National Park Service
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Invasive Exotic Plant Monitoring at Colorado National Monument

2019 Field Season

Natural Resource Report NPS/NCPN/NRR—2021/2268



ON THE COVER

Redstem filaree (*Erodium cicutarium*). Photo ©Priyantha Wijesinghe (CC-BY-NC).

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Executive Summary

Invasive exotic plant (IEP) species are a significant threat to natural ecosystem integrity and biodiversity, and controlling them is a high priority for the National Park Service. The Northern Colorado Plateau Network (NCPN) selected the early detection of IEPs as one of 11 monitoring protocols to be implemented as part of its long-term monitoring program. This report represents work completed at Colorado National Monument during 2019. During monitoring conducted June 12–19, a total of 20 IEP species were detected on monitoring routes and transects. Of these, 12 were priority species that accounted for 791 separate IEP patches. IEPs were most prevalent along riparian areas. Yellow sweetclover (*Melilotis officinale*) and yellow salsify (*Tragopogon dubius*) were the most commonly detected priority IEPs along monitoring routes, representing 73% of all priority patches. Patches of less than 40 m^2 were typical of nearly all priority IEP species except yellow sweetclover. A patch management index (PMI) was created by combining patch size class and percent cover for each patch. In 2019, a large majority of priority IEP patches were assigned a PMI score of low (46%) or very low (50%), indicating small and/or sparse patches where control is generally still feasible. This is similar to the numbers for 2017, when 99% of patches scored low or very low in PMI. Seventy-eight percent of tree patches were classified as seedlings or saplings, which require less effort to control than mature trees. Cheatgrass (*Anisantha tectorum*) was the most common IEP recorded in transects, found in 30–77% of transects across the different routes. It was the only species found in transects on all monitoring routes. When treated and untreated extra areas near the West Entrance were compared, the treated area had comparable or higher levels of IEPs than the untreated area. When segments of monitoring routes conducted between 2003 and 2019 were compared, results were mixed, due to the different species monitored in different time periods. But in general, the number of IEPs per 100 meters is increasing or remaining constant over time. There were notable increases in IEP patches per 100 meters on several routes in 2019: field bindweed (*Convolvulus arvensis*) along East Glade Park Road; Siberian elm (*Ulmus pumila*) in Red Canyon; yellow salsify along East Glade Park Road, No Thoroughfare Canyon, No Thoroughfare Trail, and Red Canyon; and yellow sweetclover in No Thoroughfare Canyon and Red Canyon. Network staff will return to re-sample monitoring routes in 2021.

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1 Introduction

Invasive exotic species fragment native ecosystems, displace native plants and animals, and alter ecosystem function. Invasive species are second only to habitat loss as threats to global biodiversity (Scott and Wilcove 1998) and represent one of the most serious threats to natural ecosystem integrity (NRC 2002). Biological invasions are occurring at accelerated rates in nearly every major ecosystem (Mooney and Hobbs 2000).

Exotic plants negatively affect park resources and visitor enjoyment by altering landscapes and fire regimes, reducing native plant communities and animal habitat, and increasing trail-maintenance needs (see Loope 1992). Recognizing these challenges, national parks of the Northern Colorado Plateau Network (NCPN) identified invasive exotic plants (IEPs) as a high-priority vital sign for long-term monitoring (O'Dell et al. 2005).

IEPs are a subset of exotic plants "whose introduction does or is likely to cause economic or environmental harm or harm to human health" (Executive Order 13112). With the aim of facilitating strategic control approaches, the NCPN monitoring program detects early invasions, identifies existing invasions, and, to the extent possible, tracks changes in the abundance and distribution of IEPs in parks along key invasive pathways.

Invasive exotic plants can spread into national parks via a number of different pathway types. Predictable IEP pathways include roads, trails, and riparian corridors. Long-distance dispersal through cargo containers and air freight are examples of sudden pathways. Anthropogenic pathways include horticultural escapes and seeds transported on shoes and in restoration seed mixes. For the National Park Service (NPS), the consequences of these plant invasions present a significant challenge to the agency's ability to maintain natural resources "unimpaired for the enjoyment of future generations."

Because regular, comprehensive monitoring of the distribution and abundance of all exotic plant species within NCPN units is beyond the fiscal capabilities of the network and parks, the NCPN focuses on the most likely areas where a broad range of invasive exotic plants may occur: riparian corridors, roads, trails, areas of high visitor impact (e.g., campgrounds), and park boundaries. This approach is cost-effective for finding many new invasions in areas where they are most likely to occur, but it may miss exotic plants dispersed to the interior areas of large parks by wind and/or animals. This report summarizes the 2019 field season at Colorado National Monument (NM).

Specific objectives of NCPN invasive exotic plant monitoring are:

1. To detect incipient populations and new introductions of invasive plant species before they become established in areas of management significance and invasion pathways; and
2. To determine status and trends of selected invasive plant populations of management significance.

2 Methods

Field work followed the invasive exotic plant monitoring protocol developed by the NCPN (Perkins et al. 2016), adapted from Andersen and Dewey (2007). The protocol emphasizes the quick collection of IEP location and abundance data in order to maximize the amount of area searched, thus increasing our chances of finding a higher percentage of both new invasions and established IEPs. By focusing on roads, trails, and waterways, which are major vectors for invasive plants, we capture the greatest amount of information (i.e., benefit) with the least amount of time and effort (i.e., cost).

After NCPN staff reviewed and updated the list of priority invasive exotic plants for the park, we established a series of co-located monitoring routes and transects along all roads, major drainages, and trails in the park. The transects, which are composed of three quadrats sampled in a quantitative manner, are used to make inference to the percent cover of priority IEPs located along the park's invasive pathways (i.e., the monitoring routes) and allow us to estimate trends in selected IEP percent cover over time. The monitoring routes are used to increase the spatial coverage of mapping performed, with the goal of maximizing opportunities for detecting IEPs.

2.1 Developing a park priority invasive exotic plant list

Prior to the start of monitoring, NCPN and park staff reviewed the list of priority IEPs (Table 2-1). The original list was developed by reviewing past park literature and state and county weed lists and consulting with park staff and county weed managers. Our priority IEP list includes existing IEPs and potential IEPs of high management concern. Because these methods were designed to be rapid, field crews were trained to develop a focused search image on the priority IEPs, instead of looking for every possible invasive plant species. The likelihood of eradicating these priority species or containing them within a park is generally high. Cheatgrass (*Anisantha tectorum*) has been recorded in transect quadrats since 2011. Tumble mustard (*Sisymbrium altissimum*), Russian thistle (*Salsola* sp.), and redstem filaree (*Erodium cicutarium*) were recorded in transect quadrats starting in 2017. Ripgut brome (*Anisantha diandra*) was added to the priority list of 29 plants in 2019.

Table 2-1. Priority invasive plant list, Colorado National Monument.

Scientific name	Common name
Acosta diffusa	diffuse knapweed
Acosta maculosa	spotted knapweed
Acroptilon repens	Russian knapweed
Anisantha diandra[1]	ripgut brome
Arctium minus	burdock
Breea arvensis	Canada thistle
Cardaria sp.[2]	hoary cress
Cardaria latifolia[3]	broadleaf pepperwort
Carduus acanthoides	plumeless thistle
Carduus nutans	musk thistle
Chorispora tenella[4]	blue mustard
Cirsium vulgare	bull thistle
Convolvulus arvensis	field bindweed
Cylindropyrum cylindricum	jointed goatgrass
Cynoglossum officinale[4]	common houndstongue
Descurainia sophia[4]	flixweed
Elaeagnus angustifolia	Russian olive
Isatis tentoria	Dyer's woad
Leucantha solstitialis	yellow starthistle
Linaria vulgaris	butter-and-eggs
Lythrum salicaria	purple loosestrife
Melilotus officinale[5]	yellow sweetclover
Onopordum acanthium	Scotch thistle
Tamarix spp.	tamarisk
Tithymalus esula	leafy spurge
Tragopogon dubius[4]	yellow salsify
Tribulus terrestris	puncturevine
Ulmus pumila	Siberian elm
Verbascum thapsus	woolly mullein

[1]Added in 2019.
[2]*Cardaria draba* was specified until 2017, when it was converted to *Cardaria* sp. *C. latifolia* continues to be identified as a separate species.
[3]*C. latifolia* is listed separately from *Cardaria* sp. because it is easy to differentiate from other *Cardaria* species. Also, *C. latifolia* can have different control strategies than other *Cardaria* species.
[4]Added in 2015.
[5]Added in 2011.

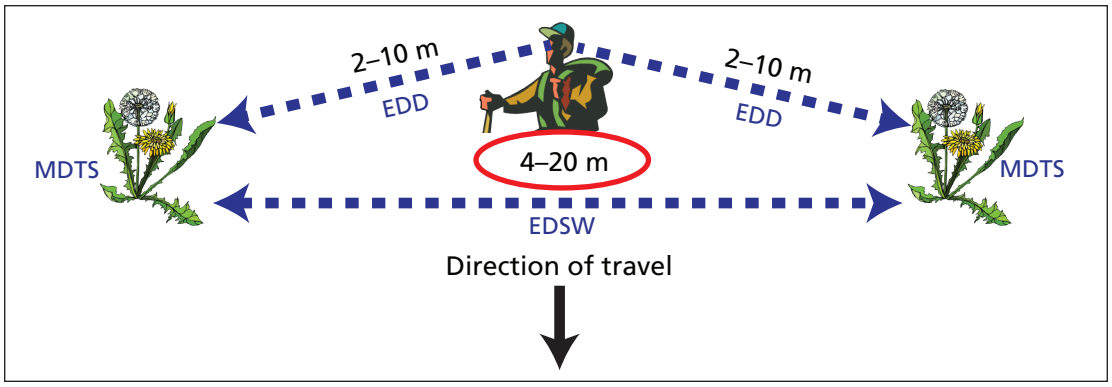


Figure 2-1. The maximum effective detection distance (EDD) at Colorado NM ranged from 2 to 10 meters in 2019, making the effective detection swath width (EDSW) 4–20 meters.

2.2 Monitoring routes

2.2.1 Minimum detection target size

The minimum detection target size (MDTS) represents the patch size that is large enough to be detected with a high level of confidence (typically at least 90% of the total number of patches of that size and larger in the monitoring area) under actual field conditions, but small enough so that any missed patches smaller than the MDTS could still feasibly be eradicated if not found until the next scheduled monitoring visit. We established an MDTS of 40 m^2 (0.01 acres or approximately 20 × 20 ft) for all IEPs. Use of the MDTS was necessary because field technicians were not expected to find every single plant of every priority IEP species during route surveys. Although searching for single mature plants of some species, such as Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix* sp.), is possible due to their large size, single plants of other species, such as field bindweed (*Convolvulus arvensis*), or even seedlings of the aforementioned species, are nearly impossible to detect in most field conditions.

2.2.2 Effective detection distance

The effective detection distance (EDD) is the maximum distance from which a searcher can consistently detect (i.e., see and recognize) the MDTS of the least-visible priority species with at least 90% efficiency. Crew members calibrated themselves by walking away from a targeted patch size of the least-visible species and determining the maximum distance from which they could consistently see and recognize the patch with complete confidence. The distance was measured either by pacing or using a laser rangefinder. The EDD for Colorado NM in 2019 was 2–10 meters, due to vegetation that could obscure some patches (Figure 2-1).

2.2.3 Effective detection swath width

Effective detection swath width (EDSW) is the maximum width of a linear search swath (band transect) in which a walking observer is confident of visually detecting 90% of all priority species of the MDTS. The effective detection swath width (EDSW) is equal to two times the EDD, because the surveyor is able to effectively detect IEPs for one EDD on either side of his/her search route. The EDSW for Colorado NM in 2019 ranged from 4 to 20 meters (Figure 2-1).

2.2.4 Patch separation resolution

We defined patch separation resolution (PSR) as the minimum distance between plants that must be considered members of separate patches or patches. Individuals or clusters of a priority species separated by the PSR distance or more were recorded as separate patches. We considered plants separated by less than the PSR to be a single patch. The PSR was set at 50 meters, based on the assumption that plants or groups of plants separated by less than 50 meters are typically considered to be one patch during planning and implementation of IEP control operations. If a patch was continuous for

more than 50 meters, then cover estimates were made every 50 meters to aid in developing an effective management strategy for the entire patch.

2.2.5 Between feature position

Between feature positions allow electronic tracking of the user's route. The GPS unit was set to automatically generate positions every 20 meters.

2.2.6 Data collection methods

For East Glade Park Road, we walked one meter out from one side of the road and then returned to the starting point by walking back one meter from the road on the other side. In some cases, due to topography and property boundaries, it was not possible to walk one meter from the road. For single-track trails and drainages, we walked the center of the trail or drainage in only one direction.

While walking, we searched for selected IEPs by visually scanning (side-to-side) all of the land within the borders of the swath. However, if the terrain was uneven or steep, and the observer had to glance frequently at the ground to ensure safe foot placement, then searchers stopped approximately every 4–20 meters (the length of one EDSW) and visually scanned the area in all directions. As monitoring routes were traversed, locations of all priority species were documented using global positioning system (GPS) units with at least five-meter accuracy.

Only IEPs designated as priority were consistently recorded on monitoring routes. Survey crew members were given the latitude to record non-priority IEP species if they were noteworthy. When a priority IEP was discovered, we recorded the following information: (1) monitoring route, (2) location, (3) patch size class (see below), (4) whether the plant was pulled by the observer, and (5) cover class (see below). If several IEP species were present with similar distributions at a single point, then we recorded a point for each individual IEP species and assigned it its own sequential identification number.

Patch size class was estimated as follows:

1. 1–3 plants (used for isolated single plants or very small patches (≤ 2 × 2 m)
2. 4 plants–40 m^2 (48 yd^2)
3. 40–400 m^2 (48–478 yd^2)
4. 400–1,000 m^2 (0.1–0.25 acre)
5. 1,000–2,000 m^2 (0.25–0.5 acre).

We recorded cover class by estimating the amount, or "percentage," of ground covered by the vertical projection of plant matter as visualized from a bird's-eye view of the vegetation (Elzinga et al. 1998). This estimate included both the living and dead standing material of the vegetation of a single plant species. Cover class of a patch was recorded using the following classes:

1. Trace (<1%)
2. Low (1–5%)
3. Moderate (6–25%)
4. High (26–50%)
5. Majority (51–100%).

We recorded the following ancillary information with every patch: the growth stage of exotic trees (i.e., sapling, seedling, mature), evidence of prior treatment, and evidence of disturbances (e.g., recent fire, flood, small mammal disturbance).

2.3 Monitoring transects

2.3.1 Transect and quadrat establishment

Our methods for sampling quadrats were based on Stohlgren and others (2005). We established transects with three vegetation quadrats every 500 meters along monitoring routes. Quadrats were centered at 0.5, 5, and 10 meters away from the route being walked. They were placed on the same side as the route being walked for roads, and on alternating sides for riparian areas, small roads, or trails. This differed slightly from 2009, when quadrats were placed at 3, 8, and 13 meters from the route. To sample cover of vegetation and soil-surface features, a 1-m^2 quadrat (sample frame of PVC pipe) was placed on the right side of the transect line

as the technician walked from the monitoring route. In some cases, the corners of the quadrat were propped up to level it. If there was not enough space between the route and a topographic feature or property boundary to conduct the three quadrats, then only the quadrats that could be placed between the route and the feature/boundary were recorded.

2.3.2 Data collection methods

Observers recorded all priority IEP species observed in the monitoring quadrats. In addition, cheatgrass has been recorded in transect quadrats since 2011. Tumble mustard, Russian thistle, and redstem filaree have been recorded in transect quadrats since 2017.

For each quadrat, we recorded percent cover of each IEP using the following classes: <1, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80, 90, or 100%. Classes in between these numbers were rounded to the nearest class. This differed slightly from 2009, when cover classes were <1, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11–25, 26–50, 51–75, or >75%. However, only three transects would have been recorded differently in 2009 had the current framework been used in that year. We also recorded percent cover of dominant soil-surface features (i.e., dead wood, dung, fungus, lichen, litter/duff, live root/bole, mineral soil/sediment, moss, biological soil crust, road, rock, standing water/flooded, stream, or trash/junk) using the same classes.

