cirsium arvense	Canada thistle	0	Eradicated	38.8258	-104.7025
Pt-526	Cirsium arvense	Canada thistle	0	Eradicated	38.8297	-104.7010
Pt-528	Cirsium arvense	Canada thistle	0	Eradicated	38.8352	-104.7021
Pt-529	Cirsium arvense	Canada thistle	0	Eradicated	38.8075	-104.6809
Pt-530	Cirsium arvense	Canada thistle	0	Eradicated	38.8309	-104.7127
Pt-58	Cirsium arvense	Canada thistle	0	Eradicated	38.8375	-104.7036
Pt-59	Cirsium arvense	Canada thistle	0	Eradicated	38.8380	-104.7039
Pt-6	Cirsium arvense	Canada thistle	0	Eradicated	38.8268	-104.7067
Pt-78	Cirsium arvense	Canada thistle	0	Eradicated	38.8270	-104.7033
Pt-8	Cirsium arvense	Canada thistle	0	Eradicated	38.8264	-104.7070
Pt-80	Cirsium arvense	Canada thistle	0	Eradicated	38.8295	-104.7023
Pt-81	Cirsium arvense	Canada thistle	0	Eradicated	38.8305	-104.7019
Pt-9	Cirsium arvense	Canada thistle	0	Eradicated	38.8265	-104.7072
Pt-91	Cirsium arvense	Canada thistle	0	Eradicated	38.8244	-104.6976
Pt-195	Cirsium arvense	Canada thistle	1	Dead Standing	38.8233	-104.7012
Pt-404	Cirsium arvense	Canada thistle	503	Dead Standing	38.8314	-104.7124
Pt-17	Cirsium vulgare	bull thistle	0	Eradicated	38.8259	-104.7051
Pt-21	Cirsium vulgare	bull thistle	0	Eradicated	38.8258	-104.7094
Ln-1	Convolvulus arvensis	field bindweed	497	Extant	38.8232	-104.7092
Ln-12	Convolvulus arvensis	field bindweed	1,018	Extant	38.8306	-104.7134
Ln-2	Convolvulus arvensis	field bindweed	4,217	Extant	38.8177	-104.6921

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Ln-23	Convolvulus arvensis	field bindweed	1,333	Extant	38.8305	-104.7132
Ln-5	Convolvulus arvensis	field bindweed	15	Extant	38.8316	-104.7084
Poly-5	Convolvulus arvensis	field bindweed	1,936	Extant	38.8234	-104.7093
Pt-11	Convolvulus arvensis	field bindweed	2	Extant	38.8257	-104.7063
Pt-148	Convolvulus arvensis	field bindweed	25	Extant	38.8246	-104.6922
Pt-18	Convolvulus arvensis	field bindweed	10	Extant	38.8255	-104.7104
Pt-191	Convolvulus arvensis	field bindweed	2	Extant	38.8229	-104.7025
Pt-20	Convolvulus arvensis	field bindweed	3	Extant	38.8257	-104.7097
Pt-210	Convolvulus arvensis	field bindweed	8	Extant	38.8225	-104.6991
Pt-212	Convolvulus arvensis	field bindweed	2	Extant	38.8227	-104.6993
Pt-213	Convolvulus arvensis	field bindweed	10	Extant	38.8228	-104.7000
Pt-228	Convolvulus arvensis	field bindweed	125	Extant	38.8202	-104.7055
Pt-23	Convolvulus arvensis	field bindweed	15	Extant	38.8260	-104.7086
Pt-240	Convolvulus arvensis	field bindweed	40	Extant	38.8366	-104.7009
Pt-242	Convolvulus arvensis	field bindweed	15	Extant	38.8367	-104.7011
Pt-25	Convolvulus arvensis	field bindweed	30	Extant	38.8240	-104.7097
Pt-252	Convolvulus arvensis	field bindweed	10	Extant	38.8345	-104.6987
Pt-26	Convolvulus arvensis	field bindweed	100	Extant	38.8237	-104.7092
Pt-27	Convolvulus arvensis	field bindweed	1,272	Extant	38.8234	-104.7088
Pt-275	Convolvulus arvensis	field bindweed	30	Extant	38.8352	-104.7035
Pt-28	Convolvulus arvensis	field bindweed	393	Extant	38.8233	-104.7086

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-281	Convolvulus arvensis	field bindweed	350	Extant	38.8367	-104.6922
Pt-289	Convolvulus arvensis	field bindweed	1	Extant	38.8168	-104.6922
Pt-29	Convolvulus arvensis	field bindweed	251	Extant	38.8232	-104.7084
Pt-290	Convolvulus arvensis	field bindweed	60	Extant	38.8175	-104.6913
Pt-299	Convolvulus arvensis	field bindweed	5	Extant	38.8131	-104.6972
Pt-30	Convolvulus arvensis	field bindweed	5	Extant	38.8231	-104.7082
Pt-307	Convolvulus arvensis	field bindweed	6	Extant	38.8233	-104.6822
Pt-31	Convolvulus arvensis	field bindweed	50	Extant	38.8228	-104.7081
Pt-310	Convolvulus arvensis	field bindweed	200	Extant	38.8239	-104.6827
Pt-311	Convolvulus arvensis	field bindweed	15	Extant	38.8243	-104.6831
Pt-312	Convolvulus arvensis	field bindweed	20	Extant	38.8246	-104.6832
Pt-315	Convolvulus arvensis	field bindweed	3	Extant	38.8109	-104.6796
Pt-32	Convolvulus arvensis	field bindweed	10	Extant	38.8225	-104.7085
Pt-320	Convolvulus arvensis	field bindweed	50	Extant	38.8310	-104.7128
Pt-33	Convolvulus arvensis	field bindweed	15	Extant	38.8227	-104.7085
Pt-34	Convolvulus arvensis	field bindweed	10	Extant	38.8228	-104.7087
Pt-348	Convolvulus arvensis	field bindweed	1	Extant	38.8315	-104.7100
Pt-349	Convolvulus arvensis	field bindweed	2	Extant	38.8315	-104.7101
Pt-35	Convolvulus arvensis	field bindweed	12	Extant	38.8235	-104.7094
Pt-350	Convolvulus arvensis	field bindweed	25	Extant	38.8318	-104.7105
Pt-351	Convolvulus arvensis	field bindweed	1,696	Extant	38.8319	-104.7102

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-352	Convolvulus arvensis	field bindweed	10	Extant	38.8321	-104.7102
Pt-353	Convolvulus arvensis	field bindweed	15	Extant	38.8323	-104.7099
Pt-354	Convolvulus arvensis	field bindweed	35	Extant	38.8324	-104.7097
Pt-356	Convolvulus arvensis	field bindweed	3	Extant	38.8325	-104.7094
Pt-357	Convolvulus arvensis	field bindweed	15	Extant	38.8324	-104.7101
Pt-358	Convolvulus arvensis	field bindweed	15	Extant	38.8324	-104.7103
Pt-359	Convolvulus arvensis	field bindweed	10	Extant	38.8324	-104.7106
Pt-36	Convolvulus arvensis	field bindweed	4	Extant	38.8234	-104.7092
Pt-360	Convolvulus arvensis	field bindweed	50	Extant	38.8317	-104.7099
Pt-363	Convolvulus arvensis	field bindweed	25	Extant	38.8316	-104.7091
Pt-364	Convolvulus arvensis	field bindweed	40	Extant	38.8317	-104.7091
Pt-366	Convolvulus arvensis	field bindweed	5	Extant	38.8321	-104.7086
Pt-367	Convolvulus arvensis	field bindweed	25	Extant	38.8321	-104.7084
Pt-368	Convolvulus arvensis	field bindweed	5	Extant	38.8317	-104.7083
Pt-370	Convolvulus arvensis	field bindweed	5	Extant	38.8316	-104.7083
Pt-371	Convolvulus arvensis	field bindweed	754	Extant	38.8254	-104.7018
Pt-372	Convolvulus arvensis	field bindweed	10	Extant	38.8261	-104.7030
Pt-377	Convolvulus arvensis	field bindweed	1	Extant	38.8371	-104.7031
Pt-378	Convolvulus arvensis	field bindweed	424	Extant	38.8372	-104.7031
Pt-381	Convolvulus arvensis	field bindweed	157	Extant	38.8378	-104.7021
Pt-382	Convolvulus arvensis	field bindweed	5	Extant	38.8377	-104.7021

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-383	Convolvulus arvensis	field bindweed	15	Extant	38.8376	-104.7022
Pt-386	Convolvulus arvensis	field bindweed	20	Extant	38.8363	-104.7022
Pt-387	Convolvulus arvensis	field bindweed	5	Extant	38.8229	-104.7081
Pt-39	Convolvulus arvensis	field bindweed	5	Extant	38.8232	-104.7082
Pt-397	Convolvulus arvensis	field bindweed	50	Extant	38.8310	-104.7126
Pt-401	Convolvulus arvensis	field bindweed	50	Extant	38.8311	-104.7129
Pt-402	Convolvulus arvensis	field bindweed	10	Extant	38.8311	-104.7128
Pt-403	Convolvulus arvensis	field bindweed	10	Extant	38.8312	-104.7127
Pt-405	Convolvulus arvensis	field bindweed	50	Extant	38.8309	-104.7130
Pt-406	Convolvulus arvensis	field bindweed	50	Extant	38.8309	-104.7131
Pt-407	Convolvulus arvensis	field bindweed	50	Extant	38.8308	-104.7132
Pt-41	Convolvulus arvensis	field bindweed	15	Extant	38.8243	-104.7071
Pt-44	Convolvulus arvensis	field bindweed	200	Extant	38.8352	-104.7058
Pt-45	Convolvulus arvensis	field bindweed	30	Extant	38.8368	-104.7058
Pt-46	Convolvulus arvensis	field bindweed	3	Extant	38.8362	-104.7021
Pt-462	Convolvulus arvensis	field bindweed	2	Extant	38.8175	-104.6790
Pt-463	Convolvulus arvensis	field bindweed	5	Extant	38.8248	-104.6839
Pt-466	Convolvulus arvensis	field bindweed	10	Extant	38.8243	-104.6832
Pt-467	Convolvulus arvensis	field bindweed	25	Extant	38.8242	-104.6833
Pt-468	Convolvulus arvensis	field bindweed	5	Extant	38.8246	-104.6839
Pt-469	Convolvulus arvensis	field bindweed	35	Extant	38.8247	-104.6840

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-47	Convolvulus arvensis	field bindweed	7,603	Extant	38.8386	-104.7021
Pt-48	Convolvulus arvensis	field bindweed	20	Extant	38.8384	-104.7017
Pt-49	Convolvulus arvensis	field bindweed	3	Extant	38.8380	-104.7017
Pt-50	Convolvulus arvensis	field bindweed	2	Extant	38.8378	-104.7017
Pt-51	Convolvulus arvensis	field bindweed	9	Extant	38.8376	-104.7017
Pt-52	Convolvulus arvensis	field bindweed	2	Extant	38.8370	-104.7028
Pt-53	Convolvulus arvensis	field bindweed	100	Extant	38.8372	-104.7020
Pt-54	Convolvulus arvensis	field bindweed	200	Extant	38.8375	-104.7023
Pt-55	Convolvulus arvensis	field bindweed	50	Extant	38.8375	-104.7026
Pt-61	Convolvulus arvensis	field bindweed	200	Extant	38.8378	-104.7028
Pt-63	Convolvulus arvensis	field bindweed	150	Extant	38.8379	-104.7022
Pt-64	Convolvulus arvensis	field bindweed	100	Extant	38.8378	-104.7019
Pt-65	Convolvulus arvensis	field bindweed	20	Extant	38.8380	-104.7023
Pt-66	Convolvulus arvensis	field bindweed	25	Extant	38.8382	-104.7025
Pt-67	Convolvulus arvensis	field bindweed	200	Extant	38.8382	-104.7027
Pt-68	Convolvulus arvensis	field bindweed	200	Extant	38.8383	-104.7032
Pt-140	Convolvulus arvensis	field bindweed	0	Eradicated	38.8262	-104.7012
Pt-143	Convolvulus arvensis	field bindweed	0	Eradicated	38.8265	-104.7005
Pt-146	Convolvulus arvensis	field bindweed	0	Eradicated	38.8272	-104.6929
Pt-147	Convolvulus arvensis	field bindweed	0	Eradicated	38.8253	-104.6923
Pt-173	Convolvulus arvensis	field bindweed	0	Eradicated	38.8300	-104.6960

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-193	Convolvulus arvensis	field bindweed	0	Eradicated	38.8234	-104.7016
Pt-197	Convolvulus arvensis	field bindweed	0	Eradicated	38.8221	-104.7016
Pt-202	Convolvulus arvensis	field bindweed	0	Eradicated	38.8250	-104.7003
Pt-204	Convolvulus arvensis	field bindweed	0	Eradicated	38.8253	-104.7000
Pt-205	Convolvulus arvensis	field bindweed	0	Eradicated	38.8246	-104.6992
Pt-221	Convolvulus arvensis	field bindweed	0	Eradicated	38.8222	-104.7082
Pt-224	Convolvulus arvensis	field bindweed	0	Eradicated	38.8220	-104.7069
Pt-226	Convolvulus arvensis	field bindweed	0	Eradicated	38.8217	-104.7040
Pt-227	Convolvulus arvensis	field bindweed	0	Eradicated	38.8219	-104.7043
Pt-229	Convolvulus arvensis	field bindweed	0	Eradicated	38.8205	-104.7059
Pt-230	Convolvulus arvensis	field bindweed	0	Eradicated	38.8215	-104.7055
Pt-231	Convolvulus arvensis	field bindweed	0	Eradicated	38.8216	-104.7053
Pt-236	Convolvulus arvensis	field bindweed	0	Eradicated	38.8196	-104.7018
Pt-237	Convolvulus arvensis	field bindweed	0	Eradicated	38.8197	-104.7019
Pt-24	Convolvulus arvensis	field bindweed	0	Eradicated	38.8251	-104.7082
Pt-243	Convolvulus arvensis	field bindweed	0	Eradicated	38.8366	-104.7011
Pt-253	Convolvulus arvensis	field bindweed	0	Eradicated	38.8343	-104.6989
Pt-276	Convolvulus arvensis	field bindweed	0	Eradicated	38.8343	-104.7032
Pt-277	Convolvulus arvensis	field bindweed	0	Eradicated	38.8344	-104.7031
Pt-278	Convolvulus arvensis	field bindweed	0	Eradicated	38.8277	-104.6918
Pt-279	Convolvulus arvensis	field bindweed	0	Eradicated	38.8265	-104.6921

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-280	Convolvulus arvensis	field bindweed	0	Eradicated	38.8281	-104.6922
Pt-282	Convolvulus arvensis	field bindweed	0	Eradicated	38.8365	-104.6951
Pt-284	Convolvulus arvensis	field bindweed	0	Eradicated	38.8170	-104.6778
Pt-286	Convolvulus arvensis	field bindweed	0	Eradicated	38.8203	-104.6943
Pt-287	Convolvulus arvensis	field bindweed	0	Eradicated	38.8204	-104.6935
Pt-288	Convolvulus arvensis	field bindweed	0	Eradicated	38.8198	-104.6934
Pt-291	Convolvulus arvensis	field bindweed	0	Eradicated	38.8220	-104.6920
Pt-304	Convolvulus arvensis	field bindweed	0	Eradicated	38.8157	-104.6978
Pt-306	Convolvulus arvensis	field bindweed	0	Eradicated	38.8173	-104.6790
Pt-308	Convolvulus arvensis	field bindweed	0	Eradicated	38.8171	-104.6801
Pt-321	Convolvulus arvensis	field bindweed	0	Eradicated	38.8299	-104.7133
Pt-336	Convolvulus arvensis	field bindweed	0	Eradicated	38.8316	-104.7093
Pt-37	Convolvulus arvensis	field bindweed	0	Eradicated	38.8239	-104.7082
Pt-38	Convolvulus arvensis	field bindweed	0	Eradicated	38.8238	-104.7080
Pt-40	Convolvulus arvensis	field bindweed	0	Eradicated	38.8244	-104.7072
Pt-42	Convolvulus arvensis	field bindweed	0	Eradicated	38.8242	-104.7069
Pt-56	Convolvulus arvensis	field bindweed	0	Eradicated	38.8375	-104.7029
Pt-57	Convolvulus arvensis	field bindweed	0	Eradicated	38.8375	-104.7033
Pt-60	Convolvulus arvensis	field bindweed	0	Eradicated	38.8379	-104.7034
Pt-62	Convolvulus arvensis	field bindweed	0	Eradicated	38.8378	-104.7025
Pt-7	Convolvulus arvensis	field bindweed	0	Eradicated	38.8265	-104.7070

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-70	Convolvulus arvensis	field bindweed	0	Eradicated	38.8314	-104.7044
Pt-76	Convolvulus arvensis	field bindweed	0	Eradicated	38.8310	-104.7033
Pt-292	Convolvulus arvensis	field bindweed	6	Dead Standing	38.8231	-104.6922
Ln-10	Elaeagnus angustifolia	Russian olive	13	Extant	38.8116	-104.6959
Poly-1	Elaeagnus angustifolia	Russian olive	4	Extant	38.8265	-104.7035
Pt-102	Elaeagnus angustifolia	Russian olive	1	Extant	38.8267	-104.7003
Pt-103	Elaeagnus angustifolia	Russian olive	1	Extant	38.8269	-104.7003
Pt-112	Elaeagnus angustifolia	Russian olive	1	Extant	38.8263	-104.6953
Pt-113	Elaeagnus angustifolia	Russian olive	1	Extant	38.8256	-104.6939
Pt-119	Elaeagnus angustifolia	Russian olive	1	Extant	38.8299	-104.6983
Pt-122	Elaeagnus angustifolia	Russian olive	1	Extant	38.8301	-104.6981
Pt-123	Elaeagnus angustifolia	Russian olive	1	Extant	38.8291	-104.6985
Pt-124	Elaeagnus angustifolia	Russian olive	1	Extant	38.8294	-104.6984
Pt-125	Elaeagnus angustifolia	Russian olive	1	Extant	38.8296	-104.6982
Pt-14	Elaeagnus angustifolia	Russian olive	1	Extant	38.8270	-104.7046
Pt-15	Elaeagnus angustifolia	Russian olive	2	Extant	38.8267	-104.7042
Pt-160	Elaeagnus angustifolia	Russian olive	1	Extant	38.8312	-104.7002
Pt-165	Elaeagnus angustifolia	Russian olive	1	Extant	38.8306	-104.6966
Pt-219	Elaeagnus angustifolia	Russian olive	1	Extant	38.8237	-104.7051
Pt-22	Elaeagnus angustifolia	Russian olive	2	Extant	38.8261	-104.7086
Pt-297	Elaeagnus angustifolia	Russian olive	1	Extant	38.8103	-104.6936

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-298	Elaeagnus angustifolia	Russian olive	7	Extant	38.8116	-104.6954
Pt-300	Elaeagnus angustifolia	Russian olive	1	Extant	38.8194	-104.7008
Pt-301	Elaeagnus angustifolia	Russian olive	3	Extant	38.8190	-104.7000
Pt-302	Elaeagnus angustifolia	Russian olive	1	Extant	38.8192	-104.7002
Pt-303	Elaeagnus angustifolia	Russian olive	1	Extant	38.8190	-104.7007
Pt-305	Elaeagnus angustifolia	Russian olive	4	Extant	38.8151	-104.6954
Pt-309	Elaeagnus angustifolia	Russian olive	1	Extant	38.8136	-104.6791
Pt-335	Elaeagnus angustifolia	Russian olive	2	Extant	38.8310	-104.7117
Pt-337	Elaeagnus angustifolia	Russian olive	1	Extant	38.8314	-104.7107
Pt-411	Elaeagnus angustifolia	Russian olive	1	Extant	38.8301	-104.7135
Pt-43	Elaeagnus angustifolia	Russian olive	1	Extant	38.8343	-104.7060
Pt-475	Elaeagnus angustifolia	Russian olive	1	Extant	38.8313	-104.7124
Pt-499	Elaeagnus angustifolia	Russian olive	1	Extant	38.8189	-104.7000
Pt-517	Elaeagnus angustifolia	Russian olive	1	Extant	38.8308	-104.7126
Pt-71	Elaeagnus angustifolia	Russian olive	1	Extant	38.8314	-104.7041
Pt-72	Elaeagnus angustifolia	Russian olive	1	Extant	38.8314	-104.7038
Pt-73	Elaeagnus angustifolia	Russian olive	1	Extant	38.8314	-104.7033
Pt-74	Elaeagnus angustifolia	Russian olive	1	Extant	38.8301	-104.7058
Pt-75	Elaeagnus angustifolia	Russian olive	1	Extant	38.8299	-104.7052
Pt-77	Elaeagnus angustifolia	Russian olive	1	Extant	38.8296	-104.7047
Pt-100	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8263	-104.7003