2.4 Extra-area surveys and quadrats

Extra areas were surveyed at the park's request, due to planned and completed treatments at the park's West Entrance. To increase sample size, we combined all treatment areas (some of which were overlapping) into one treated extra area. This extra area included 12.44 hectares of land treated several times between 2015 to 2019 (Table 2-2). We compared these to an untreated extra area of 26.31 hectares. These same areas were monitored in 2015, 2017, and 2019.

Observers conducted extra-area surveys by searching for priority and non-priority IEPs along straight, parallel lines, one EDSW apart, that followed a UTM northing or easting. To conduct these searches, the observer walked to a starting position at the edge of the intended search area corresponding to a certain UTM value. From that position, the observer used a compass to set a bearing and a target horizon landmark,

Table 2-2. Treatments to remove IEPs from the West Entrance extra areas by Colorado National Monument staff, 2015–2019.

Year	Month/Date	Treatment	Species
2015	March	Herbicide	cheatgrass, filaree, tumble mustard
2015	July 17–29	Herbicide, hand pulling	Russian thistle
2015	October 14–15	Herbicide	cheatgrass, filaree, tumble mustard
2016	May 11–12	Hand pulling	tumble mustard
2016	July 6	Hand pulling	Russian thistle
2016	July 25–August 31	Herbicide	Russian thistle
2016	August 25	Herbicide	Russian thistle
2016	November 3–7	Herbicide	cheatgrass, filaree, tumble mustard
2017	June 6–July 27	Hand pulling	Russian thistle
2017	August 8	Herbicide	Russian thistle
2017	October 25	Herbicide	Early season invasives
2018	May 31 and June 4	Herbicide	Russian thistle
2018	June 21	Hand pulling	Russian thistle
2019	March	Con mods installed	Seeded with *Hedysarum boreale*, *Sporobolus cryptandrus* and *Achnatherum hymenoides*

then walked along this line while searching for IEPs on either side of the line's center. When an IEP was found, the observer stood in the center of the patch to enter the necessary data. Patches were determined to be inside or outside the extra area according to the location of the observer when recording the patch. In addition to priority species, the following species were recorded in extra areas: redstem filaree, Russian thistle, tumble mustard, desert madwort (*Alyssum desertorum*), and cheatgrass.*

2.5 Analyses

We calculated the number of patches per 100 meters for monitoring routes. Percent cover and frequency values were generated from the quadrat data, from which we calculated the mean and standard error of percent cover by species.

During data analysis, we developed a Patch Management Index (PMI) to quantify both the extent and the density of a patch into a single value that helps identify the scale of the problem. Park managers will be able to use this tool to help prioritize IEP treatment. PMI was determined using the following formula:

Patch size class (1–5) × Percent cover class (1–5) = Patch management index (1–25)

We then grouped PMI into five classes:

1. Very low (1–5)
2. Low (6–10)
3. Moderate (11–15)
4. High (16–20)
5. Very High (21–25).

Patches with low or very low PMI scores will generally be easier to control or remove than patches with high or very high PMI scores. In many cases, directing resources toward controlling patches with low or very low PMI can be a highly effective management strategy; the goal of early detection is to allow managers to eliminate patches before they can grow into bigger problems. Other times, a species with many inventoried patches that are mostly low or very low in PMI may or may not be easier to treat (and possibly eradicate) than a different species that has a few inventoried patches that are high or very high in PMI. Therefore, park managers should consider PMI within the context of information on species and patch numbers.

*In 2015, only priority species and cheatgrass were mapped.

3 Results

3.1 Invasive exotic plant species detected

A total of 20 IEP species were recorded on monitoring routes, transects, and extra-area searches in 2019. Twelve were priority species (Table 3-1). Twenty IEP species were recorded on monitoring routes (12 priority species). Nine IEP species each were recorded in monitoring transects (5 priority species) and extra areas (4 priority species). We monitored 79.8 kilometers (49.6 mi) of monitoring routes and 26.2 hectares (64.7 ac) in the West Entrance extra areas in 2019.

3.2 Monitoring routes

A total of 791 patches of 12 priority IEP species were detected along 14 monitoring routes in 2019 (Table 3-2; Figures 3-1 to 3-8; Appendix A). An additional 21 patches of eight non-priority IEP species were detected along these same routes. Several routes* were not monitored in 2019 due to time constraints and lower priority (the result of low IEP detections in past years).

Priority IEPs were most prevalent in riparian areas, averaging 1.99 patches per 100 meters. They were found in highest numbers along the Hydro 95 (2.45 patches/100 m), Red Canyon (2.06 patches/100 m), and No Thoroughfare Canyon (2.01 patches/100 m) routes (see Table 3-2). East Glade Park Road averaged 1.34 patches per 100 meters. Trails had the lowest number of IEPs, averaging 0.27 patches per 100 meters.

Yellow sweetclover (*Melilotus officinale*), yellow salsify (*Tragopogon dubius*), and

*Columbus Canyon, Fruita Canyon, Gold Star Canyon, Hydro 11, Hydro 86, Hydro 88, Kodels Canyon, Lizard Canyon, Monument Canyon, Red Canyon, Ute Canyon, Wedding Canyon drainages, Rim Rock Drive and Rim Rock South Roads, and Kodels Canyon Trail.

Table 3-1. Invasive exotic plants detected at Colorado National Monument, June 12–19, 2019.

Scientific name	Common name	Method detected			Priority?
		Route	Transect	West Entrance extra area	
Anisantha diandra	ripgut brome	Y	Y	N	Y
Cardaria sp.	whitetop	Y	N	N	Y
Chorispora tenella	blue mustard	Y	Y	Y	Y
Convolvulus arvensis	field bindweed	Y	Y	Y	Y
Cylindropyrum cylindricum	jointed goatgrass	Y	N	N	Y
Descurainia sophia	flixweed	Y	N	Y	Y
Elaeagnus angustifolia	Russian olive	Y	N	N	Y
Melilotus officinale	yellow sweetclover	Y	Y	Y	Y
Tamarix sp.	tamarisk	Y	N	N	Y
Tragopogon dubius	yellow salsify	Y	Y	N	Y
Ulmus pumila	Siberian elm	Y	N	N	Y
Verbascum thapsus	woolly mullein	Y	N	N	Y
Anisantha tectorum	cheatgrass	Y	Y	Y	Transects only
Erodium cicutarium	redstem filaree	Y	Y	Y	Transects only
Salsola sp.	Russian thistle	Y	Y	Y	Transects only
Sisymbrium altissimum	tumble mustard	Y	Y	Y	Transects only
Agropyron cristatum	crested wheatgrass	Y	N	Y	N
Asparagus officinalis	asparagus	Y	N	N	N
Populus alba	white poplar	Y	N	N	N
Triticum aestivum	wheat	Y	N	N	N

Table 3-2. Number of IEP patches per route and per 100 meters, and hectares covered on each route, Colorado National Monument, June 12–19, 2019.

Route type	Route	Length (m)	Ha	Patches detected		Patches/100 m	
				Total	Priority	Total	Priority
Riparian	Hydro 03	414.4	0.21	6	6	1.45	1.45
	Hydro 82	1,592.2	0.96	23	23	1.44	1.44
	Hydro 85	400.3	0.24	6	6	1.50	1.50
	Hydro 95	2,817.0	2.26	69	69	2.45	2.45
	Limekin Gulch	497.3	0.30	9	9	1.81	1.81
	No Thoroughfare Canyon	9,859.9	5.18	200	198	2.03	2.01
	Red Canyon	4118.9	2.06	88	85	2.14	2.06
	Ute Canyon	7835.6	4.71	152	152	1.94	1.94
Road	East Glade Park Rd	9,528.9	6.19	129	128	1.35	1.34
Trail	Fenceline	15,404.6	10.78	68	57	0.44	0.37
	Liberty Cap	9,891.5	5.93	16	15	0.16	0.15
	Monument Canyon	8,017.8	4.81	22	21	0.27	0.26
	No Thoroughfare	4,609.7	3.22	23	21	0.50	0.46
	Old Gordon	4,763.3	3.81	1	1	0.02	0.02
Subtotals	Riparian	27,535.9	15.92	553	548	2.01	1.99
	Road	9,528.9	6.19	129	128	1.35	1.34
	Trail	42,686.8	28.55	130	115	0.30	0.27
All routes		79,751.6	50.66	812	791	1.02	0.99

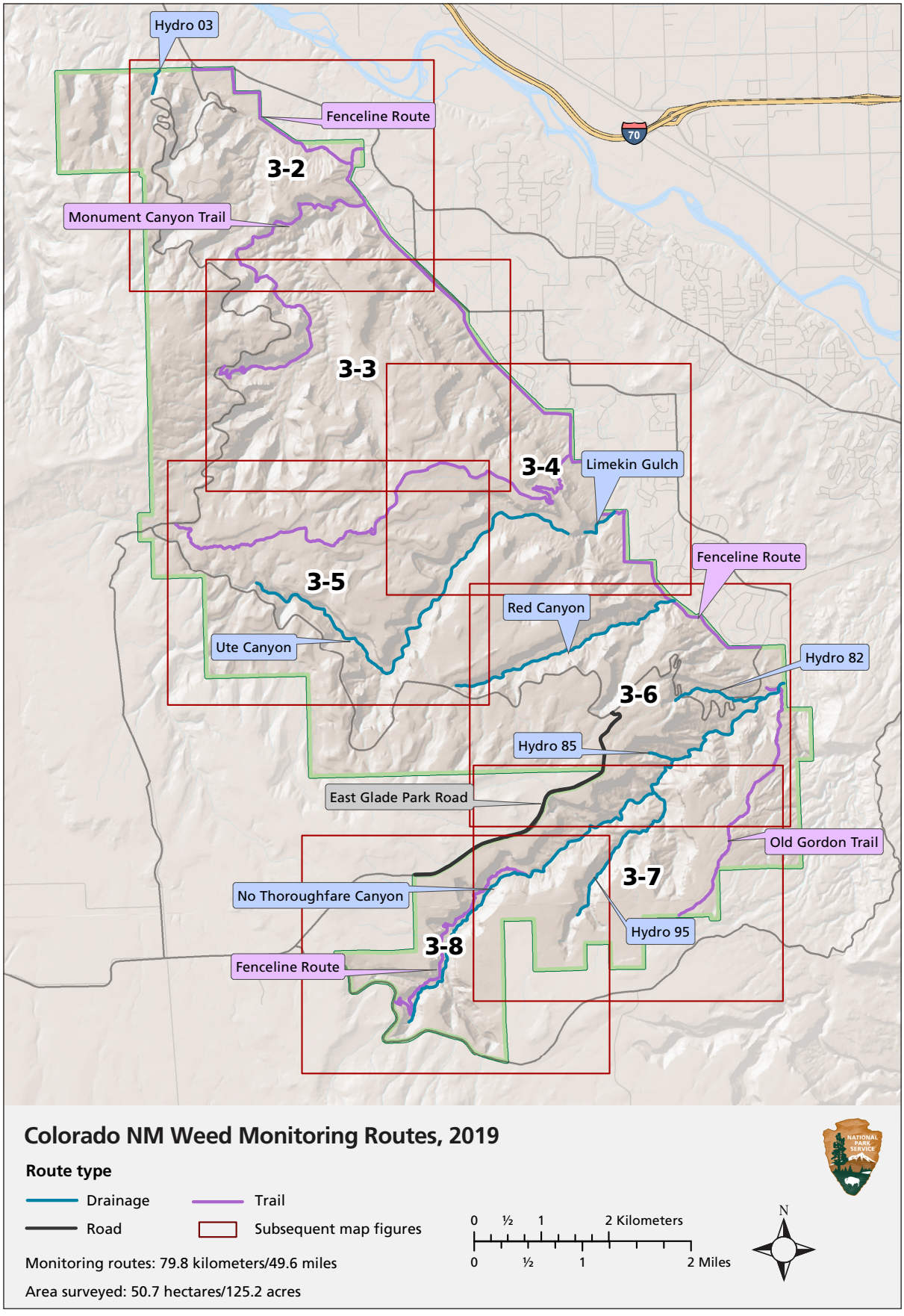


Figure 3-1. Invasive exotic plant monitoring routes, Colorado National Monument, June 12–19, 2019.

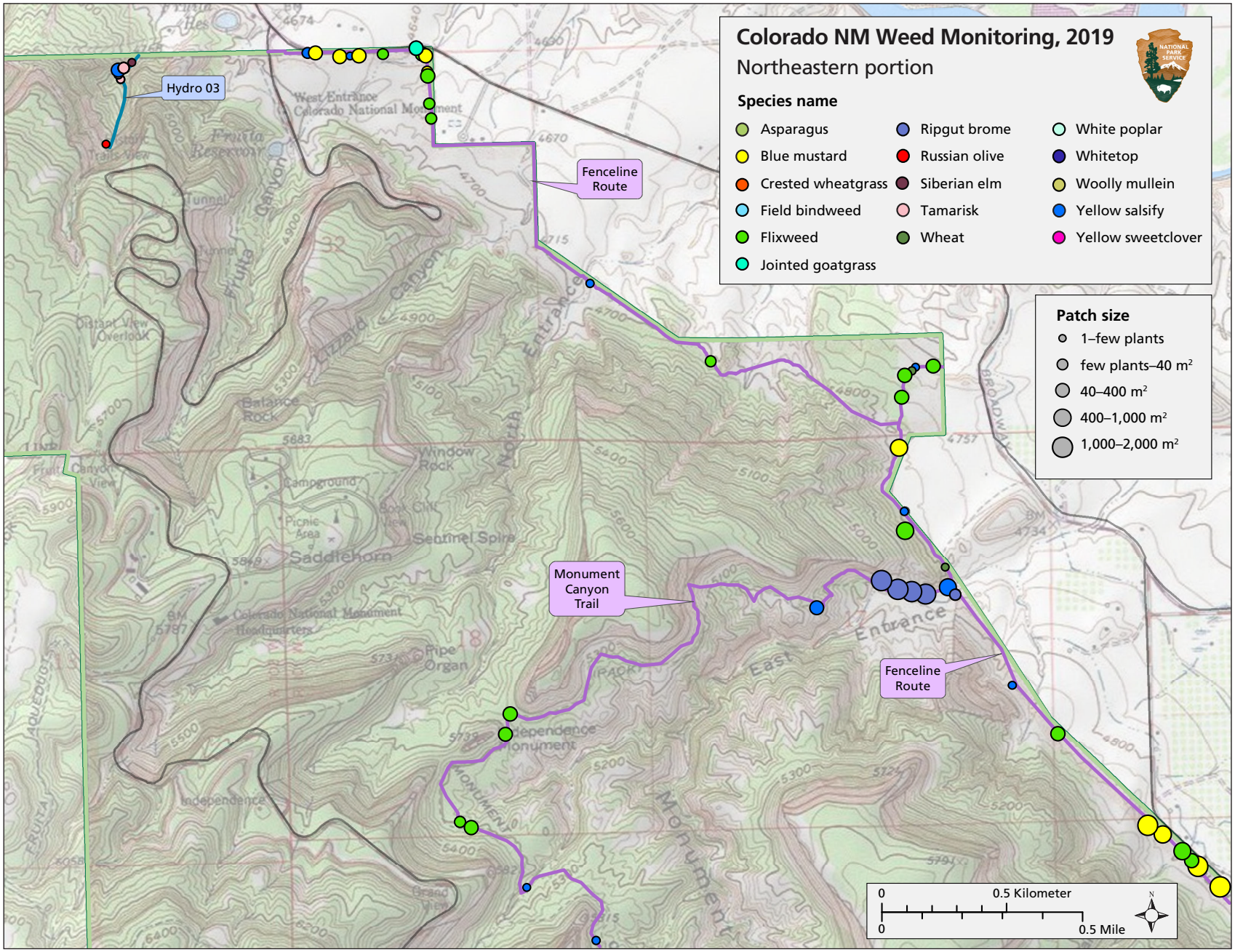


Figure 3-2. Invasive exotic plants detected on monitoring routes in the northeastern section of Colorado National Monument, June 12–19, 2019.