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-105	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8271	-104.6995
Pt-107	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8275	-104.6993
Pt-109	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8263	-104.6990
Pt-114	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8254	-104.6946
Pt-115	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8294	-104.6997
Pt-116	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8289	-104.6991
Pt-117	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8291	-104.6987
Pt-126	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8282	-104.6960
Pt-127	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8270	-104.6961
Pt-129	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8272	-104.6967
Pt-130	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8279	-104.6973
Pt-131	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8284	-104.6977
Pt-132	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8282	-104.6977
Pt-133	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8282	-104.6975
Pt-134	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8277	-104.6964
Pt-135	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8275	-104.6965
Pt-136	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8274	-104.6964
Pt-137	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8273	-104.6962
Pt-138	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8279	-104.6937
Pt-139	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8272	-104.6938
Pt-153	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8283	-104.6946

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-154	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8285	-104.6939
Pt-155	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8280	-104.6927
Pt-156	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8285	-104.6927
Pt-157	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8304	-104.6929
Pt-161	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8314	-104.6994
Pt-163	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8312	-104.6959
Pt-166	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8298	-104.6963
Pt-167	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8296	-104.6964
Pt-168	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8296	-104.6963
Pt-170	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8290	-104.6928
Pt-171	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8291	-104.6924
Pt-184	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8305	-104.7001
Pt-19	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8258	-104.7099
Pt-217	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8236	-104.7058
Pt-225	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8229	-104.7051
Pt-234	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8195	-104.7022
Pt-235	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8194	-104.7021
Pt-318	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8317	-104.7121
Pt-82	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8278	-104.6993
Pt-83	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8277	-104.6991
Pt-86	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8267	-104.6983

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
Pt-87	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8264	-104.6983
Pt-88	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8259	-104.6976
Pt-89	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8241	-104.6972
Pt-90	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8242	-104.6973
Pt-92	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8249	-104.6980
Pt-93	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8253	-104.6978
Pt-94	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8248	-104.6981
Pt-95	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8250	-104.6983
Pt-96	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8252	-104.6986
Pt-98	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8261	-104.6998
Pt-99	Elaeagnus angustifolia	Russian olive	0	Eradicated	38.8262	-104.7001
Pt-84	Elaeagnus angustifolia	Russian olive	1	Dead Standing	38.8272	-104.6989
Pt-97	Elaeagnus angustifolia	Russian olive	1	Dead Standing	38.8264	-104.6996
Pt-110	Gypsophila paniculata	baby's breath	0	Eradicated	38.8265	-104.6994
Pt-120	Gypsophila paniculata	baby's breath	0	Eradicated	38.8300	-104.6987
Pt-121	Gypsophila paniculata	baby's breath	0	Eradicated	38.8297	-104.6992
Pt-128	Gypsophila paniculata	baby's breath	0	Eradicated	38.8268	-104.6961
Pt-347	Hypericum perforatum	common St. Johnswort	3	Extant	38.8107	-104.6957
Poly-2	Hypericum perforatum	common St. Johnswort	0	Eradicated	38.8105	-104.6955
Pt-503	Linaria dalmatica ssp. dalmatica	Dalmatian toadflax	50	Extant	38.8187	-104.6996
Ln-	Linaria vulgaris	yellow toadflax	6,468	Extant	38.8353	-104.7003

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
16						
Pt-443	Linaria vulgaris	yellow toadflax	707	Extant	38.8339	-104.7009
Pt-445	Linaria vulgaris	yellow toadflax	707	Extant	38.8349	-104.7009
Pt-452	Linaria vulgaris	yellow toadflax	1,257	Extant	38.8343	-104.7000
Pt-256	Linaria vulgaris	yellow toadflax	0	Eradicated	38.8332	-104.6996
Pt-175	Lythrum salicaria	purple loosestrife	0	Eradicated	38.8311	-104.6976
Pt-398	Saponaria officinalis	bouncingbet	2	Extant	38.8309	-104.7128
Pt-399	Saponaria officinalis	bouncingbet	6	Extant	38.8308	-104.7129
Pt-400	Saponaria officinalis	bouncingbet	1	Extant	38.8310	-104.7128
Pt-408	Saponaria officinalis	bouncingbet	1	Extant	38.8306	-104.7132
Pt-118	Saponaria officinalis	bouncingbet	0	Eradicated	38.8297	-104.6986
Pt-476	Tamarix ramosissima	tamarisk	1	Extant	38.8305	-104.7134
Pt-216	Tamarix ramosissima	tamarisk	0	Eradicated	38.8245	-104.6961
Ln-9	Tribulus terrestris	punctureVine	1,867	Extant	38.8315	-104.6996
Pt-159	Tribulus terrestris	punctureVine	6	Extant	38.8315	-104.6935
Pt-164	Tribulus terrestris	punctureVine	4	Extant	38.8314	-104.6938
Pt-396	Tribulus terrestris	punctureVine	50	Extant	38.8316	-104.7001
Pt-456	Tribulus terrestris	punctureVine	5	Extant	38.8316	-104.6940
Pt-457	Tribulus terrestris	punctureVine	1	Extant	38.8316	-104.6942
Pt-464	Tribulus terrestris	punctureVine	3	Extant	38.8242	-104.6830
Pt-465	Tribulus terrestris	punctureVine	10	Extant	38.8243	-104.6831
Pt-101	Tribulus terrestris	punctureVine	0	Eradicated	38.8263	-104.7002
Pt-	Tribulus	punctureVine	0	Eradicated	38.8314	-104.6991

GIS ID	Scientific Name	Common Name	# of Ind.	Status	Latitude	Longitude
162	terrestris					
Pt-169	Tribulus terrestris	puncturevine	0	Eradicated	38.8283	-104.6930
Pt-203	Tribulus terrestris	puncturevine	0	Eradicated	38.8250	-104.6999
Pt-211	Tribulus terrestris	puncturevine	0	Eradicated	38.8228	-104.6991
Pt-232	Tribulus terrestris	puncturevine	0	Eradicated	38.8210	-104.7025
Pt-283	Tribulus terrestris	puncturevine	0	Eradicated	38.8317	-104.6944
Pt-285	Tribulus terrestris	puncturevine	0	Eradicated	38.8224	-104.6949
Pt-85	Tribulus terrestris	puncturevine	0	Eradicated	38.8269	-104.6984

Appendix C. Fact Sheets

The following weed fact sheets were downloaded from the Colorado Department of Agriculture website in 2014 at https://www.colorado.gov/pacific/agconservation/noxious-weed-species.

Diffuse knapweed

Centaurea diffusa

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Diffuse knapweed Identification and Management

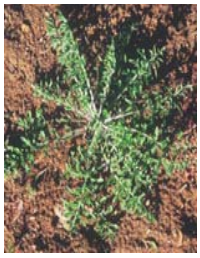
Identification and Impacts

Diffuse knapweed (*Centaurea diffusa*) is a non-native biennial forb that reproduces solely by seed. A biennial is a plant that completes its lifecycle within two years. During the first year of growth, diffuse knapweed appears as a rosette in spring or fall. During the second year in mid to late spring – the stem bolts, flowers, sets seed, and the plant dies. Once the plant dries up, it breaks off at ground level and becomes a tumbleweed which disperses the still viable seeds over long distances. A prolific seed producer, diffuse knapweed can produce up to 18,000 seeds per plant. Therefore, the key to managing this plant is to prevent seed production. Diffuse knapweed can grow 1 to 3 feet tall, and is diffusely branched above ground. This gives the plant a ball-shaped appearance and tumble-weed mobility when broken off. Leaves are small, and are reduced in size near the flowering heads. Flowers are mostly white, sometimes purple, urn-shaped, and are located on each branch tip. Bracts that enclose the flowerheads are divided like the teeth of a comb, and are tipped with a distinct slender spine. Upon drying, the bracts become rough, rendering them injurious to the touch. Flowers bloom July through August. Seed set usually occurs by mid-August.

Diffuse knapweed tends to invade disturbed, overgrazed areas. Other habitats may also include rangeland, roadsides, riparian areas, and trails. It is a tough competitor on dry sites and rapidly invades and dominates disturbed areas. Once established, diffuse knapweed outcompetes and reduces the quantity of desirable native species such as perennial grasses. As a result, biodiversity and land values are reduced, and soil erosion is increased.

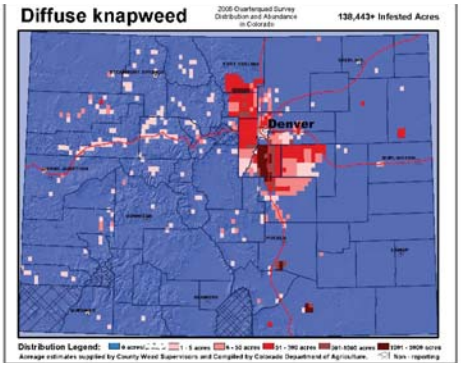
The key to effective control of Diffuse knapweed is to prevent the plant from flowering and going to seed. An integrated weed management approach dealing with Diffuse knapweed is highly recommended. There are many options of mechanical, chemical, and biological controls, available. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Diffuse knapweed is designated as a "List B" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information, visit www.colorado.gov/ag/csd and click on the Noxious Weed Program link or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division at 303-239-4100.



Key ID Points

1. Floral bracts have yellow spines with teeth appearing as a comb and a distrinct terminal spinte.
2. Flowers are white or lavender.
3. Seedlings have finely divided leaves



Plant photo, top © Kelly Uhing. Infestation map above, Crystal Andrews. Flower photo © Cindy Roche. Rosette and leaf photos © Dale Swenarton.

Updated on: 08/08

Management Recomendations

Diffuse knapweed

CULTURAL
Establishment of selected grasses can be an effective cultural control of diffuse knapweed. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

BIOLOGICAL
The seedhead weevil (*Larinus minutus*) and the root weevil fly (*Cyphocleonus achates*) provide fair to good control when used in combination with each other. Expect to wait at least 3 to 5 years for the insects to establish and achieve optimum results. This is an option for large infestations. To obtain the insects, contact the Colorado Department of Agriculture, 970-464-7916.

MECHANICAL
Any mechanical or physical method that severs the root below the soil surface will kill diffuse knapweed. Mowing or chopping is most effective when diffuse knapweed plants are at full-bloom. Be sure to properly dispose of the flowering cut plants, since seeds can mature and become viable after the plant has been cut down.

Integrated Weed Management:

Diffuse knapweed is best controlled in the rosette stage. It is imperative to prevent seed production. Do not allow diffuse knapweed flowers to appear. Management must be persistent in order to deplete the seed bank in the soil.

HERBICIDES : The following are recommendations for herbicides that can be applied to range and pasturelands. Always read, understand, and follow the label directions. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. **The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING
Aminopyralid (Milestone)	5-7 ounces/acre or 1 teaspoon/gal water	Spring at rosette to early bolt stage and/or in the fall to rosettes. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
2,4-D Amine	1 qt./acre or 1 oz/gal water	Apply to spring/fall rosettes - before flowering stalk lengthens. DO NOT apply when outside temperatures will exceed 85 degrees. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Clopyralid + Triclopyr (Redeem R&P)	1.5-2 pints/acre or 0.75 oz/gal water	Apply from rosette to early bolt stage of growth and/or in the fall to rosettes. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Picloram (Tordon 22K *this is a Restricted Use Pesticide*)	1-2 pts/acre or 0.75 oz/gal water	Apply to spring rosettes through mid-bolt and in fall to rosettes. DO NOT apply near trees/ shrubs/high water table.

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Canada Thistle Identification and Management

List B

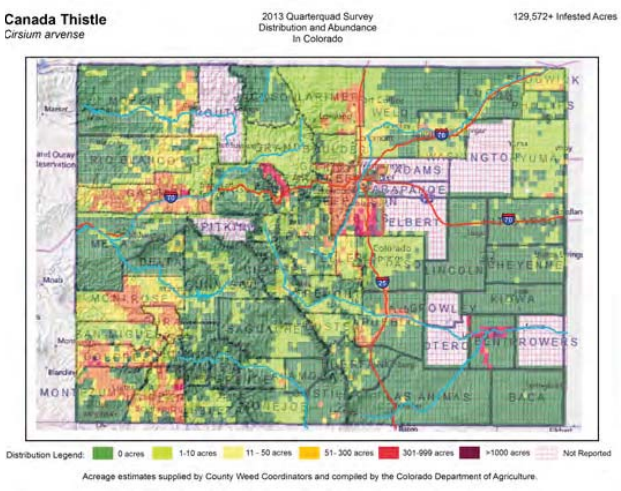
Canada thistle (*Cirsium arvense*) is a non-native, deep-rooted perennial that spreads by seeds and aggressive creeping, horizontal roots called rhizomes. Canada thistle can grow 2 to 4 feet in height. The leaves are oblong, spiny, bright green, and slightly hairy on the undersurface. Unlike other noxious biennial thistles which have a solitary flower at the end of each stem, Canada thistle flowers occur in small clusters of 1 to 5 flowers. They are about 1 cm in diameter, tubular shaped, and vary from white to purple in color.

Canada thistle emerges from its root system from late April through May. It flowers in late spring and throughout the summer. It produces about 1,000 to 1,500 seeds per plant that can be wind dispersed. Seeds survive in the soil for up to 20 years. Additionally, Canada thistle reproduces vegetatively through its root system, and quickly form dense stands. Each fragmented piece of root, 0.25 inch or larger, is capable of forming new plants. The key to controlling Canada thistle is to eliminate seed production and to reduce the plant's nutrient reserves in its root system through persistent, long-term management.

Canada thistle is one of the most troublesome noxious weeds in the U.S. It can infest diverse land types, ranging from roadsides, ditch banks, riparian zones, meadows, pastures, irrigated cropland, to the most productive dryland cropland. Large infestations significantly reduce crop and cattle forage production and native plant species. It is a host plant to several agricultural pests and diseases. Canada thistle prefers moist soils, but it can be found in a variety of soil types. It has been found at elevations up to 12,000 feet.

Effective Canada thistle control requires a combination of methods. Prevention is the most important strategy. Maintain healthy pastures and rangelands, and continually monitor your property for new infestations. Established plants need to be continually stressed. Management options become limited once plants begin to produce seeds. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

2013 Quarter Quad Survey



Canada thistle is designated as a "List B" species as described in the Colorado Noxious Weed Act. It is required to be either eliminated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/weeds and click on the Noxious Weed Program link or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, (303) 869-9030.

Key ID Points

1. Cluster of 1-5 white to purple flowers on a stem.
2. Floral bracts are spineless.
3. Small flowers that are 1 cm in diameter.
4. Perennial, rhizomatous plant with spiny, oblong, green leaves.

Canada thistle

Cirsium arvense

List B

Canada thistle

Cirsium arvense

Integrated Weed Management Recommendations

Integrated weed management is imperative for effective Canada thistle control. This weed needs to be continually stressed, forcing it to exhaust root nutrient stores, and eventually die. Mowing or grazing can be followed up with herbicide application. Avoid hand-pulling and tilling which can stimulate the growth of new plants.

CULTURAL
Prevention is the best control strategy. Maintain healthy pastures , riparian areas, and rangelands. Prevent bare ground caused by overgrazing, and continually monitor your property for new infestations. Establishment of select grasses can be an effective control.

BIOLOGICAL
Cattle, goats, and sheep will graze on Canada thistle when plants are young and succulent in the spring. Follow up grazing with a fall herbicide application. Insects are available, and provide limited control. Currently, collection and distribution methods for Canada thistle rust (*Puccinia punctiformis*) are being refined. For more information on Canada thistle biocontrol, contact the Colorado Department of Agriculture - Palisade Insectary at (970) 464-7916.

MECHANICAL
Due to Canada thistle's extensive root system, hand-pulling and tilling create root fragments and stimulate the growth of new plants. Mowing can be effective if done every 10 to 21 days throughout the growing season. Combining mowing with herbicides will further enhance Canada thistle control.

CHEMICAL
The table below includes recommendations for herbicides that can be applied to rangeland and some pastures. Treatments may be necessary for an additional 1 to 3 years because of root nutrient stores. Always read, understand, and follow the label directions.

HERBICIDE	RATE	APPLICATION TIMING
Aminopyralid (Milestone)	5-7 oz/acre or 1 teaspoon/gal water	Apply in spring until flowering and/or to fall regrowth. Add 0.25% v/v non-ionic surfactant (equivalent to 0.32oz/ gal water or 1 qt/100 gal water). Can also add chlorsulfuron (Telar) at 1 oz/acre to the mix.
Aminoclopyrachlor + chlorsulfuron (Perspective)	5.5 oz product/acre + 0.25% v/v non-ionic surfactant	Apply in spring from rosette to flower bud stage and/or fall regrowth. Important: Applications greater than 5.5 oz product/acre exceeds the threshold for selectivity. DO NOT treat in the root zone of desirable trees and shrubs. Not permitted for use in the San Luis Valley.
Clopyralid + triclopyr (Prescott; others)	3 pints product/acre or 1.25 oz/gal water	Apply in spring until flowering and/or fall regrowth. Add 0.25% v/v non-ionic surfactant.

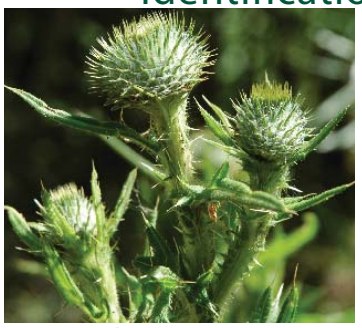
Colorado Department of Agriculture - Conservation Services
305 Interlocken Parkway
Broomfield, CO 80021
(303) 869-9030
www.colorado.gov/ag/weeds

Rev. 10/14

Bull thistle

Colorado Dept. of Agriculture,
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Bull thistle Identification and Management



Identification and Impacts

Bull thistle *(Cirsium vulgare (Savi) Tenore)* is a biennial forb that was introduced to North America as a seed contaminant and is now widespread. Gumdrop-shaped flowers are pinkish to dark purple in color and 1 ½ to 2 inches in diameter. The flower bracts are somewhat tapered and covered with spines. Seeds are capped with a circle of plume-like white hairs. Leaves are alternate. In Colorado, Bull thistles are the only species that are prickly hairy on the top and are cottony-hairy on the undersides of the leaves. In mature plants the leaves extend down, clasping the stem and are divided into segments. The plant has a short, fleshy taproot with several primary roots extending from the root crown. Seed leaves are round to spatulate, and smooth. Mature plants can produce up to 4,000 seeds per plant.

Habitats for Bull thistle include dry to moist environments. It thrives on nitrogen-rich soils, and it grows on gravelly to clay-textured soils. Bull thistle cannot withstand deep shade and is commonly seen in areas such as pastures, overgrazed rangeland, roadsides, and logged areas. Within Colorado Bull thistle infestations have been reported to occur in nearly all counties west of the continental divide, this plant has also been observed in the Upper Arkansas Watershed and in pockets on the plains. It is widespread throughout the United States and parts of Canada.

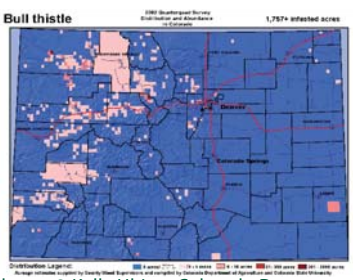
Heavy infestations can reduce livestock forage. Additionally, the presence of bull thistle in hay decreases the forage value and lowers the market price. It is an aggressive weed, but it will not withstand cultivation. Bull thistle is often a transient species, appearing in recent clear cuts or disturbed areas and becoming a dominant species for several years. It has been reported to cause hay fever in some individuals and is often confused with musk thistle.