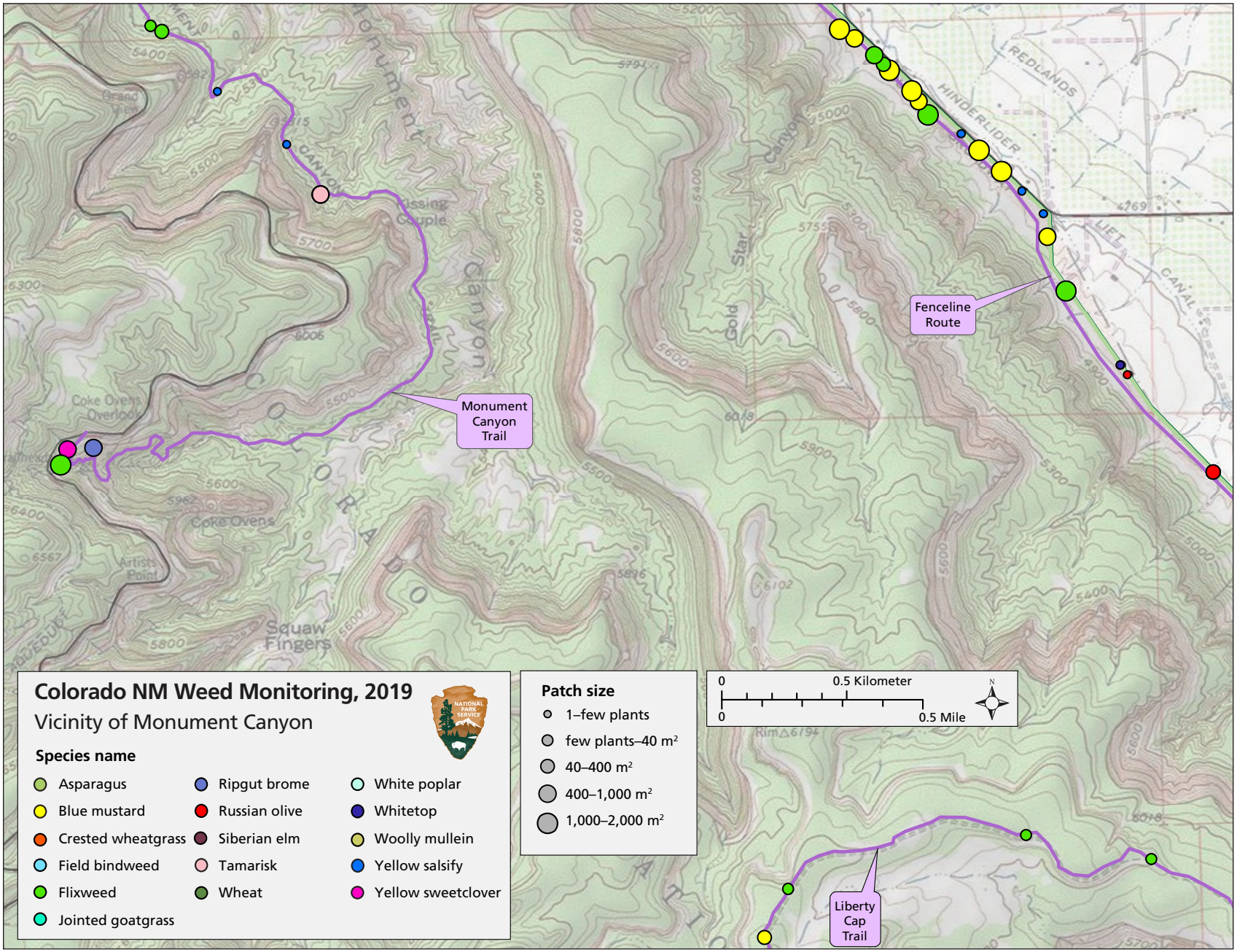


Figure 3-3. Invasive exotic plants detected on monitoring routes in the vicinity of Monument Canyon, Colorado National Monument, June 12–19, 2019.

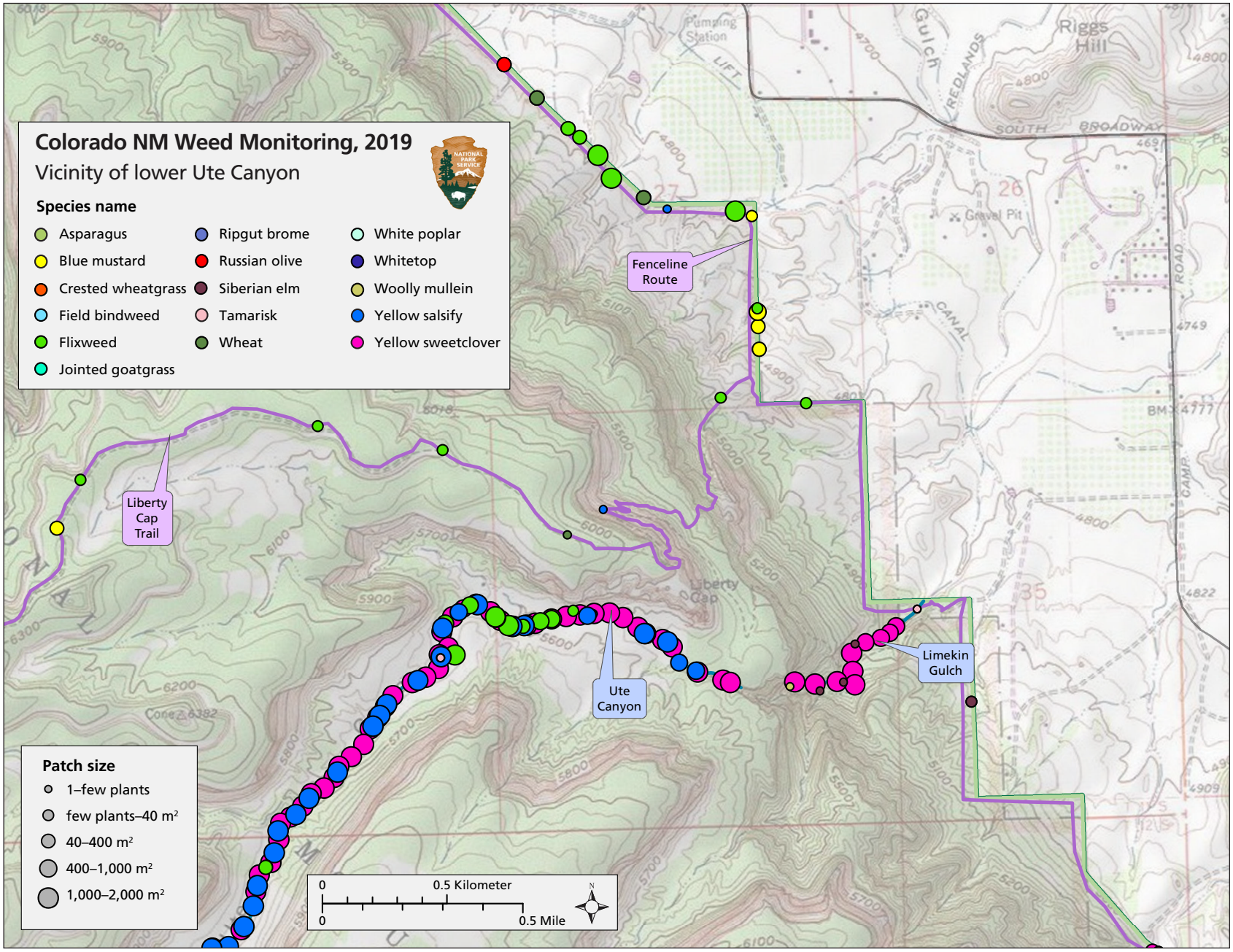


Figure 3-4. Invasive exotic plants detected on monitoring routes in the vicinity of lower Ute Canyon, Colorado National Monument, June 12–19, 2019.

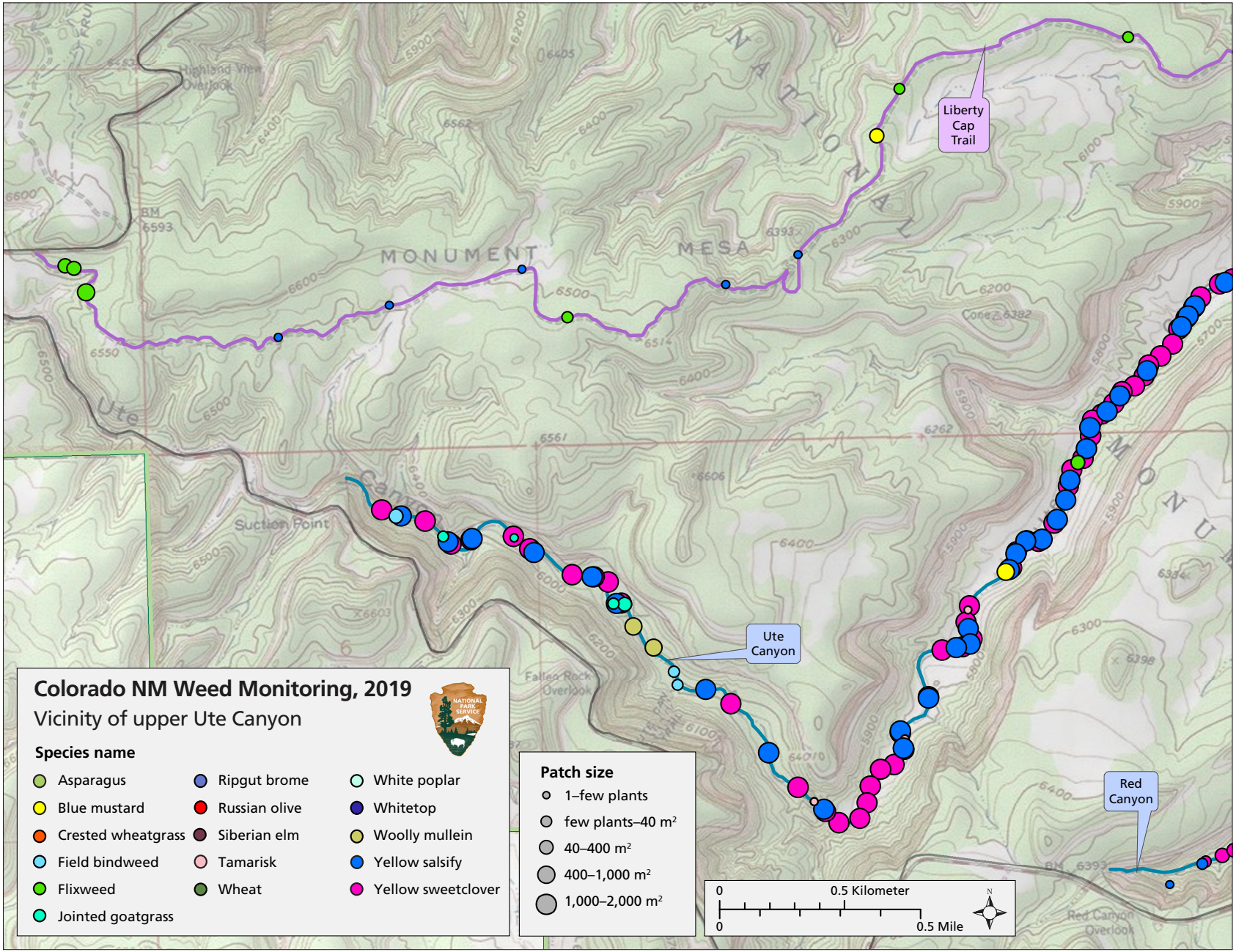


Figure 3-5. Invasive exotic plants detected on monitoring routes in the vicinity of upper Ute Canyon, Colorado National Monument, June 12–19, 2019.

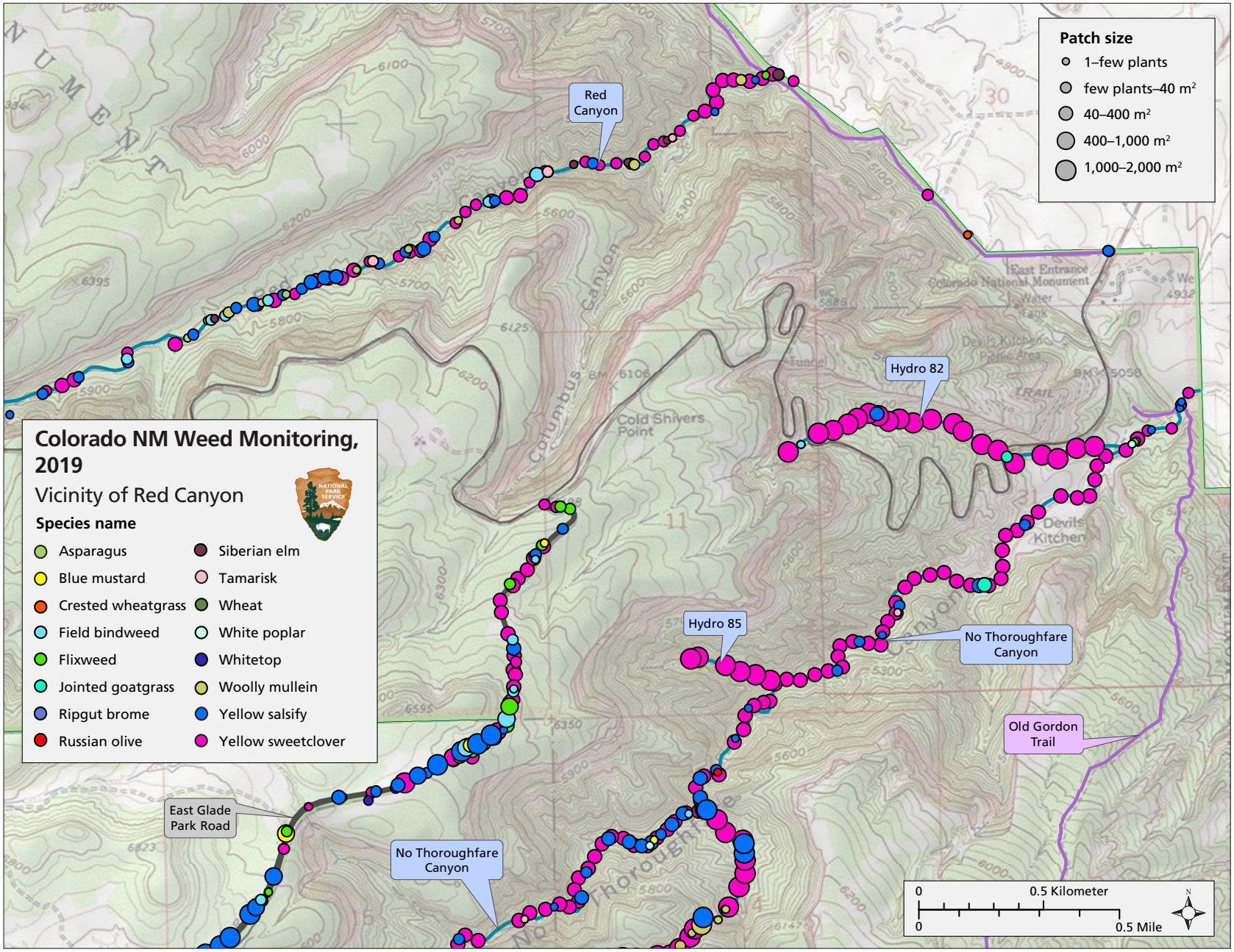


Figure 3-6. Invasive exotic plants detected on monitoring routes in the vicinity of Red Canyon, Colorado National Monument, June 12–19, 2019.