The key to effective control of Bull thistle is maintaining healthy pastures and rangeland, guarding against disturbance or overuse, and as with most biennial limit seed production. To reduce seed production, plants with buds or flowers should be collected and immediately disposed of or destroyed. Chemical control is most effective when plants are in rosette stage, spring or early fall. Mechanical controls can be used to eliminate small patches or plants in a later growth stages. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Bull thistle is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/weeds or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Key ID Points

1. Leaves are prickly-hairy above and cottony below.
2. Heads cobwebby-pubescent (hairy).
3. Flowers are composite and purple in color.



Photos © Kelly Uhing, Colorado Department of Agriculture, map above by Crystal Andrews, Colorado Department of Agriculture,

Updated on:
08/08

Cirsium vulgare (Savi) Tenore

Management Recommendations

Bull thistle

CULTURAL
Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing.

BIOLOGICAL
Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

MECHANICAL
Because biennial thistles do not reproduce from their roots, any mechanical or physical method that severs the root below the soil surface will kill the weed. It is necessary to revegetate the site with desirable plants. Tillage, hoeing, or even hand-pulling should be successful (not on rangeland), providing it is done before the reproductive growth stages.

Integrated Weed Management:

Prevention is the most effective control with Bull thistle, maintaining healthy pastures and rangeland and continually monitor your property for new infestations.

As with most biennials, limiting seed production is another key to controlling plant populations. Chemical and mechanical options to control Bull thistle are also effective.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Clopyralid (Transline or Stinger)	0.13 to 0.5	Apply to rosettes in spring or fall.
Clopyralid + 2,4-D (Curtail)	0.2 + 1.0 to 0.3 + 1.5	Apply to rosettes in spring or fall.
Dicamba (Banvel, Vanquish, or Clarity)	0.5 + 1.0	Apply to rosettes in spring or fall if good growing conditions exist.
2,4-D or 2,4-D + dicamba (Rangestar)	1.5 to 2.0 1.0 + 0.5	Apply to rosettes in spring.
Picloram (Tordon 22K *restricted use chemical)	0.13 to 0.25	Apply to rosettes in spring or fall.
Chlorsulfuron (Telar)	0.047 (0.75 oz ai)	Spring from bolting to bud stages; add a non-ionic surfactant
Metsulfuron (Escort XP)	0.019 (0.3 oz ai)	Spring from bolting to bud stages; add a non-ionic surfactant.

Field bindweed

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Leaves are shaped like arrowheads.
2. Flowers are funnel-shaped, white to pink, and have two small bracts one inch below the flower base.

Field bindweed Identification and Management

Identification and Impacts

Field bindweed (*Convolvulus arvensis*) is a non-native deep-rooted perennial that reproduces from seed and creeping, horizontal roots (rhizomes). Field bindweed stems are prostrate (grows low to the ground) and twining, and grow up to 6 feet long. Leaves are distinguishable by their arrowhead shape. The flowers are bell or trumpet-shaped, white to pink in color, and are about 1 inch long. Field bindweed seeds can remain viable in the soil for up to 40 years.

Field bindweed emerges from its root system in the spring. Flowering occurs from June to September and until the first fall frost. The number of seeds produced per plant ranges from 25 to 300 and seed production is variable depending on environmental conditions. Field bindweed is an extremely difficult noxious weed to control because, in part, of its taproot that may go 20 feet deep into the soil, and which repeatedly gives rise to numerous long rhizomes.

Field bindweed is a problem throughout Colorado. It is one of the most competitive perennial weeds. It is widespread in cultivated areas, pastures, lawns, gardens, roadsides, and waste areas from 4,000 to 8,000 feet in elevation.

To successfully manage field bindweed, containment and persistence in controlling existing stands are necessary in order to exhaust the root system and deplete the soil seed bank. This weed needs to be continually stressed, forcing it to exhaust root nutrient stores and eventually die. Of all control methods, prevention is most important. Maintain healthy pastures and rangeland and continually monitor your property for new infestations. A healthy cover of desirable perennial plants will assist in discouraging field bindweed establishment.

Field bindweed is designated as a "List C" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local jurisdictions managing this species.

On the back of this sheet are field bindweed management recommendations. For more information, visit www.ag.state.co.us/csd/csdhome.html. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

White flower © Mary Ellen Harte, Invasive.org.
All other photos © Kelly Uhing.

Convulvulus arvensis

Management Recomendations

CULTURAL
Establishment of selected grasses can be an effective cultural control of field bindweed. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for **weed invasions.**

Bindweed mite damage

BIOLOGICAL
The bindweed gall mite, *Aceria mahlerbae*, has proven to be effective in reducing field bindweed infestations. This is an option for large infestations. To obtain a mite release, contact the Colorado Department of Agriculture, 970-464-7916.

MECHANICAL
Cutting, mowing, or pulling has a negligible effect unless the plants are cut below the surface in the early seedling stage. Well-established populations have a large seed bank in the soil that can remain viable for over 40 years.

Integrated Weed Management:

Field bindweed requires active management once it is established because of its potential to regenerate rapidly. Even small infestations should be viewed as a serious threat and managed aggressively.

Contain and persistently control infestations in order to exhaust the root system and deplete the soil seed bank.

Maintain a healthy cover of perennial plants to discourage field bindweed establishment.

Field bindweed

HERBICIDES: The following are recommendations for herbicides that can be applied to range and pasturelands. *Rates are approximate and based on equipment with an output of 30 gallons per acre. Please read label for exact rates.* Always read, understand, and follow the label directions. **The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING
Clarity + 2,4-D Amine	1 qt./acre or 1 oz/gal water	Just after full-bloom and/or fall. DO NOT apply near or under trees/shrubs or where soils have rapid permeability. DO NOT apply when outside temperatures will exceed 85 degrees. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
Tordon 22K *this is a Restricted Use Pesticide*	1 qt./acre or 1 oz/gal water	Just after full-bloom and/or fall. DO NOT apply near or under trees/shrubs or where soils have rapid permeability. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Roundup Ultra *non-selective herbicide, will kill all vegetation*	4 - 5 qts./acre or 4 - 5 oz/gal water	Apply at full-bloom and/or fall. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water. Use caution when applying near grasses or other desirable vegetation.

Conservation Services Division
Colorado Dept. of Agriculture
303-239-4100

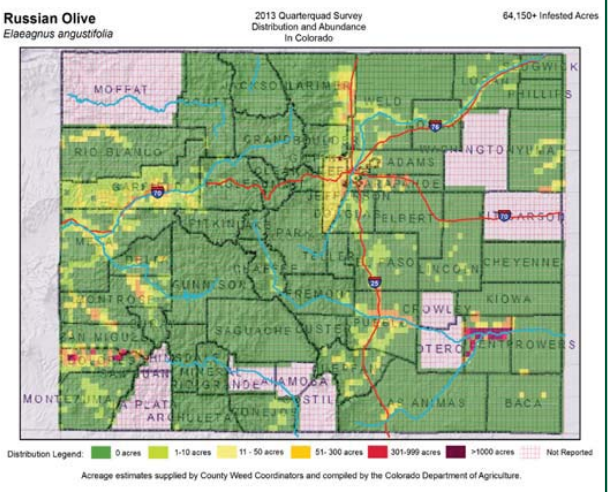
Russian Olive Identification and Management

List B

Russian olive *(Elaeagnus angustifoilia)* is a perennial tree or shrub that is native in Europe and Asia. The plant has olive-shaped fruits, silver color at first then becoming yellow-red when mature. Russian olive can reproduce by seed or root suckers. Seeds are readily spread by birds and can remain viable for up to 3 years. Spring moisture and slightly alkaline soil tend to favor seedling growth. The plant's extensive root system sprouts root suckers frequently. The tree can reach up to 30 feet in height with branches that have 1 to 2 inch thorns. Leaves are 2 to 3 inches long, alternate, narrow, and have simple blades with smooth edges. The leaf's lower surface is silvery white, while the upper surface is light green in color. Flowers are 4 small sepals in light yellow clusters, fragrant, and appear May through June. Fruits mature from September to November. Russian olive twigs are flexible, reddish, and have surfaces coated with gray and scaly pubescence, becoming smooth.

Once thought to be a beneficial windbreak tree, it since has been deemed detrimental to the environment. Russian olive can grow in a variety of soil and moisture conditions, but prefers open, moist, riparian zones. It is shade tolerant and can be found along streams, floodplains, fields and open areas up to approximately 8,000 feet in elevation. Russian-olive can outcompete native plants, interfere with natural plant succession and nutrient cycling, and tax water reserves. Because Russian olive is capable of fixing nitrogen in its roots, it can grow on bare, mineral substrates and dominate riparian vegetation. Although Russian olive provides a plentiful source of edible fruits for birds, ecologists have found that bird species richness is actually higher in riparian areas dominated by native vegetation.

The key to effective control of Russian olive is preventing establishment of the trees or shrubs. If plants are already present, control options include cut-stump treatments and mechanical mowing. These treatments depend on size and location of the plant. Details on the back of this sheet can help you create a management plan compatible with your site ecology.



Russian olive is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/weeds and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

© Patrick Breen, OSU

© Patrick Breen, OSU

Key ID Points

1. Leaves are silvery white.
2. Branches have 1 to 2 inch thorns.
3. Yellow-red fruits on mature plants.
4. Mature trees have shedding, reddish-brown bark.

Russian olive

Elaeagnus angustifoilia

List B

Russian olive

Elaeagnus angustifolia

Integrated Weed Management Recommendations

Integrated weed management offers the most effective combination of control efforts through the "cut stump" treatment. Trees are cut down with a hatchet or chainsaw, then immediately treated with an approved herbicide on the surface of the cut stump. The most effective timing is late summer/early fall for herbicide transfer into the roots.

© John Randall, TNC

© James Miller, USFS

© Chris Ness, Adams County

© Scott Peterson, USDA

CULTURAL

Replace Russian olives with native trees. Prevent establishment of new trees by removing seedlings and saplings before they mature. Contact your local Natural Resources Conservation Service for recommendations of other possible trees or shrubs.

BIOLOGICAL

Tubercularia canker is an unapproved biocontrol. However, it overwinters on infected stems and spreads via rain-splash, animals, or pruning implements to open wounds in the bark. Infected tissue becomes discolored or sunken. Entire stems may be girdled and killed, and the disease can deform or kill stressed plants over time.

MECHANICAL

Saplings can be pulled with a weed-wrench or cut with brush-cutters. Trees can be girdled or cut with chainsaws. However, stump sprouting commonly occurs after cutting down the tree; and stump excavation without removing all parts of the roots can result in root sprouting. Treating cut-stumps with an herbicide can eliminate sprouting. Stump burning is practical when conditions support a long, hot fire and most effective in summer or early fall. Saplings are most sensitive to mechanical treatment.

CHEMICAL

The table below includes recommendations for herbicides that can be applied to range and pasturelands. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Triclopyr (Garlon 4, Remedy)	Undiluted (100% solution)	Apply to the cambial layer of the tree immediately after the cut-stump treatment.
Imazapyr + Water (Habitat + Water or Arsenal + Water)	Diluted by mixing 8 to 12 fl. oz / 1 gallon of water	Apply to the cambial layer of the tree immediately after the cut-stump treatment.
Imazapyr (Habitat or Arsenal)	4 to 6 pt./acre	Broadcast spray/spraying individual trees; low or high volume spray.

COLORADO DEPARTMENT OF AGRICULTURE

Colorado Department of Agriculture - Conservation Services
700 Kipling Street, Suite 4000
Lakewood, CO 80215
303-239-4100
www.colorado.gov/ag/weeds

Colorado State University Extension

Rev. 9/2013

Common St. Johnswort

Hypericum perforatum

Colorado Dept. of Agriculture, Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

Identification and Management

Identification and Impacts

Common St. Johnswort (*Hypericum perforatum*) is a perennial forb native to Europe and frequently found in the Pacific Northwest. Common St. Johnswort grows to a height of 1 to 3 feet tall, with multiple branched stems. The stems are erect, ridged, rust colored, and woody at the base. The elliptical to oblong shaped leaves are no longer than 1 inch, covered with clear dots, and are opposite of each other on the stems. The flowers are bright yellow and about 3/4 of an inch in diameter. They appear in showy terminal clusters, have five petals and numerous visible stamens. Rust-brown seed pods are formed after flowering. Seed pods are about 1/4 inch in length and contain numerous amounts of seeds. One plant can produce up to 100,000 seeds per year. The root system consist of a large taproot and fiberous roots near the surface. The plant reproduces by seeds or short runners.

Habitats for Common St. Johnswort include disturbed sites, railroad right-of-ways, roadsides, rangeland, meadows, dry pastures, and open woodlands. It prefers sandy, dry soils, and full sun. If not monitored, it will infest healthy plant communities. The weed is toxic to white-haired animals. Animals will exhibit a skin irritation which is associated to sunlight. Animals will not die if the plant is ingested, but will show signs of weight loss.

The key to effective control of Common St. Johnswort is preventing the establishment of plant communities. Using an integrated weed management approach will assist in the control of Common St. Johnswort. Using a combination of mechanical, chemical and biological treatment options proves to be a effective in controlling this plant. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Common St. Johnswort is designated as a "List C" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local jurisdictions managing this species. For more information, visit www.colorado.gov/ag/weeds or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Photos © From bottom left; Colorado State University Extension - Adams County; (Next 2) Steven Dewey, Utah State University, Bugwood.org; Kelly Uhing, Colorado Department of Agriculture; Carlos DiSalvo, USDI National Park Servie, Bugwood.org

Updated on:
08/09

Management Recommendations

http://www.colorado.gov/ag/weeds

Common St. Johnswort

CULTURAL
Preventing the establishment of Common St. Johnswort, by planting desirable grasses and forbs will assist in control efforts. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

BIOLOGICAL
There are many different forms of biological control available to assist in control of Common St. Johnswort. Currently there is not any available for use in Colorado. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916 for more information.

MECHANICAL
Hand pull or dig when soil is moist, multiple times to remove all of the plants. Bag specimens carefully so as not to scatter seeds and remove from the sight. If left at the sight plants can regenerate vegetatively. The key to effective control is to prevent seed production and/or spread.

Integrated Weed Management:

Preventing the establishment of Common St. Johnswort, is the key method to control plant populations. Using a combination of cultural, biological, chemical, and mechanical treatments will help in control this plants population.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Aminopyralid (Milestone)	5-7 oz/acre or 1 teaspoon/gal water	Spring at actively growing to early growth stage. Add non-ionic surfactant @ 0.32oz/gal water ot 1qt/100 gal water.
Metsufuron (Cimarron)	1.0 oz/acre	Apply in spring to young activeley growing stages. Add non-ionic surfactacnt @ 0.32 oz/gal water or 1qt/100 gal water.
Picloram (Tordon 22K *this is a Restricted Use Pesticide*)	2-4 pts/acre	Apply to actively growing plants to pre-bud stages. DO NOT apply near trees/shrubs/high water tables
2,4-D Amine	2-4 pts/acre	Apply in spring to early growth to flower bud stage.

Photos © Top to Bottom; Steven Dewey, Utah State University, Bugwood.org; Whitney Cranshaw, Colorado State University, Bugwood.org; Kelly Uhing, Colorado Department of Agriculture

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Dalmatian toadflax

Colorado Dept. of Agriculture,
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Showy yellow snapdragon-like flowers with an orange throat on elongated racemes.
2. Thick, waxy, bluish heart-shaped leaves that wrap the stem.

Updated on:
08/08

Dalmatian toadflax Identification and Management

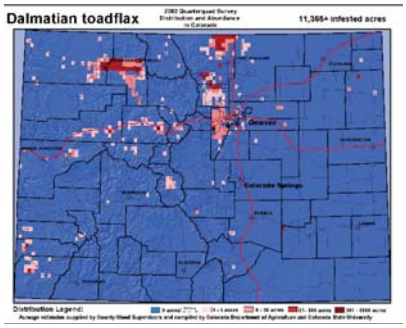
Identification and Impacts

Dalmatian toadflax *(Linaria dalmatica)* is a non-native, perennial forb introduced from the Mediterranean region as a folk remedy, fabric dye and ornamental. It reproduces both by seed and by extensive, creeping rhizomes. A single plant produces 500,000 seeds, most of which fall within 18 inches of the parent plant. Seeds can remain viable for at least 10 years. Dalmatian toadflax grows to 3 feet, and has bright yellow snapdragon-like flowers with an orange throat on elongated racemes. The alternate leaves are broad, with a thick, waxy cuticle and a bluish cast. Each leaf is heart-shaped and wraps the stem.

Habitats for Dalmatian toadflax include disturbed open sites, fields, pastures, rangeland, roadsides, cropland and forest clearings. Infestations can begin in small disturbed sites, then spread even to rangeland and wildlife habitats in excellent condition. Dalmatian toadflax is a highly aggressive plant that can genetically adapt to varied environmental conditions and herbicide controls. Its extreme competitiveness is due to early spring regeneration from vegetative buds on roots that are not dependent on soil moisture or native plant competition. Once established, toadflax quickly overruns native plants and becomes a monoculture that severely reduces forage, productivity, biodiversity and wildlife habitat.

The key to effective control of Dalmatian toadflax is prevention and integrating as many management strategies as possible. Prevention is always desirable when dealing with Dalmatian toadflax. Early detection and eradication can keep populations from exploding, making more management options available. With the plants varying genetically using many different approaches is important such as; chemical, mechanical, cultural and biological methods. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Dalmatian toadflax is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/csd and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.



Clockwise, from lower left, photos © John M. Randall of The Nature Conservancy; and Linda Wilson and Susan Turner of Invasive.org. Infestation map by Crystal Andrews, Colorado Department of Agriculture.

Linaria dalmatica

Management Recommendations

CULTURAL
It is imperative to seed managed areas with competitive grasses such as thickspike wheatgrass and streambank wheatgrass. The combination of herbicide spraying and seeding competitive grasses controls Dalmatian toadflax better than spraying alone. (K.G. Beck, CSU)

BIOLOGICAL
Calophasia lunula, a predatory noctuid moth, feeds on leaves and flowers of Dalmatian toadflax. Eteobalea intermediella, a root boring moth, and Mecinus janthinus, a stem boring weevil, are also available. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

MECHANICAL
For small infestations, pulling toadflax by hand can be effective. Pull every year for 5 to 6 years to deplete the reserves of the root system. Monitor the site for 10 - 15 years to remove seedlings produced from dormant seeds.

Integrated Weed Management:

Because of the high genetic variability of the toadflax species, it is critical to integrate as many management strategies as possible into the control program. Two local populations may respond differently to the same herbicides.

Keys to management are to prevent seed formation and vegetative spread by roots. Controlling toadflaxes is expensive and difficult, prevention is the best option.

Dalmatian toadflax

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. **Always read, understand, and follow the label directions. The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING
Picloram (Tordon 22K) *Avoid spraying near trees and/or water	2-4 pints/acre	Apply when flowering in spring and/or in the fall. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
Chlorsulfuron (Telar)	2-3 oz./acre	Apply at flower stage in spring and/or in the fall. Add non-ionic surfactant @ 0.32 oz/gal. water or 1 qt./100 gal. water.
2,4-D + Dicamba (Rangestar)	2 qt. + 2 qt/ acre	Apply during pre-bloom to flower stage in spring. Add non-ionic surfactant @ 0.32 oz/gal. water or 1 qt/100gal water. Retreatment is required for several years.

Top photo, © Kelly Uhing, Colorado Department of Agriculture. *Calophasia lunula* larva photo © Bob Richard, USDA APHIS, Invasive.org. Handpulling toadflax photo © Lake Tahoe Environmental Education Coalition.

Yellow toadflax

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Yellow flowers that are like snapdragons with deep orange centers.
2. Stems that are woody at the base and smooth to the top.