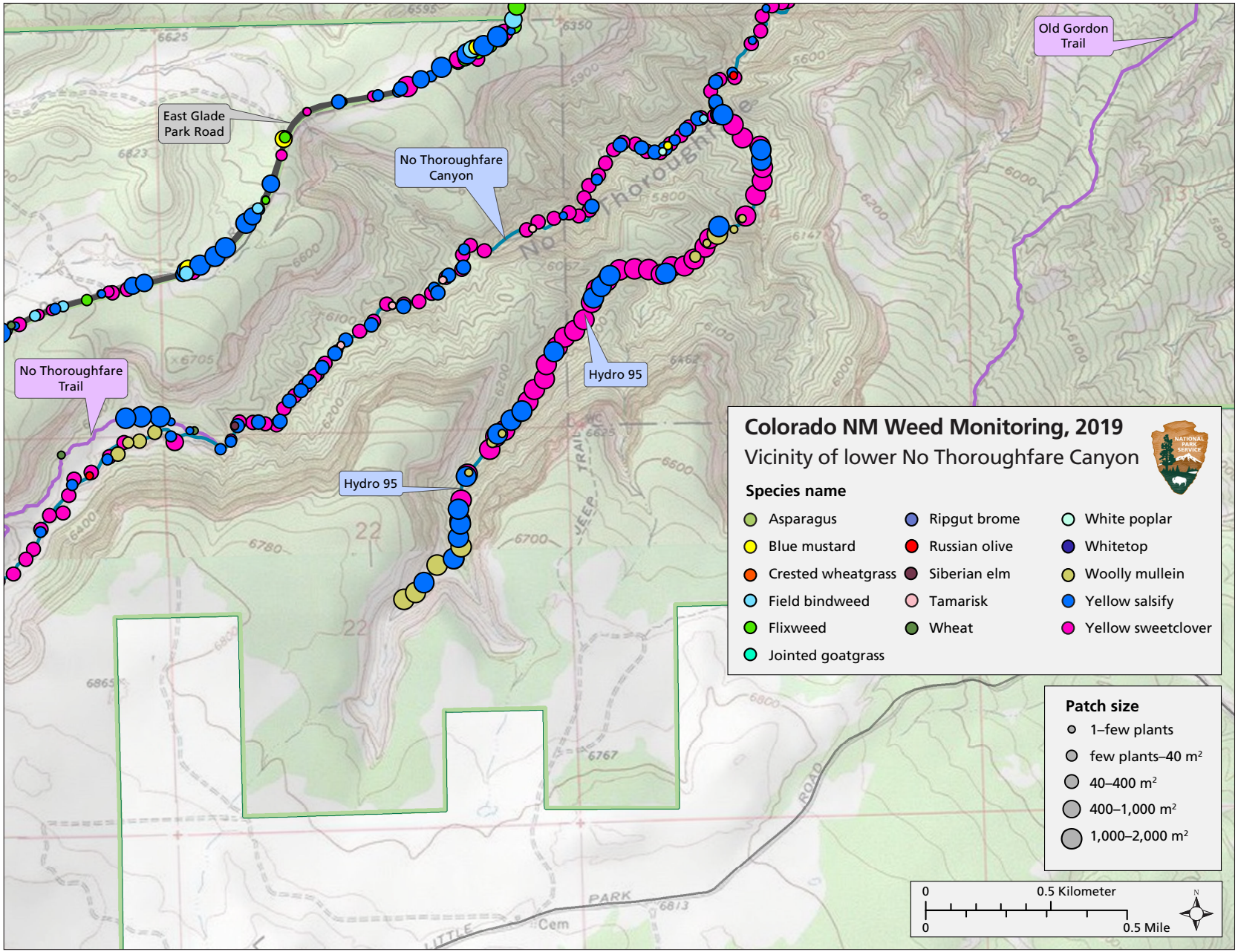


Figure 3-7. Invasive exotic plants detected on monitoring routes in the vicinity of lower No Throughfare Canyon, Colorado National Monument, June 12–19, 2019.

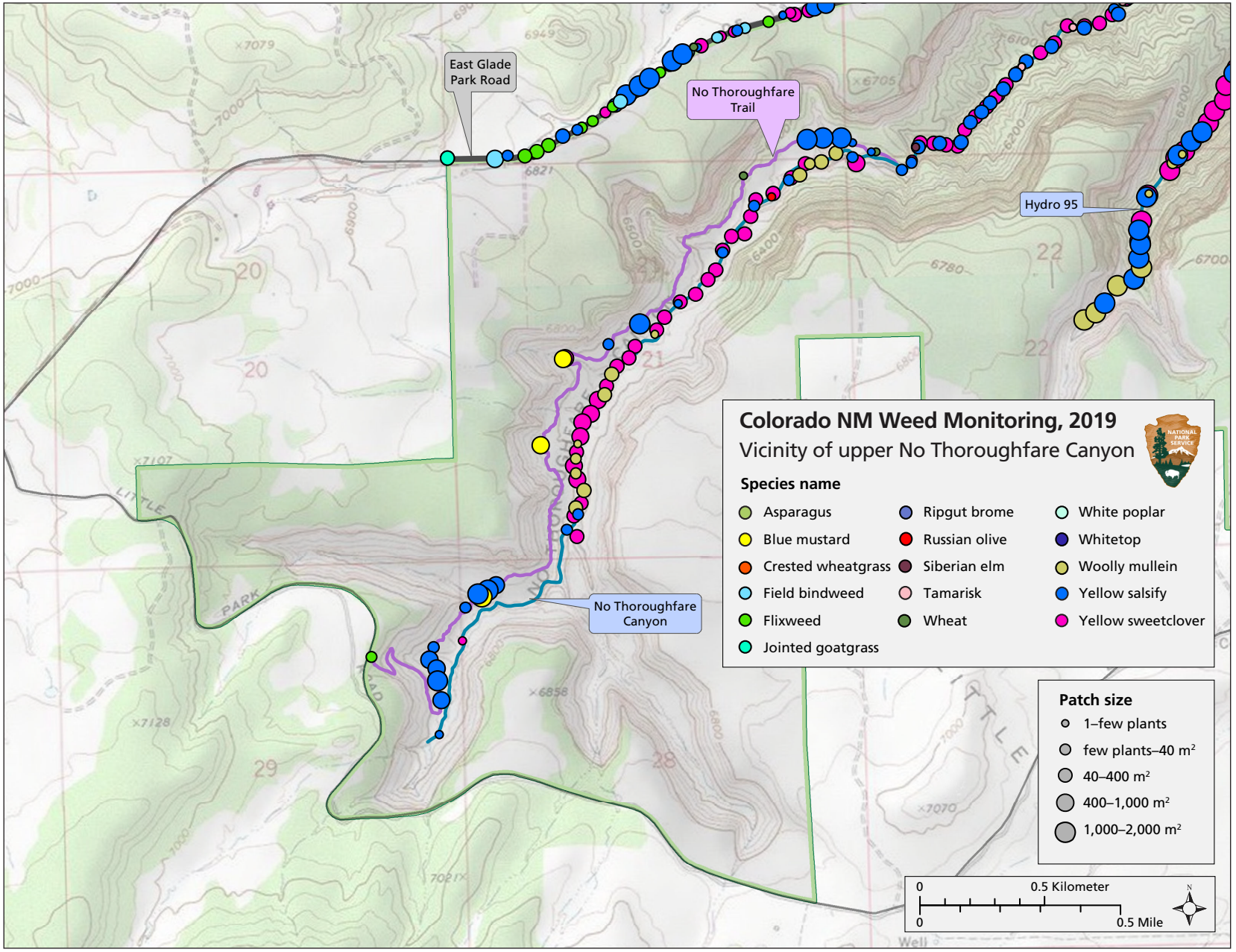


Figure 3-8. Invasive exotic plants detected on monitoring routes in the vicinity of upper No Throughfare Canyon, Colorado National Monument, June 12–19, 2019.

flixweed (*Descurania sophia*) were the most commonly detected priority IEPs, representing 82% of all priority patches along monitoring routes (Table 3-3). Yellow sweetclover and yellow salsify alone represented 73% of all priority patches. Only priority species should be examined when comparing across areas, as these were the only species recorded consistently by all observers. Non-priority species are shown in Table 3-4.

Of the 791 priority patches, 31% were assigned to size classes smaller than 40 m^2 (see Table 3-3). Of the species with at least 20 patches, there were four species for which the majority of patches were in size classes smaller than 40 m^2: field bindweed, tamarisk, Siberian elm (*Ulmus pumila*), and woolly mullein (*Verbascum thapsus*). The majority of patches were larger than 40 m^2 for blue mustard (*Chorispora tenella*), flixweed, yellow sweetclover, and yellow salsify.

Across all IEP species, the patch management index of the vast majority of priority patches was classified as low (47%) or very low (50%) (see Table 3-3). Only ten patches of blue mustard and flixweed, three patches of yellow salsify, and one patch of tamarisk were classified as moderate or high PMI.

Three priority invasive tree species were detected: Russian olive, tamarisk, and Siberian elm. Of the 37 patches of trees detected, 24% were seedlings, 54% were saplings, and 22% were mature trees (Table 3-5).

3.3 Monitoring transects

Transect data from routes where at least 10 transects were conducted, and totals for drainages, roads, and trails, are summarized in Table 3-6 (also see Appendix B). A total of 161 transects were sampled in 2019. The only widespread priority IEP species was yellow sweetclover. Cheatgrass and redstem filaree were the only non-priority IEP species widespread on all routes surveyed, while tumble mustard was widespread along the Fenceline route. Percent cover of cheatgrass was near 1% along all large riparian areas and the East Glade Park Road, and 3% along the Fenceline. Cheatgrass was present in over 65% of the riparian transects, East Glade Park Road, and the Fenceline. Cheatgrass was also present in 30%, 45%, and 75% of the Old Gordon, Liberty Cap, and Monument Canyon Trails, respectively, but at a lower percent cover. Yellow sweetclover was the most frequent priority species, present in 35%, 31%, 25% of transects in No Thoroughfare Riparian, Ute Canyon Riparian, and East Glade Park Road, respectively.

Riparian routes had the highest frequency of IEP species within transects (79%), with an average percent cover of 1.20%. IEPs were also prevalent along East Glade Park Road, with 85% of transects containing at least one IEP with an average percent cover of 1.04%. Trails were lower, with 57% frequency and an average percent cover of 0.52%. However, the Fenceline route was by far the highest area of invasive cover, at 84% frequency and 5% percent cover. The Fenceline had three different species with a frequency of greater than 45%.

3.4 West Entrance extra area

At the request of park managers, IEPs were mapped at the park's West Entrance in 2019. This area has been a target for invasive-plant control. Cheatgrass, redstem filaree, flixweed, tumble mustard, blue mustard, yellow sweetclover, and Russian thistle were found in both extra areas (Tables 3-7 and 3-8, Figure 3-9). The treated area had almost the same number of patches as the untreated area, but was less than half the size of the untreated area. The distribution of priority species across size classes was similar between the treated and untreated areas (Table 3-7). Patches of cheatgrass, redstem filaree, Russian thistle, and tumble mustard were dominated by the largest size class and spread uniformly across both treatment areas (Table 3-8).

3.5 Comparison to past results

Colorado National Monument was previously surveyed for IEPs in 2003, 2009, 2011, 2013, 2015, and 2017 (Dewey and Anderson 2005; Perkins 2010; Perkins 2012; Perkins 2014; Perkins 2016; Gommermann et al. 2019) (Table 3-9). Tables 3-10 and 3-11 list monitoring routes where segments of each route and IEP species searched for were the same for the different time periods. Un-

Table 3-3. Number of priority patches by species, patch size class, and patch management index detected along monitoring routes, Colorado National Monument, June 12–19, 2019.

Scientific name	Common name	Total patches	Patch size class[A]					Patch management index[B]				
			1	2	3	4	5	Very low	Low	Moderate	High	Very high
Anisantha diandra	ripgut brome	6	0	1	0	1	4	0	6	0	0	0
Cardaria sp.	whitetop	1	0	0	1	0	0	0	1	0	0	0
Chorispora tenella	blue mustard	29	2	3	8	10	6	5	14	9	1	0
Convolvulus arvensis	field bindweed	26	4	15	4	3	0	12	14	0	0	0
Cylindropyrum cylindricum	jointed goatgrass	8	1	3	4	0	0	1	7	0	0	0
Descurainia sophia	flixweed	75	3	28	26	9	9	22	43	9	1	0
Elaeagnus angustifolia	Russian olive	5	4	0	1	0	0	1	4	0	0	0
Melilotus officinale	yellow sweetclover	356	4	39	154	16	143	183	173	0	0	0
Tamarix sp.	tamarisk	20	16	3	0	1	0	18	1	1	0	0
Tragopogon dubius	yellow salsify	218	39	46	41	15	77	120	95	3	0	0
Ulmus pumila	Siberian elm	12	9	3	0	0	0	10	2	0	0	0
Verbascum thapsus	woolly mullein	35	12	8	8	2	5	26	9	0	0	0
All priority species		791	94	149	247	57	244	398	369	22	2	0

[A]Patch size classes: 1 = 1–3 plants, 2 = 4 plants–40 m^2, 3 = 40–400 m^2, 4= 400–1,000 m^2, 5 = 1,000–2,000 m^2.
[B]Patch size class × Patch density. 1–5 = very low, 6–10 = low, 11–15 = moderate, 16–20 = high, 21–25 = very high.

Table 3-4. Number of non-priority patches by species, patch size class, and patch management index detected along monitoring routes, Colorado National Monument, June 12–19, 2019.

Scientific name	Common name	Total patches	Patch size class[A]					Patch management index[B]				
			1	2	3	4	5	Very low	Low	Moderate	High	Very high
Agropyron cristatum	crested wheatgrass	1	0	1	0	0	0	1	0	0	0	0
Anisantha tectorum	cheatgrass	3	0	0	0	0	3	0	0	2	1	0
Asparagus officinalis	asparagus	3	3	0	0	0	0	3	0	0	0	0
Erodium cicutarium	redstem filaree	1	0	0	0	0	1	1	0	0	0	0
Populus alba	white poplar	2	2	0	0	0	0	2	0	0	0	0
Salsola sp.	Russian thistle	1	0	0	0	0	1	0	1	0	0	0
Sisymbrium altissimum	tumble mustard	2	0	0	0	0	2	1	1	0	0	0
Triticum aestivum	wheat	8	6	0	2	0	0	7	1	0	0	0
All non-priority species		21	11	1	2	0	7	15	3	2	1	0

[A]Patch size classes: 1 = 1–3 plants, 2 = 4 plants–40 m^2, 3 = 40–400 m^2, 4= 400–1,000 m^2, 5 = 1,000–2,000 m^2.
[B]Patch size class × Patch density. 1–5 = very low, 6–10 = low, 11–15 = moderate, 16–20 = high, 21–25 = very high.

Table 3-5. Total number of patches of trees by species and growth stage, Colorado National Monument, June 12–19, 2019.

Scientific name	Common name	Mature tree	Sapling	Seedling
Elaeagnus angustifolia	Russian olive	3	2	0
Tamarix sp.	tamarisk	3	13	4
Ulmus pumila	Siberian elm	2	5	5
Total		8	20	9

Table 3-6. Total number of transects per route, number of transects where exotic plant species were detected, mean percent cover by species, and standard error for routes with at least 10 transects, Colorado National Monument, June 12–19, 2019.