Updated on:
02/08

Yellow toadflax Identification and Management

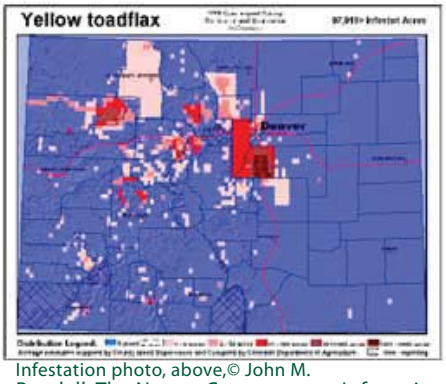
Identification and Impacts

Yellow toadflax (Linaria vulgaris) is a perennial escaped ornamental plant that is native to the Mediterranean region. The leaves are narrow, linear, and 1 to 2 inches long. The stems are woody at the base and smooth toward the top. Sparingly branched and 1 to 3 feet tall. The showy snapdragon-like flowers are bright yellow with a deep orange center and have a spur as long as the entire flower. It develops an extensive root system, making control options varied. Yellow toadflax displaces desirable plant communities reducing ecological diversity and rangeland value. Decreases forage for domestic livestock, some big game species and decreases habitat for associated animal communities. The plant is known to be mildly poisonous to cattle. Goats and sheep have been known to graze the plants with little effect.

Habitats for Yellow toadflax include roadsides, vacant lots, gravel pits, fields, waste areas, other disturbed sites and rangeland. It has adapted to a variety of site conditions, from moist to dry and does well in all types of soil. The plant can even establish in areas of excellent condition in natural disturbances or small openings.

The key to effective control of Yellow toadflax is prevention and integrating as many management strategies as possible. Prevention is always desirable when dealing with Yellow toadflax. Early detection and eradication can keep populations from exploding, making more management options available. With the plants varying genetically using many different approaches is important such as; herbicide, mechanical, cultural and biological methods. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Yellow toadflax is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/weeds and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.



Infestation photo, above,© John M. Randall, The Nature Conservancy. Infestation map, Crystal Andrews, Colo.Dept.of Agriculture. Flower photo, top, © Missouri Extension. Flower bract photo, left,© Paul Slichter, University of Wisconsin, Stevens Point. Leaves photo © Gary Fewless, Unviersity of Wisconsin, Stevens Point.

Linaria vulgaris

Management Recommendations

CULTURAL
Establish select grasses and forbs as an effective cultural control of Yellow toadflax. Contact your local Natural Resources Conservation Service for seed mix recommendations. Bareground is prime habitat for weed invasions, so maintain healthy pastures and prevent bare spots caused by overgrazing.

BIOLOGICAL
Calophasia lunula, a predatory noctuid moth, feeds on leaves and flowers of Yellow toadflax. Eteobalea intermediella, a root boring moth and Mecinus janthinus a stem boring weevil are also available. For more information, contact the Colorado Department of Agriculture's Insectary in Palisade, Colorado at 970-464-7916.

MECHANICAL
Handpulling or digging is not recommended for eradication of Yellow toadflax because it's unlikely that the entire root will be excavated and a new plant is likely to occur. A single new plant might be an exception. Tillage is not recommended due to the creeping root system.

Integrated Weed Management:

Because of the high genetic variability of the toadflax species it is critical to integrate as many management strategies as possible into the control program. Two local populations may respond differently to the same herbicides.

Keys to management are to prevent seed formation and vegetative spread by roots. Controlling is expensive and difficult to treat toadflaxes, prevention is the best option.

Yellow toadflax

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasture-lands. *Rates are approximate and based on equipment with an output of 30 gallons per acre.* Always read, understand, and follow the label directions. The herbicide label is the LAW!

Herbicide	Rate	Application Timing
Chlorsulfuron (Telar - general use)	Apply 1-3 oz/A product plus 0.50% v/v MSO Silicone Blend surfactant (multiple brands available)	Apply at mid-flowering through fall. Telar has grazing restrictions above 1 1/3 oz/A rate. Please refer to the label for more detail.
Picloram + Chlorsulfuron (Tordon 22K - *restricted use* + Telar - general use)	Apply at 1 qt/Acre Picloram + 1.25 oz/A Telar plus 0.25% v/v non-ionic surfactant.	Apply at flowering through fall. Typically late August through September application timing has shown best results. Re-treatment may be necessary. Refer to label for grazing restrictions on Telar.
Picloram (Tordon 22K - *re-stricted use*)	Apply at 1.5 qt/A plus 0.25% v/v non-ionic surfactant or 1 qt/A crop oil concentrate	Apply in fall (late August through September). Re-treatment may be necessary.

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Purple loosestrife

Lythrum salicaria

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street, Suite 4000
Lakewood, CO 80215
303-239-4100

Purple loosestrife Identification and Management

Identification and Impacts

Purple loosestrife *(Lythrum salicaria)* is a non-native, tap-rooted, perennial forb. It is native to Europe and was introduced to North America as an ornamental plant for gardens. It has escaped into natural areas such as streambanks and shallow ponds. Purple loosestrife reproduces primarily by seed. A single, mature plant can produce up to three million seeds per year. The seeds can remain viable in the soil for 5 to 20 years. Pieces of roots or stems also can produce new plants. Purple loosestrife produces multiple four-sided stems that can grow two to eight feet tall. Leaves are two to five inches long, lance-shaped and whorled on the stems. Flowers are tightly grouped in long, vertical heads; they bloom from the bottom up. They are reddish-purple in color, about one inch long, and have five to seven petals. Flowers appear from late June through September.

Key ID Points

1. Showy rose-purple flowers bloom in long vertical racemes.
2. Lance-shaped leaves have smooth edges.

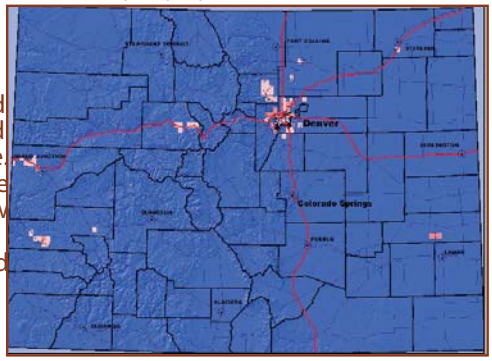
Purple loosestrife can be found along riverbanks, ditches, and wet meadows throughout the state. Infestations rapidly replace native vegetation, can impede water flow in canals and ditches, and have little wildlife habitat value. Infested wetlands eventually become a monoculture of loosestrife.

If purple loosestrife is growing in your garden, remove plants immediately and consider a substitute. There are many planting alternatives that are better suited to Colorado and beneficial to wildlife. Alternatives include spotted gayfeather, Rocky Mountain Penstemon, beebalm, purple coneflower, and Colorado Columbine. For more information refer to Colorado Native Plant Society's website, www.conps.org.

The key to effective control of purple loosestrife is early detection when infestations are small. It is fairly easy to control small numbers of loosestrife plants when the seed bank in the soil is low. Eradicating large populations is much more difficult. Persistent management and monitoring of site is a long-term program to ensure eradication. Small loosestrife infestations should be eradicated by hand-pulling/cutting in combination with herbicide application. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Purple loosestrife is designated as "List A" species on the Colorado Noxious Weed Act. It is required to be eradicated wherever found in the State. For more information visit www.colorado.gov/ag/csd and click on the Noxious Weed Program link or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Map of purple loosestrife infestation.



All photos © Kelly Uhing. Infestation map above, Crystal Andrews, Colorado Department of Agriculture.

Updated on: 09/13

Management Recommendations

CULTURAL
Prevent the establishment of new infestations by minimizing disturbance and seed dispersal.

BIOLOGICAL
Biocontrol agents are not included in the prescribed management plans by the State for List A Species. Eradication is the management objective of all List A's. For more information on biocontrol in Colorado, please contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

MECHANICAL
Hand removal of isolated individuals can be effective on small infestations. Hand removal should be performed prior to seed set. It is important to remove the entire rootstalk of the plant to avoid regrowth from root fragments. During the flowering stage, flowerheads must be cut and disposed of properly before a herbicide is applied. This will prevent or reduce seed production.

Integrated Weed Management:

Since purple loosestrife has been identified in Colorado, preventing the populations from spreading is important in management of the weed. Prevent new seeds from being added to the seed bank by managing purple loosestrife before it flowers or by clipping and disposing of the flowerheads prior to seed set and using herbicides to control plants.

Follow up control efforts the same growing season and for several years afterwards. Maintain a healthy cover of perennial plants.

HERBICIDES

The following are recommendations for herbicides that can be applied to range and pasture lands. Always read, understand, and follow the label directions. Rates are approximate and based on equipment with an output of 30 gallons per acre. Please read label for exact rates. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Triclopyr (Garlon 3A)	6-8 qts./acre or 1.3-1.9 oz/gal water	Apply in summer. If plants are flowering, cut and properly dispose of flowerheads before applying Garlon 3A. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
Glyphosate (Rodeo (aquatic safe) *nonselective, will kill all vegetation it contacts*)	4 qts./acre or 1.3-1.9 oz/gal water	Apply in summer during the flowering stage. Cut and properly dispose of flowerheads before applying Rodeo. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Aquatic 2,4-D Amine	1-2 qts/acre or 1.3-2.5 oz/gal water	Early spring - prevents seed formation only. Retreatment will be necessary. DO NOT apply when outside temperatures will exceed 85 degrees. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.

Purple loosestrife

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Bouncingbet

Colorado Dept. of Agriculture,
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Leaves are opposite, smooth, narrow, and 2-4 inches long.
2. Flowers have five petals and are generally light pink to white.

Updated on:
08/08

Bouncingbet Identification and Management

Identification and Impacts

Bouncingbet *(Saponaria officinalis)* is a perennial forb. The flowers are crowded at the ends of branches, and have five petals that are generally light pink to white and slightly notched at the apex. Flowering begins in July and continues until September. The fruits are many-seeded capsules and seeds are dull-black and roundish or kidney-shaped. Bouncingbet reproduces by seed and spreads by rhizomatous swollen nodes. Leaves are opposite, smooth, narrow, 2 to 4 inches long and have three distinct veins from the base. The stems are erect, sparingly branched, smooth, and forming. Mature plants grow up to three feet tall.

Bouncingbet can be poisonous to livestock and humans. It is generally considered unpalatable to livestock. The plant contains sapogenic glycosides that cause gastrointestinal irritation and can destroy red blood cells when absorbed in the blood streams of grazing animals.