Route	Type	Scientific name	Common name	# of transects detected/ total transects	Frequency	Percent cover	SE
No Thoroughfare Canyon	Riparian	*Anisantha tectorum*	cheatgrass	13/20	65%	0.85	0.30
		Erodium cicutarium	redstem filaree	1/20	5%	0.01	0.01
		Melilotus officinale	yellow sweetclover	7/20	35%	0.11	0.05
Ute Canyon	Riparian	*Anisantha tectorum*	cheatgrass	12/16	75%	0.96	0.33
		Erodium cicutarium	redstem filaree	4/16	25%	1.00	0.68
		Melilotus officinale	yellow sweetclover	5/16	31%	0.09	0.05
		Salsola sp.	Russian thistle	1/16	6%	0.02	0.02
All Riparian[A]				44/56	79%	1.20	0.31
East Glade Park	Road	*Anisantha tectorum*	cheatgrass	15/20	75%	0.76	0.34
		Convolulus arvensis	field bindweed	1/20	5%	0.08	0.08
		Erodium cicutarium	redstem filaree	2/20	10%	0.06	0.05
		Melilotus officinale	yellow sweetclover	5/20	25%	0.13	0.07
		Tragopogon dubius	yellow salsify	2/20	10%	0.02	0.01
All East Glade Park Road				17/20	85%	1.04	0.35
Liberty Cap	Trail	*Anisantha tectorum*	cheatgrass	9/20	45%	0.28	0.10
Monument Canyon	Trail	*Anisantha diandra*	ripgut brome	1/15	7%	0.04	0.04
		Anisantha tectorum	cheatgrass	12/15	80%	0.43	0.17
		Erodium cicutarium	redstem filaree	5/15	33%	0.17	0.09
		Tragopogon dubius	yellow salsify	1/15	7%	0.02	0.02
Old Gordon	Trail	*Anisantha tectorum*	cheatgrass	3/10	30%	0.07	0.04
Fenceline	Trail	*Anisantha tectorum*	cheatgrass	24/31	77%	3.02	0.99
		Chorispora tenella	blue mustard	3/31	10%	0.03	0.02
		Erodium cicutarium	redstem filaree	15/31	48%	1.41	0.53
		Salsola sp.	Russian thistle	4/31	13%	0.06	0.04
		Sisymbrium altissimum	tumble mustard	14/31	45%	0.54	0.20
		All species		26/31	84%	5.03	1.19
All Trails[AB]				31/54	57%	0.52	0.17

[A]Totals include detections and transects on routes with fewer than 10 transects.
[B]Fenceline is not a designated trail, so it is not included in the trail totals. This route borders the urban interface. In some places, it is walked as a trail. In other places, there is no trail.

Table 3-7. Priority species observed and patch size class detected in the West Entrance extra area, Colorado National Monument, June 12–19, 2019.

Scientific name	Common name	Treatment	Total patches	Patch size class				
				1	2	3	4	5
Chorispora tenella	blue mustard	Treated	10	0	1	3	5	1
		Untreated	5	0	2	2	1	0
Convolvulus arvensis	field bindweed	Treated	2	0	1	1	0	0
		Untreated	0	0	0	0	0	0
Descurainia sophia	flixweed	Treated	2	0	1	1	0	0
		Untreated	7	0	2	2	1	2
Melilotus officinale	yellow sweetclover	Treated	1	0	1	0	0	0
		Untreated	1	0	0	1	0	0
All priority species		Treated	15	0	4	5	5	1
		Untreated	13	0	4	5	2	2

[A]Patch size classes: 1 = 1–3 plants, 2 = 4 plants–40 m^2, 3 = 40–400 m^2, 4= 400–1,000 m^2, 5 = 1,000–2,000 m^2.

Table 3-8. Non-priority species observed and patch size class detected in the West Entrance extra area, Colorado National Monument, June 12–19, 2019.

Scientific name	Common name	Treatment	Total patches	Patch size class				
				1	2	3	4	5
Agropyron cristatum	crested wheatgrass	Treated	1	0	1	0	0	0
		Untreated	0	0	0	0	0	0
Anisantha tectorum	cheatgrass	Treated	47	0	0	0	0	47
		Untreated	76	0	0	0	0	76
Erodium cicutarium	redstem filaree	Treated	47	0	0	0	0	47
		Untreated	36	0	0	4	0	32
Salsola sp.	Russian thistle	Treated	36	0	1	0	1	34
		Untreated	9	0	0	0	0	9
Sisymbrium altissimum	tumble mustard	Treated	50	0	1	2	0	47
		Untreated	53	0	0	0	1	52
All non-priority species		Treated	181	0	3	2	1	175
		Untreated	174	0	0	4	1	169

[A]Patch size classes: 1 = 1–3 plants, 2 = 4 plants–40 m^2, 3 = 40–400 m^2, 4= 400–1,000 m^2, 5 = 1,000–2,000 m^2.

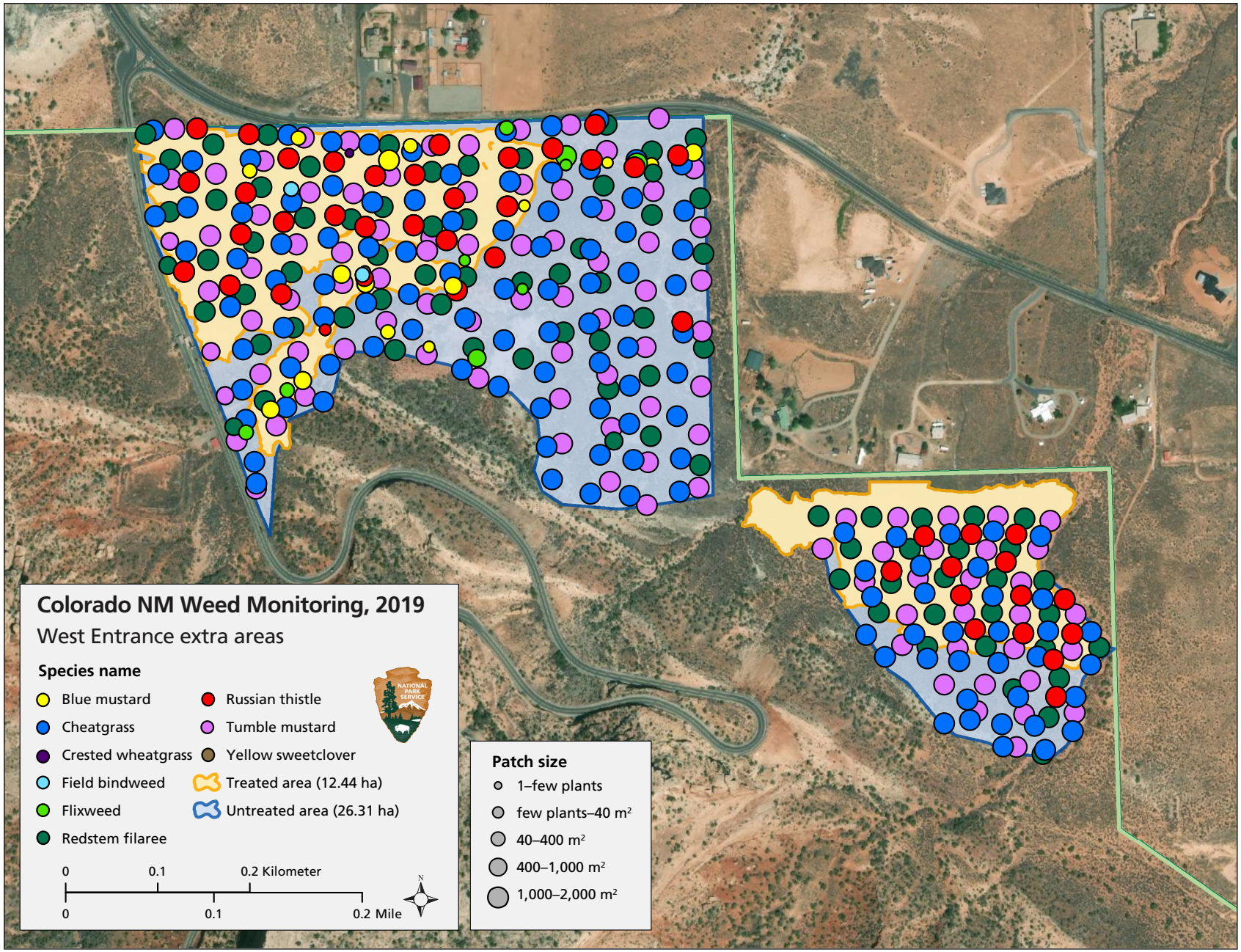


Figure 3-9. Invasive plants detected in treated and untreated areas at Colorado National Monument's West Entrance, 2019.

Table 3-9. Routes (length in meters monitored) for areas monitored at Colorado National Monument, 2003–2019.

Route	Type	Year[A]						
		2003[B]	2009	2011	2013	2015	2017	2019
Hydro 03	Riparian	–	–	S (446)	S (446)	S (404)	S (421)	S (415)
No Thoroughfare Canyon[C]	Riparian	S	S (10,302)	S (12,331)	S (10,975)	S (13,903)	S (13,907)	S (14,669)
Red Canyon	Riparian	–	S (4,017)	S (3,874)	S (4,014)	S (3,917)	S (2,040)	S (4,119)
Ute Canyon[D]	Riparian	S	S (7,813)	S (8,032)	S (7,949)	S (8,629)	S (8,269)	S (8,333)
East Glade Park	Road	–	S (9,677)	S (9,538)	S (9,538)	S (9,538)	–	S (9,529)
Fenceline	Trail	–	S (15,439)	–	S (15,403)	S (1,124)	–	S (15,405)
Liberty Cap	Trail	–	S (8,295)	–	S (9,653)	–	–	S (9,891)
Monument Canyon	Trail	S	S (8,590)	–	S (8,014)	–	–	S (8,018)
No Thoroughfare	Trail	S	–	S (1,586)	S (4,361)	S (4,595)	–	S (4,610)
Old Gordon	Trail	–	S (4,899)	–	S (4,770)	–	–	S (4,763)

[A]S = surveyed; – = not surveyed.
[B]Exact meters monitored cannot be determined for 2003, due to differing methods.
[C]Includes Hydro 82, 85, and 95.
[D]Includes Limekin Gulch.

Table 3-10. Monitoring routes on which IEP species searched for during each monitoring period were detected one or more times during each monitoring period at Colorado National Monument, 2003–2019.

Route	Scientific name	Common name
No Thoroughfare Canyon	*Convolvulus arvensis*	field bindweed
Ute Canyon	*Acroptilon repens*	Russian knapweed
	Elaeagnus angustifolia	Russian olive
	Tamarix sp.	tamarisk
	Verbascum thapsus	woolly mullein

Table 3-11. Monitoring routes on which IEP species searched for during each monitoring period were detected one or more times during each monitoring period at Colorado National Monument, 2009–2019.

Route	Scientific name	Common name
Hydro 03	*Acosta diffusa*	diffuse knapweed
No Thoroughfare, Hydros 82, 85, and 95	*Acosta maculosa*	spotted knapweed
Red Canyon	*Acroptilon repens*	Russian knapweed
Ute Canyon and Limekin Gulch	*Arctium minus*	burdock
East Glade Park Road	*Breea arvensis*	Canada thistle
Fenceline	*Cardaria* sp.	hoary cress
Liberty Cap Trail	*Cardaria latifolia*	broadleaf pepperwort
Monument Canyon Trail	*Carduus acanthoides*	plumeless thistle
No Thoroughfare Trail	*Carduus nutans*	musk thistle
Old Gordon Trail	*Leucantha solstitialis*	yellow starthistle
	Cirsium vulgare	bull thistle
	Convolvulus arvensis	field bindweed
	Cylindropyrum cylindricum	jointed goatgrass
	Elaeagnus angustifolia	Russian olive
	Isatis tentoria	Dyer's woad
	Linaria vulgaris	butter-and-eggs
	Lythrum salicaria	purple loosestrife
	Onopordum acanthium	Scotch thistle
	Tamarix spp.	tamarisk
	Tithymalus esula	leafy spurge
	Tribulus terrestris	puncturevine
	Ulmus pumila	Siberian elm
	Verbascum thapsus	woolly mullein

less noted, only data from these commonly monitored routes were used for comparison between years.

The following six IEP species have been the most commonly observed from 2009 to 2019: bull thistle (*Cirsium vulgare*), field bindweed, Russian olive, tamarisk, Siberian elm, and woolly mullein. Yellow sweetclover was added to the priority list in 2011, while yellow salsify and flixweed were added in 2015. Below, we analyze the data for the three different time periods: 2009–2019 (Figure 3-10), 2011–2019 (Figure 3-11), and 2015–2019 (Figure 3-12).

- From 2009 to 2019, the number of IEPs per 100 meters increased slightly along the Ute Canyon, Red Canyon, and East Glade Park monitoring routes, while decreasing on the No Thoroughfare Canyon route. The Fenceline route has stayed relatively constant in patches per 100 m (Figure 3-10).
- From 2011 to 2019, IEPs increased on the Fenceline route and decreased along East Glade Park Road. The No Thoroughfare, Red Canyon, and Ute Canyon routes have stayed relatively constant since 2011 (Figure 3-11).
- From 2015 to 2019, IEPs increased on the East Glade Park Road, No Thoroughfare Canyon, and Red Canyon routes while staying relatively constant along Ute Canyon and No Thoroughfare Trail (Figure 3-12). (Fenceline was not monitored in 2015 or 2017, so the only data with flixweed and yellow salsify is from 2019.)

Table 3-12 highlights species detected at least five times in any given year along routes consistently monitored from 2009 to 2019. In 2019, there were notable increases in IEP patches per 100 m for the following species and routes:

- Field bindweed along East Glade Park Road,
- Siberian elm in Red Canyon,
- Yellow salsify along East Glade Park Road, No Thoroughfare Canyon, No Thoroughfare Trail, and Red Canyon, and
- Yellow sweetclover in No Throughfare Canyon and Red Canyon.

Woolly mullein in Red Canyon was one of the only IEPs that decreased in 2019.

The following priority IEP species remain undetected since monitoring began in 2009: diffuse knapweed (*Acosta diffusa*), spotted knapweed (*Acosta maculosa*), Canada thistle (*Breea arvensis*), plumeless thistle (*Carduus acanthoides*), musk thistle (*Carduus nutans*), yellow starthistle (*Leucantha solstitialis*), butter-and-eggs (*Linaria vulgaris*), purple loosestrife (*Lythrum salicaria*), and Scotch thistle *(Onopordum acanthium*). Russian knapweed (*Acroptilon repens*), and puncturevine (*Tribulus terrestris*) remain unobserved since 2011. Common houndstongue (*Cynoglossum officinale*) remains unobserved since it was added to the priority list in 2015. One patch of leafy spurge (*Tithymalus esula*) was observed in 2015, but none was observed in 2017 or 2019. However, in 2019, jointed goatgrass (*Cylindropyrum cylindricum*) was observed for the first time since 2011.

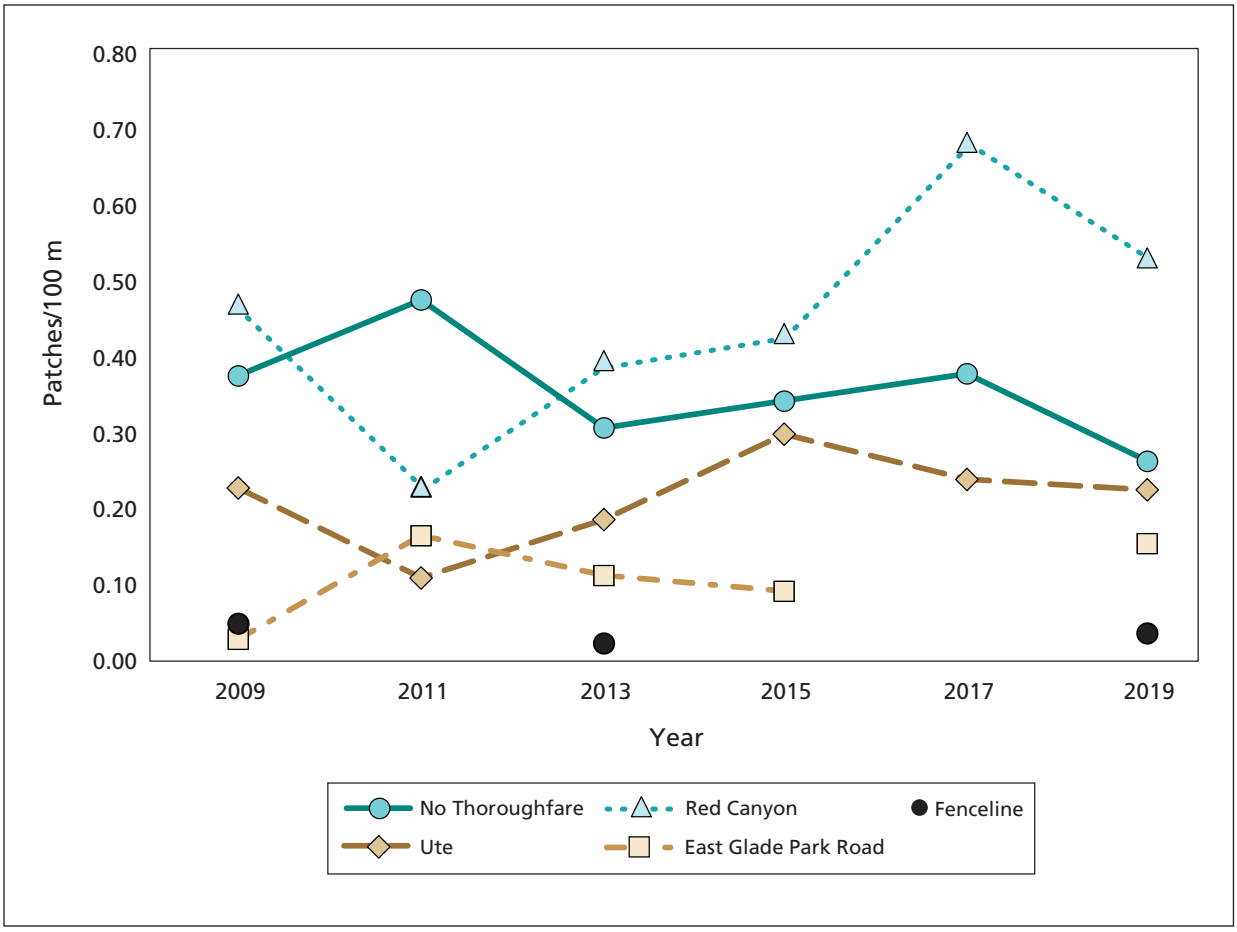


Figure 3-10. Patches per 100 meters for six priority invasive exotic plant species detected on common monitoring routes in Colorado National Monument, 2009–2019.

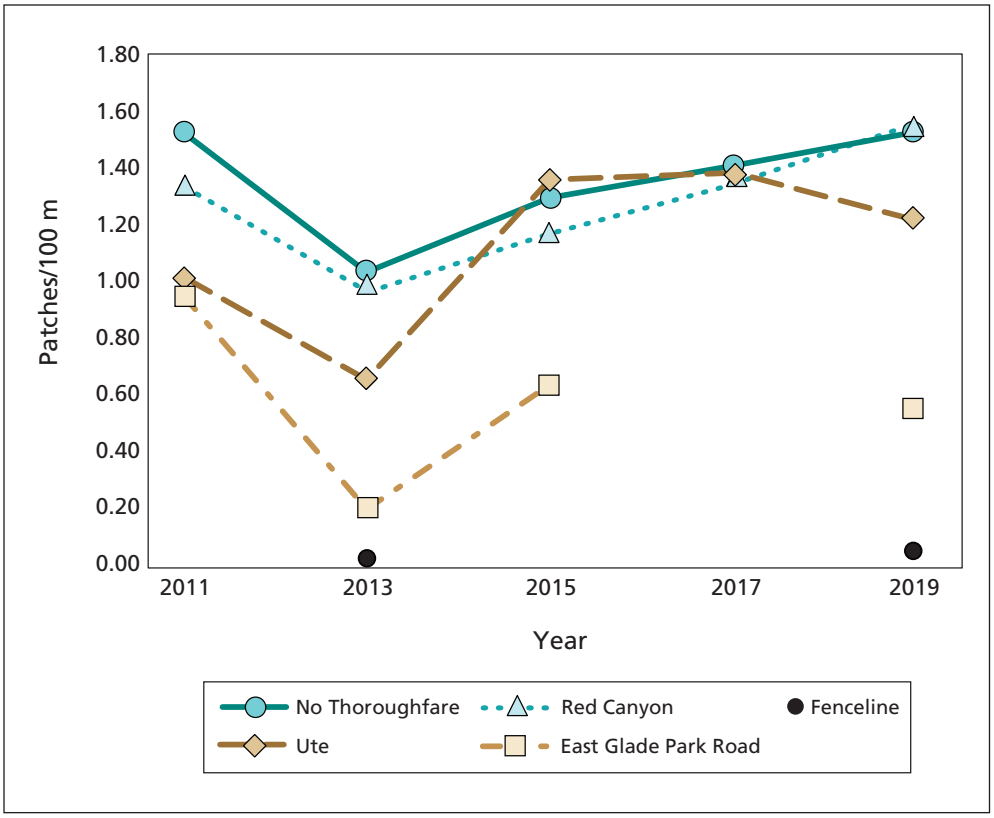


Figure 3-11. Patches per 100 meters for seven priority invasive exotic plant species detected on common monitoring routes in Colorado National Monument, 2011–2019.

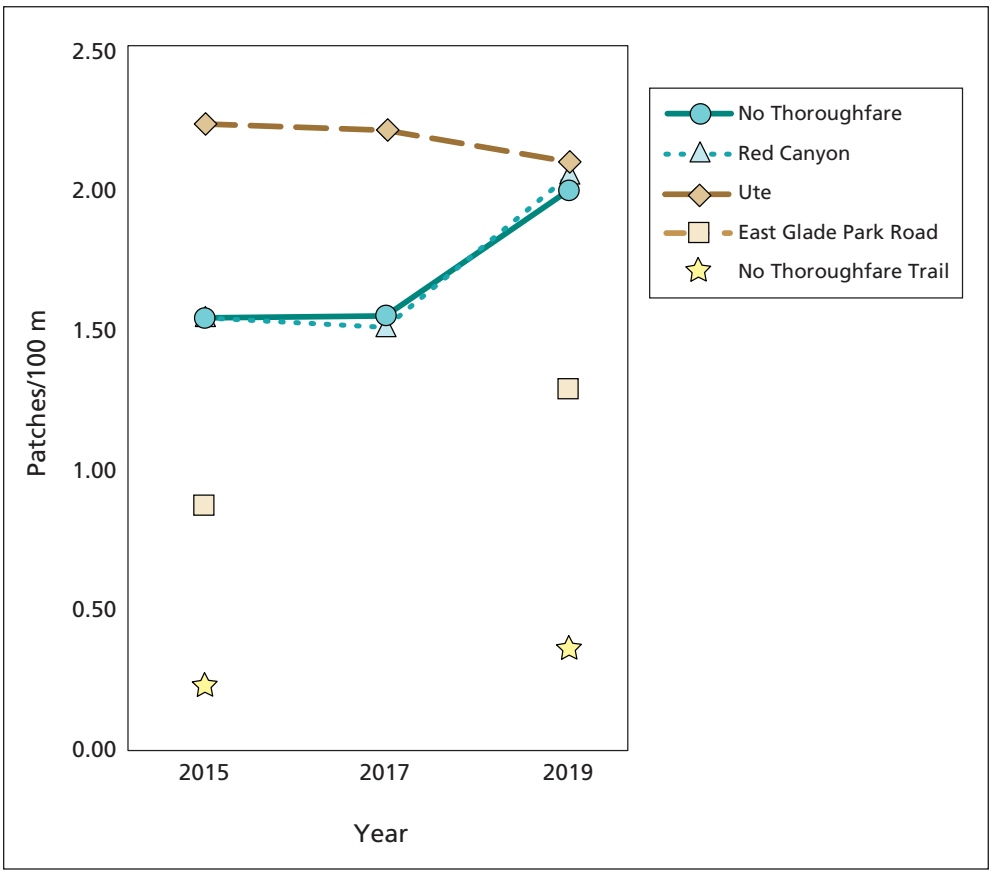


Figure 3-12. Patches per 100 meters for nine priority invasive exotic plant species detected on common monitoring routes in Colorado National Monument, 2015–2019.

Table 3-12. Number of IEP patches/100 m (minimum 5 detections in a year) observed along monitoring routes consistently surveyed at Colorado National Monument from 2009 to 2019.

Route	Scientific name	Common name	Year[A]					
			2009	2011	2013	2015	2017	2019
East Glade Park Road	*Convolvulus arvensis*	field bindweed	0.02	0.16	0.09	0.09	NS	0.15
	Tragopogon dubius	yellow salsify	NP	NP	NP	0.24	NS	0.47
No Thoroughfare Canyon	*Cirsium vulgare*	bull thistle	0.01	0.01	0.00	0.01	0.09	0.00
	Elaeagnus angustifolia	Russian olive	0.14	0.05	0.00	0.05	0.02	0.01
	Melilotus officinale	yellow sweetclover	NP	0.95	0.60	0.86	0.88	1.09
	Tamarix spp.	tamarisk	0.08	0.08	0.04	0.03	0.03	0.04
	Tragopogon dubius	yellow salsify	NP	NP	NP	0.22	0.12	0.40
	Ulmus pumila	Siberian elm	0.02	0.07	0.04	0.08	0.00	0.01
	Verbascum thapsus	woolly mullein	0.11	0.12	0.14	0.13	0.18	0.15
No Thoroughfare Trail	*Tragopogon dubius*	yellow salsify	NP	NP	NP	0.22	NS	0.37
Red Canyon	*Melilotus officinale*	yellow sweetclover	NP	1.11	0.60	0.74	0.69	1.02
	Tragopogon dubius	yellow salsify	NP	NP	NP	0.38	0.15	0.49
	Ulmus pumila	Siberian elm	0.07	0.08	0.12	0.05	0.00	0.15
	Verbascum thapsus	woolly mullein	0.10	0.03	0.012	0.28	0.34	0.17
Ute Canyon	*Descurainia sophia*	flixweed	NP	NP	NP	0.00	0.12	0.13
	Tamarix spp.	tamarisk	0.10	0.00	0.01	0.03	0.05	0.07
	Verbascum thapsus	woolly mullein	0.05	0.01	0.08	0.19	0.15	0.04
	Tragopogon dubius	yellow salsify	NP	NP	NP	0.65	0.52	0.52
	Melilotus officinale	yellow sweetclover	NP	0.91	0.45	1.03	1.10	1.03

[A]NP = Not on priority list. NS = Not sampled.

4 Discussion

4.1 Priority invasive exotic plant list

The NCPN will continue to work with Colorado NM staff and area IEP experts to review and update the list of priority species each year. In this report, presence and absence data for most priority species (and presence data for other species) should be reliable. However, absence data for non-priority species should be considered suspect, because not all observers consistently recorded non-priority species.

4.2 Possibilities for management control

Priority invasive exotic plants are most widespread along riparian and road areas. The routes with the highest priority IEP densities are currently Hydro 95, Red Canyon, No Thoroughfare Canyon, and Ute Canyon. Levels of IEPs in Ute, Red, and No Thoroughfare canyons are largely due to high quantities of yellow sweetclover. The overall number of IEP patches has increased slightly or remained stable when compared to previous surveys. Because monitoring was conducted at approximately the same time each year, phenology differences between years should be minimal.

Six of the twelve priority IEP species observed across the park were found to have 25 patches or fewer (see Table 3-3). These species should be targeted for control efforts for potential eradication along monitoring routes.

The number, size, and maturity of tree patches indicate that control efforts of woody patches along monitored routes to date have been effective and should continue. Declines observed in these populations are likely the result of efforts by park staff and volunteers to control these species. Tree patches consisted largely of seedlings and saplings, which are easier to control than mature trees. From 2009 to 2019, seedlings and saplings accounted for 75–92% of patches (Figure 4-1). Continued control efforts should be made before more seedlings and saplings grow into mature trees.

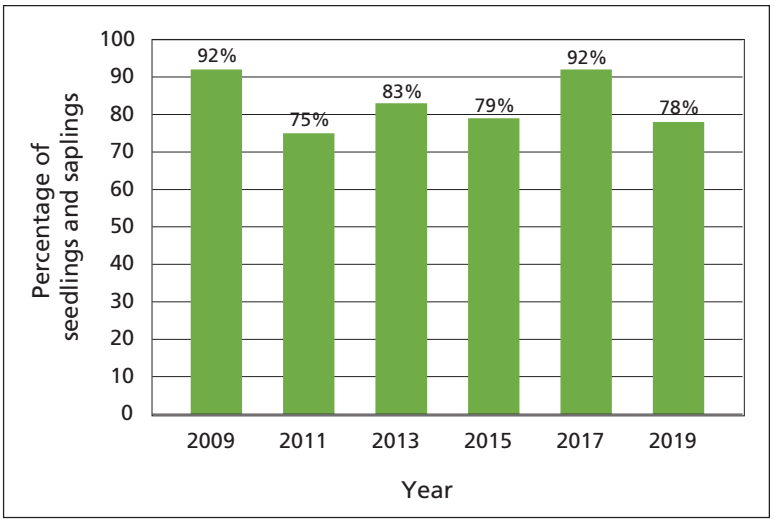


Figure 4-1. Percentage of IEP tree patches recorded at Colorado National Monument that were seedlings and saplings, 2009–2019.

Despite the increase in woolly mullein patches between 2013 and 2019, 57% of these patches are currently less than 40 m^2 (see Table 3-3). Because this species can be treated with hand-pulling, future control efforts by park staff and volunteers may be particularly effective. Keeping mullein at low numbers will require constant effort. Cheatgrass and yellow sweetclover are widespread across the park but sparsely dispersed within patches, making future control efforts difficult.

It will be much easier for park staff to contain invasive species if eradication efforts continue. In just a few years, small patches could become large, and seedlings and saplings will become mature trees, requiring removal by chainsaw instead of loppers or pruning shears. Preventing additional exotic-species invasions should give native species a better chance to persist.

While the patch management index was originally intended to elucidate trends in IEP populations over time, it can also be used to inform treatment decisions. In 2019, a large majority of priority IEP patches were assigned a PMI score of low (46%) or very low (50%), indicating small and/or sparse patches where control is generally still feasible. This is similar to the numbers for 2017, when 99% of patches scored low or very low in PMI. A low or very low classification indicates a patch that is either small in area, sparse in cover, or both small in

area and sparse in cover. Therefore, from a management perspective, patches with low or very low PMI should not be interpreted as insignificant. On the contrary—isolated and/or uncommon species with low or very low PMI may be some of the most important areas to treat, thereby preventing future spread and representing opportunities for eradication. For other, more widespread species, such as yellow sweetclover, the large number of patches with low or very low PMI indicates a species that is sparsely scattered across a broad landscape. Therefore, while control of an individual patch will require minimal effort, control of the population will require traversing large areas. Conversely, while patches with higher PMI will be difficult to manage and treat due to their larger size and denser cover, they also represent opportunities for possible eradication if patch numbers for a given species are low. Ultimately, managers should consider both numbers of patches and PMI values when determining treatment priorities.

It should be noted that all observations of IEPs in this report are limited to the routes surveyed. Actual percent cover of IEPs across the entire park cannot be inferred with these methods. Because we have chosen to monitor areas most likely to be invaded by a broad suite of IEPs, it is plausible that the percent cover for most IEP species may be lower in the interior of the park than along the monitoring routes.

4.3 Extra areas

The extra areas were surveyed in an attempt to match management actions with monitoring. However, management actions often need to take place when funds and resources are available, and in some cases this occurs before pre-treatment data can be collected. In the West Entrance extra areas, for example, the first herbicide application for cheatgrass occurred on 9.7 hectares in March 2015, before NCPN crews first monitored the area in July 2015. Therefore, it cannot be known how effective the treatment was on invasive plants.

After the first treatment, several additional herbicide and hand-pulling treatments occurred in the area between July 2015 and March 2019. NCPN crews monitored both treated and proposed (untreated) areas. The lack of pre-treatment data prevents meaningful comparisons, but some general comparisons can be made with the above caveats in mind. Invasive species remain widespread in the treated area and are at the same or higher levels as in the untreated area. This may be because new invasives are filling in behind the controlled species faster than native species are.

Park managers are currently considering a new plan for exotic management control in the West Entrance area. In addition to control efforts, the park staff has been seeding, planting, and caging native plants in treatment areas. In March 2019, they will install connectivity modifiers within one acre of the West Entrance extra area to promote native revegetation. Data from the treated areas will provide information on the effectiveness of control efforts over time.

4.4 Future monitoring efforts

IEPs at Colorado NM will generally be monitored at the same time of year in alternating years. Consistency in timing of monitoring should ensure consistency in detection probabilities and cover estimates of most species. For many species, sampling any time from May through September is not expected to drastically alter the chances of detecting invasive species larger than the minimum detection target size. In 2021, the NCPN will resurvey all monitoring routes as staffing and time allows. Because detections from one year may be eradicated by park staff before the next sampling period, the monitoring quadrats are relocated each year. Long-term trend reporting will focus on (1) trends in species distribution and percent cover of individual species and (2) changes in IEP percent cover of priority species and cheatgrass by monitoring route. Extra-area surveys will also be considered at the park's request.