The habitat of Bouncingbet is often found in large dense patches on hillsides, along rivers, roadsides, meadows, and waste areas. It prefers moist, well-drained soil, and full sun to partial shade and is currently found primarily in municipal areas and nearby wildlands. Bouncingbet spreads rapidly, replacing more valuable species (e.g. perennial grasses). Bouncingbet is increasingly common in Colorado, particularly in residential areas and local open spaces where it has escaped as an ornamental species. Bouncingbet was originally introduced from Europe as a garden ornamental.

The key to effective control of Bouncingbet is early detection and prevention of new infestations, since it is not yet widespread in Colorado. If infestations are discovered, they should be controlled immediately, and all seed production prevented. Since Bouncingbet usually grows in dense patches it is relatively easy to spot and treat. Be aware that this species is often found in wet areas, which may restrict the use of certain herbicides. As with all perennial weeds that have extensive root systems, the key to controlling Bouncingbet, is to eliminate seed production while depleting the nutrient reserves in the roots. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Bouncingbet is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/csd and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Saponaria officinalis

Management Recommendations

CULTURAL
Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing.

BIOLOGICAL
There is no biological control available for Bouncingbet. Since biological control agents take years to research, develop and release, no releases are expected in the foreseeable future. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

MECHANICAL
Physical or mechanical control of Bouncingbet is NOT recommended because the plant reproduces clonally from its root system. Handpull or dig only single plants/new infestations when soil is moist to make certain entire root system is excavated.

Integrated Weed Management:

Since Bouncingbet usually grows in dense patches it is relatively easy to spot and treat. Be aware that this species is often found in wet areas, which may restrict the use of certain herbicides. As with all perennial weeds that have extensive root systems, the key to controlling Bouncingbet is to eliminate seed production while depleting the nutrient reserves in the roots.

Bouncingbet

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. **Always read, understand, and follow the label directions. The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING
Chlorsulfuron (Telar)	1 oz product/A + 0.25% v/v	Apply at bolting to bud growth stage. (Late Spring to Mid Summer)

Photos © Top to bottom: Michael Shephard, USDA Forest Service, Bugwood.org; Richard Old, XID Services, Inc., Bugwood.org; and Dale Swenarton, Colorado Department of Agriculture.

Saltcedar

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Saltcedar is a tall shrub or small tree that has white to pink flowers in clusters called racimes.
2. Leaves are small and scaly.

Updated on:
08/08

Saltcedar Identification and Management

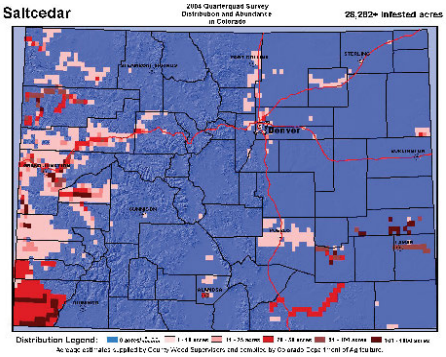
Identification and Impacts

Saltcedar, or tamarisk *(Tamarix spp.)*, is a non-native deciduous evergreen shrub or small tree that grows from 5 to 20 feet tall. The bark on saplings and stems is reddish-brown. The leaves are small, scale-like and bluish-green in color. Tiny pink to white flowers have five petals and grow on slender racemes. Saltcedar reproduces by seeds as well as vegetatively. A mature plant can produce up to 600,000 seeds per year. Seeds are viable for up to 45 days under ideal conditions. Saltcedar buds break dormancy in February or March. Flowering occurs anytime between April and August. Ideal conditions for saltcedar seedling survival are saturated soil during the first few weeks of life, a high water table, and open sunny ground with little competition from other plants.

Saltcedar was introduced from central Asia, northern Africa, and southern Europe for ornamental purposes and for stream bank stabilization. It is now widespread in the United States. Saltcedar crowds out native stands of riparian and wetland vegetation. Saltcedar increases salinity of surface soil, rendering the soil inhospitable to native plant species. Saltcedar can be found along floodplains, riverbanks, streambanks, marshes, and irrigation ditches. It's heavy use of water has contributed to the intensity of the drought.

The most effective method of control for saltcedar is to prevent its establishment through proper land management. Monitor susceptible areas for new infestations. An integrated weed management approach has proven to be an effective control when dealing with saltcedar. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Saltcedar is designated as a "List B" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information, please visit www.colorado.gov/ag/csd and click on the Noxious Weed Program link. Or call the State Weed Coordinator of the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.



Plant and flower photos © Kelly Uhing. Leaf photo © USDA Aphis PPQ. Infestation photo above, © Steve Dewey, Invasive.org. Tamarisk branch © Stevens County, WA Noxious Weed Control Board

Tamarix spp.

Management Recomendations

Saltcedar

CULTURAL
After a saltcedar infestation is managed, revegetation is necessary in order to protect the soil resource and reduce the threat of reinvasion. Seeded grasses, willow stakes, and cottonwood cuttings can reduce the chances of saltcedar reinvading managed sites.

BIOLOGICAL
The saltcedar leaf beetle (*Diorhabda elongata*) larvae and adults feed on foliage. This causes stem dieback and potential death of the plant if defoliation is consistent. The leaf beetle should be available for limited distribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture, 970-464-7916.

MECHANICAL
A bulldozer or prescribed fire can be used to open up large stands of saltcedar. These methods must be followed up with a herbicide treatment of the resprouts when they are 1 to 2 meters tall. Chainsaws, or loppers for smaller plants, are effective for cut-stump treatments to smaller infestations or in environmentally-sensitive management areas.

Integrated Weed Management:

Select the appropriate control method based on the size of the area and other environmental or cultural considerations. Re-seed controlled areas with desirable species to protect the soil resource and to prevent or slow saltcedar reinvasion. Follow up control efforts the same growing season and for several years afterwards.

HERBICIDES: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on hand-held equipment with an output of 30 gallons per acre. Always read, understand, and follow the label directions. **The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING
Triclopyr (Garlon 4 *approved aquatic label*)	Foliar - 2-4 qts./acre Cut-stump - undiluted 100% Basal bark treatment 1:3 of herbicide:natural oil	Foliar treatments - late spring to early fall Cut-stump - anytime except when snow is present Basal bark - anytime except when snow is present
Glyphosate (Rodeo *approved aquatic label* **nonselective, will kill all vegetation it contacts**)	Cut-stump - undiluted 100%	Treat anytime except when snow is present. Treat the cambium immediately after being cut. Thoroughly wet the surface, but not to the of run-off.
Imazapyr (Arsenal or Habitat *Habitat is approved for use in aquatic sites*)	Cut-stump - 8-12oz/gal water Foliar - 0.5-6.5oz/gal water + nonionic surfactant or methylated seed oil	Cut-stump - anytime except spring during heavy sap flows. Foliar - late spring to late summer. Spray entire crown and 70% of plant. Avoid spray solution run-off. After application, do not disturb saltcedar for 2 years or overall control will be reduced.

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Puncturevine

Colorado Dept. of Agriculture,
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

Identification and Management

Identification and Impacts

Puncturevine (*Tribulus terrestris*) in a summer annual forb, and is native to Europe. The plant is prostrate or ascending, spreading into mat forming cover. The stems are trailing and can grow to 1 1/2 to 5 feet long. Leaves are formed into leaflets, with each leaflet containing 5 to 8 oval leaves. The leaves are hairy and opposite. The flowers appear in July through October. They have five petals and are yellow in color. Each flower node will produce a fruit, at maturity the fruit will break into 5 seed capsules. Each seed capsule will produce 2-4 seeds. Each capsule is hard and contains many spines, almost tack like. The shape of the seed capsule has been referred to as a "goathead." The seeds will propagate after the first moisture of the spring and then any wet period following. Seeds can stay viable for 4 to 5 years.

Habitats for Puncturevine include, but are not limited to roadsides, pastures, waste areas, cultivated fields, yards, and disturbed sites. The seed capsules can cause injury to humans, animals, and tires. Seeds can be found in hay, which may cause injury to animals. The capsules can also become entangled in wool, and decrease the quality. Due to the spiny nature of the plant, spreading seed over large areas is fairly easy.

The key to effective control of Puncturevine is preventing the plants to produce seed. Puncturevine can easily be dug up, making sure to get all the roots and to bag any flowering parts. Chemical and biological controls can also be effective as treatment options. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Puncturevine is designated as a "List C" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local jurisdictions managing this species. For more information, visit www.colorado.gov/ag/weeds and click on the Noxious Weed Program link. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Photos © From Bottom left; Steve Dewey, Utah State University, Bugwood.org; All other Kelly Uhing, Colorado Department of Agriculture

Tribulus terrestris

Updated on:
08/09

Management Recommendations

http://www.colorado.gov/ag/weeds

Puncturevine

CULTURAL
Cultural control for Puncturevine is a difficult task, since seed reserves can stay viable for 4 to 5 years. Preventing the plants from establishing, by eliminating bareground can assist in the process. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

BIOLOGICAL
There are two biological controls available for control of Puncturevine; *Microlarinus lareynii*, a seed feeding weevil, and *Microlarinus lypriformis*, a stem boring weevil. Contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916 for more information.

MECHANICAL
Hand pull or dig when soil is moist, but make sure to wear gloves. Bag specimens carefully so as not to scatter seeds. This is helpful unless infestations are too large. The key to effective control is to prevent seed production and/or spread.

Integrated Weed Management:

Using a combination of control options can be effective in the control of Puncturevine. The plants are hard to eradicate, due to the seed viability of 4 to 5 years in the soil. Constant monitoring and management can be helpful.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Glyphosate (Roundup) *Non-selectiveherbicide*	1.6% solution or 2 oz./gal water	Apply in early plant growth stages, emergance and rosettes.
2,4 D and Dicamba (Outlaw)	1-2 pints/Acre or 0.5-1.0 oz/gal water	Spring at emergence of seedlings continue through growing season. Add non-ionic surfactant 0.32 oz./gal water or 1 qt./100 gal water.
Chlorusulfuron (Telar)	1-3 oz./Acre	Apply pre-emergance or early post-emergance.
Pendimethalin (Pendulum)	2.1-4.2 qts/Acre	A pre-emegance spray.

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