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Appendix A. Exotic Plant Patch Data

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Fenceline Route	Anisantha diandra	Ripgut brome	0	–	4330442.379	698818.077	4	2	8
Monument Canyon Trail	Anisantha diandra	Ripgut brome	0	Mature Tree(s)	4327840.623	696605.129	2	4	8
Monument Canyon Trail	Anisantha diandra	Ripgut brome	0	–	4330453.936	698644.23	2	5	10
Monument Canyon Trail	Anisantha diandra	Ripgut brome	0	–	4330463.6	698589.05	2	5	10
Monument Canyon Trail	Anisantha diandra	Ripgut brome	0	–	4330499.077	698522.929	2	5	10
Monument Canyon Trail	Anisantha diandra	Ripgut brome	0	–	4330443.552	698699.135	2	5	10
Fenceline Route	Cardaria sp.	whitetop	0	–	4328172.845	700715.405	4	3	12
East Glade Park Road	Chorispora tenella	Blue mustard	0	–	4322227.865	702739.868	2	1	2
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4327135.7	702080.768	1	2	2
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4332603.698	696427.743	1	3	3
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4326749.695	702104.2	1	4	4
No Thoroughfare Canyon	Chorispora tenella	Blue mustard	0	–	4320989.817	703197.3	5	1	5
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4332538.92	696701.849	3	2	6
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4332603.018	696695.331	2	3	6
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4332601.25	696350.907	2	3	6
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4326692.331	702105.979	2	3	6
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4332613.7	696252.988	2	3	6
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4329480.001	699650.71	2	4	8
Ute Canyon	Chorispora tenella	Blue mustard	0	Sapling(s)	4324526.605	700134.793	4	2	8
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4326599.992	702110.375	3	3	9
Liberty Cap Trail	Chorispora tenella	Blue mustard	0	–	4325880.576	699290.951	3	3	9
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4328946.998	700239.711	2	5	10
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4329517.021	699591.146	2	5	10
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4329352.773	699792.062	2	5	10
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4329270.305	699880.876	2	5	10
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4329032.835	700149.877	2	5	10
East Glade Park Road	Chorispora tenella	Blue mustard	0	–	4321383.524	702429.842	4	3	12
East Glade Park Road	Chorispora tenella	Blue mustard	0	–	4320498.221	701280.903	3	4	12
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4328685.675	700423.692	3	4	12
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4329227.809	699908.729	3	4	12

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Fenceline Route	Chorispora tenella	Blue mustard	0	–	4331031.27	698593.16	3	4	12
No Thoroughfare Trail	Chorispora tenella	Blue mustard	0	–	4319019.05	700049.525	3	4	12
No Thoroughfare Trail	Chorispora tenella	Blue mustard	0	–	4318673.554	699959.904	3	4	12
Ute Canyon	Chorispora tenella	Blue mustard	0	–	4324064.443	699828.783	3	4	12
No Thoroughfare Trail	Chorispora tenella	Blue mustard	0	–	4318065.467	699723.938	3	5	15
East Glade Park Road	Chorispora tenella	Blue mustard	0	–	4321016.482	701662.439	4	4	16
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4322159.967	702700.523	2	1	2
Red Canyon	Convolvulus arvensis	Field bindweed	0	–	4322994.798	700998.328	1	2	2
Red Canyon	Convolvulus arvensis	Field bindweed	0	–	4323763.083	702708.21	1	3	3
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4322170.873	702697.533	2	2	4
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4320346.983	700779.994	2	2	4
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4320249.064	700555.682	2	2	4
Red Canyon	Convolvulus arvensis	Field bindweed	0	–	4323156.351	701350.052	2	2	4
Ute Canyon	Convolvulus arvensis	Field bindweed	0	–	4323594.682	698464.249	2	2	4
Ute Canyon	Convolvulus arvensis	Field bindweed	0	–	4323650.509	698448.236	2	2	4
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4321618.904	702610.831	5	1	5
Hydro 82	Convolvulus arvensis	Field bindweed	1	–	4322636.798	703807.172	5	1	5
No Thoroughfare Canyon	Convolvulus arvensis	Field bindweed	0	–	4321099.02	703340.508	5	1	5
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4321608.339	702608.811	3	2	6
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4320308.631	700668.838	3	2	6
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4321823.297	702606.461	3	2	6
Fenceline Route	Convolvulus arvensis	Field bindweed	0	–	4323443.096	705092.008	3	2	6
Red Canyon	Convolvulus arvensis	Field bindweed	0	–	4323649.156	702506.265	3	2	6
Red Canyon	Convolvulus arvensis	Field bindweed	0	–	4323176.085	701409.812	3	2	6
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4320479.841	701274.039	2	3	6
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	Mature Tree(s)	4320739.647	701558.746	3	2	6
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4319823.086	699777.894	2	4	8
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4321374.202	702412.999	2	4	8
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4321494.934	702580.365	2	4	8
East Glade Park Road	Convolvulus arvensis	Field bindweed	0	–	4320053.15	700280.845	3	3	9
Ute Canyon	Convolvulus arvensis	Field bindweed	0	–	4324297.491	697292.663	3	3	9
Red Canyon	Convolvulus arvensis	Field bindweed	0	–	4323239.077	701588.522	5	2	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Ute Canyon	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4324207.45	697782.065	4	1	4
East Glade Park Road	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4319825.345	699586.674	2	3	6
Fenceline Route	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4332634.005	696657.339	2	3	6
No Thoroughfare Canyon	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4322052.881	704573.499	2	3	6
Hydro 82	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4322587.487	704665.806	4	2	8
Ute Canyon	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4324212.181	697488.848	4	2	8
Ute Canyon	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4323932.656	698196.474	4	2	8
Ute Canyon	Cylindropyrum cylindricum	Jointed goatgrass	0	–	4323929.795	698242.702	3	3	9
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4322379.398	702805.744	1	2	2
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4326405.107	701955.308	1	2	2
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321389.888	702484.61	1	3	3
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321338.462	702386.841	1	3	3
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321414.982	702531.379	1	3	3
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4319833.447	699897.683	1	3	3
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321363.131	702438.001	1	3	3
No Thoroughfare Canyon	Descurainia sophia	Flixweed	0	Sapling(s)	4322648.545	705199.171	3	1	3
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4322369.525	702845.376	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4322055.918	702595.558	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320499.961	701328.411	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4322217.339	702729.176	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4319973.198	700169.281	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320030.939	700249.772	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320545.159	701401.268	2	2	4
Fenceline Route	Descurainia sophia	Flixweed	0	–	4326384.272	702299.079	2	2	4
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4325125.587	698004.571	2	2	4
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4326290.718	700338.393	2	2	4
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4329531.261	696833.355	2	2	4
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325550.613	701363.974	2	2	4
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320772.324	701590.272	5	1	5
Red Canyon	Descurainia sophia	Flixweed	0	–	4324177.747	703662.346	5	1	5
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320168.926	700440.316	3	2	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320138.326	700396.785	3	2	6

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320373.223	700875.048	3	2	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4319947.898	700126.616	3	2	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4332411.351	696708.634	3	2	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4332352.615	696716.279	3	2	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4326765.497	702102.88	3	2	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4332610.268	696522.673	3	2	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4331378.696	697838.767	3	2	6
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4326076.323	699386.316	3	2	6
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4326195.187	700839.435	3	2	6
No Thoroughfare Trail	Descurainia sophia	Flixweed	0	–	4317823.416	699281.869	3	2	6
Ute Canyon	Descurainia sophia	Flixweed	0	–	4324062.108	699826.486	3	2	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4319851.596	699945.215	2	3	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321465.338	702582.707	2	3	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320084.954	700324.569	2	3	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4320580.155	701437.27	2	3	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4319876.4	699991.836	2	3	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4327486.315	701342.255	2	3	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4327450.854	701389.794	2	3	6
Fenceline Route	Descurainia sophia	Flixweed	0	–	4332609.794	696682.477	2	3	6
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4329963.158	697033.478	2	3	6
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4329507.454	696878.193	2	3	6
Ute Canyon	Descurainia sophia	Flixweed	0	–	4324520.556	700129.062	2	3	6
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321024.264	701666.047	4	2	8
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321545.516	702594	2	4	8
Fenceline Route	Descurainia sophia	Flixweed	0	–	4329413.392	699730.758	2	4	8
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4325228.065	696001.372	2	4	8
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325517.441	701277.929	2	4	8
Fenceline Route	Descurainia sophia	Flixweed	0	–	4332523.216	696703.007	3	3	9
Fenceline Route	Descurainia sophia	Flixweed	0	–	4329376.244	699767.373	3	3	9
Fenceline Route	Descurainia sophia	Flixweed	0	–	4329884.061	699229.791	3	3	9
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4325339.099	695914.757	3	3	9
Liberty Cap Trail	Descurainia sophia	Flixweed	0	–	4325327.793	695950.657	3	3	9

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4331233.44	698603.106	3	3	9
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4331322.385	698616.671	3	3	9
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4329881.563	697016.089	3	3	9
Fenceline Route	Descurainia sophia	Flixweed	0	–	4328468.407	700498.364	2	5	10
Fenceline Route	Descurainia sophia	Flixweed	0	–	4327285.929	701517.316	2	5	10
Fenceline Route	Descurainia sophia	Flixweed	0	–	4327379.793	701462.72	2	5	10
Fenceline Route	Descurainia sophia	Flixweed	0	–	4327155.011	702015.634	2	5	10
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325372.044	700888.397	2	5	10
Monument Canyon Trail	Descurainia sophia	Flixweed	0	Mature Tree(s)	4327771.341	696473.042	2	5	10
Monument Canyon Trail	Descurainia sophia	Flixweed	0	–	4331357.683	698729.558	4	3	12
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325488.161	701162.625	4	3	12
East Glade Park Road	Descurainia sophia	Flixweed	0	–	4321377.506	702419.181	3	4	12
Fenceline Route	Descurainia sophia	Flixweed	0	–	4330699.137	698618.105	3	4	12
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325498.349	700850.289	3	4	12
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325571.877	700949.316	3	4	12
Fenceline Route	Descurainia sophia	Flixweed	0	–	4329174.855	699944.673	3	5	15
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325526.499	701052.252	3	5	15
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325490.393	701103.686	3	5	15
Ute Canyon	Descurainia sophia	Flixweed	0	–	4325507.042	701231.208	4	4	16
Fenceline Route	Elaeagnus angustifolia	Russian-olive	0	Mature Tree(s)	4328132.645	700744.086	5	1	5
Hydro 03	Elaeagnus angustifolia	Russian-olive	0	Mature Tree(s)	4332248.457	695413.58	5	1	5
No Thoroughfare Canyon	Elaeagnus angustifolia	Russian-olive	0	Sapling(s)	4319670.88	700886.354	5	1	5
No Thoroughfare Canyon	Elaeagnus angustifolia	Russian-olive	0	Sapling(s)	4321270.442	703461.209	5	1	5
Fenceline Route	Elaeagnus angustifolia	Russian-olive	0	Mature Tree(s)	4327743.803	701087.064	3	3	9
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322377.814	702787.774	1	2	2
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320008.77	700220.833	1	2	2
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321186.348	702018.336	1	2	2
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322387.645	702738.836	1	2	2
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321732.23	702619.875	1	2	2
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4319844.306	699930.954	1	2	2
Fenceline Route	Melilotus officinale	Yellow sweet-clover	0	–	4323679.817	704336.018	1	2	2
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320171.312	701874.967	1	2	2

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322696.2	705253.517	1	2	2
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319814.634	701451.129	1	2	2
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322706.121	705353.021	1	2	2
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322803.873	705393.648	1	2	2
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322852.495	705423.393	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323400.799	702010.504	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323266.722	701699.54	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323020.813	701001.375	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323729.688	702677.567	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323777.108	702740.539	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323608.386	702409.298	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323637.783	702454.044	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323561.689	702368.347	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322859.986	700661.946	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324008.642	703360.418	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323217.326	701543.883	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323900.911	703236.355	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323837.551	703156.97	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323810.397	703038.316	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323809.133	703099.412	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323802.103	702969.191	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323421.963	702132.009	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323890.582	703194.166	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323817.579	702909.776	1	2	2
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323945.813	703304.572	1	2	2
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320416.241	701037.616	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321678.216	702617.483	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321936.813	702560.627	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321848.451	702587.301	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321988.04	702556.232	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320276.375	700604.449	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322049.758	702607.445	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321335.802	702438.176	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320402.337	700977.919	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321698.777	702610.036	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321756.706	702613.23	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322079.227	702627.564	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321323.187	702358.769	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322211.791	702734.032	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321626.691	702611.197	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322115.618	702668.302	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321562.485	702595.066	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321574.063	702606.138	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4322163.197	702693.345	1	3	3
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4321114.801	703409.594	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321753.31	703962.394	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321709.395	703981.577	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320995.852	703068.45	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322549.263	705042.963	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321507.826	703575.456	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321677.584	703866.161	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320366.884	702203.926	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320400.98	702253.213	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320463.137	702311.304	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320031.464	701749.724	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321797.993	703971.694	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320287.304	702022.275	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321561.711	703653.324	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321693.808	703921.704	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321637.876	703699.317	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320120.254	701827.322	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319938.428	701662.041	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321655.275	703804.788	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321566.837	703678.326	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322590.659	705079.965	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318646.578	700105.526	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318305.651	700106.867	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318440.226	700123.396	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320070.159	701785.936	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318389.795	700093.907	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319803.007	701022.76	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320709.172	702841.704	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319375.913	700662.899	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322042.017	704241.441	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320870.88	702921.024	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320973.769	702979.912	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320722.033	702802.367	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321808.902	704090.248	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319069.924	700338.853	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321934.739	704204.946	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320731.847	702882.403	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320963.581	703168.268	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320591.878	702408.428	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320919.863	702948.045	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322049.536	704592.381	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322279.191	704709.996	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322094.034	704346.836	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322197.479	704646.388	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321977.933	704203.954	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322078.615	704281.703	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322051.425	704516.226	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322314.551	704751.88	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320076.864	701795.766	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319746.409	700965.749	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319511.373	700726.571	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319024.218	700315.179	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322258.553	704660.761	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319520.639	700779.255	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322129.638	704648.924	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322067.018	704457.299	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318910.779	700225.965	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319135.654	700427.158	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322104.011	704404.414	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322078.412	704641.654	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321658.513	703749.405	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322423.467	704890.61	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319591.438	700802.498	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319186.856	700456.157	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322613.327	705162.874	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322354.878	704798.194	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322423.442	705012.066	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322415.624	704960.277	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322661.823	705211.22	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319657.513	700824.29	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319337.476	700632.433	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321397.907	703531.335	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321261.354	703465.374	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321550.283	703612.786	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321107.797	703382.255	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321065.09	703282.731	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321207.812	703369.801	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321155.26	703389.81	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321449.196	703568.65	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320495.262	702373.503	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321802.199	704140.528	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321100.997	703329.232	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322492.491	705034.065	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320654.036	702632.427	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320830.534	702881.4	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320781.709	702863.572	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320699.834	702743.391	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319684.156	700892.546	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321031.907	703250.187	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321002.793	703017.677	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321254.327	703404.353	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320554.014	702377.526	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319278.078	700581.452	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319248.631	700521.011	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319455.866	700690.722	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320997.722	703208.307	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318991.138	700266.788	1	3	3
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320685.37	702678.472	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323331.322	701836.706	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323443.78	702177.807	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323239.079	701613.978	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323676.717	702638.902	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323667.329	702580.926	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324156.051	703482.442	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324153.289	703594.103	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324027.618	703408.903	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324116.354	703441.715	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323653.009	702518.308	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322906.237	700778.903	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324182.587	703689.286	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324064.87	703457.006	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323446.065	702225.774	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323055.815	701200.357	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324157.199	703528.462	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4322884.69	700728.699	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323321.157	701789.519	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323363.817	701943.994	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323330.77	701893.971	1	3	3
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323494.26	702262.955	1	3	3
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320333.263	700735.082	2	2	4
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320951.774	701652.813	2	2	4
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321022.248	701673.759	2	2	4
Fenceline Route	Melilotus officinale	Yellow sweet-clover	0	–	4324152.574	703777.48	2	2	4
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318855.157	700189.858	1	4	4
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318536.731	700107.65	1	4	4
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318764.267	700128.098	1	4	4
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318798.516	700160.771	1	4	4
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320210.599	700498.792	5	1	5
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321220.207	702156.726	5	1	5
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321126.818	701755.289	5	1	5
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4317887.861	699645.507	5	1	5
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320313.517	700682.11	3	2	6
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321393.478	702471.619	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321815.931	704025.073	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320356.555	702074.034	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319991.095	701705.702	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319886.025	701484.894	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319873.579	701633.686	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320355.799	702142.781	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320248.093	701965.9	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321899.978	704170.269	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320569.836	702463.542	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4321856.841	704148.973	2	3	6
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4320967.191	703112.767	2	3	6
Red Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324164.141	703647.253	2	3	6
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321442.268	702544.155	2	4	8
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321334.537	702358.352	2	4	8
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319805.008	701225.868	2	4	8

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318589.733	700093.82	2	4	8
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4318708.587	700119.559	2	4	8
No Thoroughfare Trail	Melilotus officinale	Yellow sweet-clover	0	–	4319022.31	700056.903	2	4	8
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325558.999	700922.538	2	4	8
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325424.349	702537.81	2	4	8
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325461.304	702635.311	2	4	8
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325439.844	702599.099	2	4	8
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325488.004	702658.964	2	4	8
Monument Canyon Trail	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4327834.006	696500.236	2	4	8
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320484.773	701299.183	3	3	9
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319884.272	701538.038	3	3	9
No Thoroughfare Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4319878.56	701588.507	3	3	9
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4320407.48	700962.685	5	2	10
East Glade Park Road	Melilotus officinale	Yellow sweet-clover	0	–	4321227.385	702156.632	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322630.12	705031.804	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322557.789	704699.162	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322734.617	704173.733	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322684.983	703880.388	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322758.023	704131.244	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	1	–	4322606.967	703755.464	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322744	704217.641	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322727.419	704276.297	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322746.703	704043.94	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322621.555	704957.225	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322723.015	704004.573	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322579.055	704878.819	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322696.612	703942.895	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322593.722	704813.385	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	–	4322767.223	704092.117	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319827.846	702509.38	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320223.522	702783.367	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320475.447	703171.493	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320416.532	702911.508	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319489.606	702365.831	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320618.938	703364.883	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320509.536	703264.466	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320506.286	703211.705	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320585.817	703346.397	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320451.355	702954.477	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320495.37	703121.001	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320057.786	702704.77	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319676.077	702397.094	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319572.52	702371.566	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319340.508	702342.478	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320185.708	702754.79	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320497.507	703064.619	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319775.798	702485.041	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320494.231	703003.662	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319852.58	702543.811	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320361.852	702892.695	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320116.187	702711.608	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320294.429	702862.107	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4319967.207	702639.003	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320014.406	702664.039	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320250.937	702825.144	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	–	4320535.903	703302.408	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325533.124	701392.078	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325487.702	701121.959	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325458.276	701653.836	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325499.837	701209.854	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325510.16	701071.181	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325527.819	701334.78	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323923.267	699678.02	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324148	699874.032	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324422.937	700090.005	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324195.294	699916.228	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325541.379	701509.316	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325404.282	701761.528	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325434.944	701722.067	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325401.949	700862.662	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325270.94	701964.626	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325466.099	700837.154	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325575.54	700973.641	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325539.543	701447.51	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325256.364	702334.48	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325483.157	701622.658	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323545.578	699507.163	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325265.304	702423.907	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325264.5	702252.67	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323785.956	699689.865	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323516.403	698685.842	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325516.256	701278.078	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324323.005	697231.402	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323242.301	699306.92	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324024.036	698173.48	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323855.353	699664.338	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324268.803	700030.002	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325492.576	701176.564	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324191.352	699965.049	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323395.589	699390.031	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323752.176	699649.016	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323325.317	699404.083	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325261.52	701995.311	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324198.947	697604.196	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324179.836	697519.314	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324276.723	697412.753	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323067.139	699078.61	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325522.682	701563.167	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323103.714	699252.209	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324490.01	700103.229	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325303.37	701862.622	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323264.287	699364.985	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325373.389	700825.636	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325546.506	701032.509	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4325525.18	700879.694	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324054.371	698024.265	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323740.416	699564.397	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323039.192	699221.656	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324043.733	698114.945	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323172.622	699265.259	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323168.598	698963.514	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323020.567	699135.242	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324081.98	699852.688	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324213.728	697779.902	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4324161.632	697847.823	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	–	4323934.149	698229.995	2	5	10
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325306.655	702486.471	2	5	10
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325379.538	702481.309	2	5	10
Limekin Gulch	Melilotus officinale	Yellow sweet-clover	0	Mature Tree(s)	4325253.287	702495.782	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324721.531	700229.011	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324631.89	700181.698	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325209.065	700639.927	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324766.072	700277.647	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324838.611	700363.425	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325165.202	700610.224	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324880.797	700404.729	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325317.953	700822.614	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325121.628	700579.215	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325076.797	700548.259	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324963.39	700472.608	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325013.447	700523.029	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324925.641	700424.569	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325283.211	700771.609	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324697.014	700188.721	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4325262.756	700717.598	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324538.521	700150.206	2	5	10
Ute Canyon	Melilotus officinale	Yellow sweet-clover	0	Sapling(s)	4324815.991	700313.307	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4322692.758	704483.262	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4322741.618	704351.576	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4322613.858	704630.119	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4322724.958	704444.05	2	5	10
Hydro 82	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4322639.178	704561.774	2	5	10
Hydro 85	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321690.153	703554.746	2	5	10
Hydro 85	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321654.218	703679.564	2	5	10
Hydro 85	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321677.078	703619.399	2	5	10
Hydro 85	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321717.403	703494.029	2	5	10
Hydro 85	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321749.99	703381.232	2	5	10
Hydro 85	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321744.391	703348.495	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4320708.806	703507.75	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4320903.768	703575.969	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4320849.18	703575.596	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4320986.96	703566.133	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321021.168	703495.191	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4320792.878	703549.483	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321073.667	703458.315	2	5	10
Hydro 95	Melilotus officinale	Yellow sweet-clover	0	Seedling(s)	4321116.168	703409.078	2	5	10
Red Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4323402.615	702025.75	1	2	2
Red Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4323776.113	702753.424	2	2	4
Hydro 03	Tamarix sp.	tamarisk	0	Mature Tree(s)	4332525.59	695462.542	5	1	5
Limekin Gulch	Tamarix sp.	tamarisk	0	Mature Tree(s)	4325556.29	702744.429	5	1	5

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Hydro 03	Tamarix sp.	tamarisk	0	Sapling(s)	4332509.176	695472.007	5	1	5
No Thoroughfare Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4320192.028	701890.42	5	1	5
No Thoroughfare Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4320350.429	702096.657	5	1	5
No Thoroughfare Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4322653.569	705205.475	5	1	5
No Thoroughfare Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4320452.5	702297.119	5	1	5
No Thoroughfare Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4320657.87	702657.323	5	1	5
Red Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4323915.981	703272.11	5	1	5
Ute Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4325537.54	701442.964	5	1	5
Ute Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4325361.656	700830.51	5	1	5
Ute Canyon	Tamarix sp.	tamarisk	0	Sapling(s)	4323905.809	699671.924	5	1	5
Hydro 95	Tamarix sp.	tamarisk	0	Seedling(s)	4320698.596	703492.052	5	1	5
No Thoroughfare Canyon	Tamarix sp.	tamarisk	0	Seedling(s)	4321936.772	704212.284	5	1	5
Ute Canyon	Tamarix sp.	tamarisk	0	Seedling(s)	4323369.249	699408.361	5	1	5
Ute Canyon	Tamarix sp.	tamarisk	0	Seedling(s)	4323108.495	699031.799	5	1	5
Hydro 03	Tamarix sp.	tamarisk	0	Sapling(s)	4332554.278	695484.574	3	2	6
Monument Canyon Trail	Tamarix sp.	tamarisk	0	Mature Tree(s)	4328855.756	697514.007	3	4	12
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4331689.995	697353.901	2	1	2
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319850.005	701287.684	2	1	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320338.224	700748.844	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4322285.814	702815.829	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321294.49	702307.62	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320733.698	701565.031	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321191.351	702038.224	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321267.723	702250.544	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4322179.372	702703.356	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320196.414	700478.113	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320239.846	700539.297	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4319937.644	700108.212	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320422.747	702262.061	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321281.175	703455.249	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4322303.979	704741.814	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321012.377	703224.758	1	2	2

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321814.985	704051.738	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4318333.718	700065.279	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320854.483	702912.934	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321695.703	703960.655	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319828	701211.552	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320575.692	702382.424	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319633.866	700816.978	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319807.454	701449.589	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319736.649	700957.526	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321966.417	704217.348	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319445.7	700690.488	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4318395.496	700111.268	1	2	2
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319777.989	701409.274	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323096.687	701276.873	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323261.282	701650.101	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4322849.813	700647.547	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323811.191	702940.942	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323502.81	702280.228	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4322980.7	701003.491	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323207.125	701455.823	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323287.185	701727.298	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4322919.452	700797.232	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323440.215	702159.054	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323653.826	702534.084	1	2	2
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323392.537	702048.486	1	2	2
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321787.326	702611.461	1	3	3
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320475.828	701257.781	1	3	3
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4319913.405	700048.365	1	3	3
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320098.641	700342.71	1	3	3
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320038.154	700259.977	1	3	3
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320125.995	700382.552	1	3	3
Hydro 03	Tragopogon dubius	Yellow salsify	0	–	4332546.175	695462.99	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4321112.936	703398.761	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320010.728	701730.23	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320748.364	702893.894	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320347.454	702140.379	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319889.191	701646.992	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320994.062	703006.291	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319885.381	701561.825	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320402.646	702277.647	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321098.471	703317.018	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320103.076	701816.219	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320963.986	703145.077	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320977.67	703185.612	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319968.897	701685.449	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319870.322	701477.245	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321054.408	703269.823	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321244.943	703388.42	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4322049.741	704550.784	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320212.919	701909.878	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320274.135	702012.233	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320160.253	701866.509	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320471.915	702322.793	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320504.428	702379.655	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320046.534	701764.726	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320980.799	703091.575	1	3	3
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321165.788	703389.053	1	3	3
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323337.073	701871.826	1	3	3
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323332.224	701822.479	1	3	3
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323454.625	702237.329	1	3	3
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323221.73	701527.124	1	3	3
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4323315.424	701767.296	1	3	3
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4330443.105	698816.001	4	1	4
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4329097.979	700077.557	4	1	4

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319886.204	701211.674	4	1	4
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321206.665	702119.631	2	2	4
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4319835.398	699828.109	2	2	4
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4323445.56	705089.318	2	2	4
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4332614.4	696221.557	2	2	4
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319078.645	700232.733	2	2	4
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320398.277	700932.929	5	1	5
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321502.194	702595.915	5	1	5
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321165.122	701900.205	5	1	5
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321382.409	702472.897	5	1	5
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321447.062	702569.949	5	1	5
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320268.827	700589.687	5	1	5
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4330776.016	698614.444	5	1	5
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4328778.521	700406.399	5	1	5
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4327162.609	701741.03	5	1	5
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4328870.009	700321.588	5	1	5
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4332602.456	696392.358	5	1	5
Fenceline Route	Tragopogon dubius	Yellow salsify	0	–	4330077.576	699047.191	5	1	5
Liberty Cap Trail	Tragopogon dubius	Yellow salsify	0	–	4325262.504	698663.404	5	1	5
Liberty Cap Trail	Tragopogon dubius	Yellow salsify	0	–	4325042.051	696800.498	5	1	5
Liberty Cap Trail	Tragopogon dubius	Yellow salsify	0	–	4325175.042	697262.678	5	1	5
Liberty Cap Trail	Tragopogon dubius	Yellow salsify	1	–	4325958.003	701483.869	5	1	5
Liberty Cap Trail	Tragopogon dubius	Yellow salsify	0	–	4325325.718	697816.575	5	1	5
Liberty Cap Trail	Tragopogon dubius	Yellow salsify	0	–	4325385.34	698964.446	5	1	5
Monument Canyon Trail	Tragopogon dubius	Yellow salsify	0	–	4329055.979	697378.57	5	1	5
Monument Canyon Trail	Tragopogon dubius	Yellow salsify	0	–	4331353.496	698660.568	5	1	5
Monument Canyon Trail	Tragopogon dubius	Yellow salsify	0	–	4329266.721	697101.303	5	1	5
Monument Canyon Trail	Tragopogon dubius	Yellow salsify	0	–	4328862.005	697507.287	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4322815.214	705394.966	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4320710.254	702779.849	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4317512.683	699553.452	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4319242.316	700511.897	5	1	5

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321843.117	704146.119	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321411.83	703534.858	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4321538.433	703589.969	5	1	5
No Thoroughfare Canyon	Tragopogon dubius	Yellow salsify	0	–	4322699.91	705269.131	5	1	5
Old Gordon Trail	Tragopogon dubius	Yellow salsify	0	–	4322789.056	705388.732	5	1	5
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4322762.556	700511.053	5	1	5
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4324026.197	703449.765	5	1	5
Red Canyon	Tragopogon dubius	Yellow salsify	0	–	4324157.346	703618.26	5	1	5
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4317863.155	699529.66	3	2	6
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4318020.321	699658.061	3	2	6
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321216.838	702130.341	2	3	6
Hydro 82	Tragopogon dubius	Yellow salsify	0	–	4322766.21	704124.128	2	3	6
Monument Canyon Trail	Tragopogon dubius	Yellow salsify	0	–	4330389.185	698264.595	2	3	6
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320441.171	701104.722	2	4	8
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320490.662	701271	2	4	8
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320429.004	701058.434	2	4	8
Monument Canyon Trail	Tragopogon dubius	Yellow salsify	0	–	4330470.615	698790.23	2	4	8
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4317776.725	699542.523	2	4	8
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4317812.683	699513.945	2	4	8
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4317648.805	699562.313	2	4	8
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325529.79	701420.884	2	4	8
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325544.307	700904.027	2	4	8
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325309.011	701856.283	2	4	8
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325341.359	701789.732	2	4	8
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	Mature Tree(s)	4320837.868	701609.738	2	4	8
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	Mature Tree(s)	4320707.587	701537.064	2	4	8
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321166.332	701881.974	3	3	9
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320512.426	701326.952	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320146.007	700396.824	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320242.425	700530.713	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320079	700304.773	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320215.76	700489.591	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321357.631	702394.645	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320547.039	701388.477	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321425.951	702516.884	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321390.198	702461.023	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321302.234	702293.856	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320115.443	700356.845	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320581.814	701429.082	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4320679.346	701511.697	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4320479.75	703188.982	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319893.438	702570.637	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319479.073	702367.057	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319535.91	702359.785	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319837.61	702517.353	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4320470.772	702965.788	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319340.622	702340.113	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319423.515	702359.771	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4321114.252	703416.541	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4320382.511	702899.468	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4320428.447	702930.979	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319668.164	702391.846	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319930.308	702614.682	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4320165.491	702743.265	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4319243.215	702223.032	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	–	4320666.727	703401.173	2	5	10
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319906.41	701092.717	2	5	10
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319900.832	701030.498	2	5	10
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4318075.728	699708.28	2	5	10
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4317727.597	699546.867	2	5	10
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319159.985	700358.235	2	5	10
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4319906.527	701167.691	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324193.289	699912.974	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325490.881	701167.712	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325479.583	700839.718	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323331.431	699402.995	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324145.787	697864.786	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324282.9	700041.439	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325487.705	701116.639	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324446.796	700096.519	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323076.85	699070.875	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325574.98	700979.232	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324204.686	697607.862	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324044.065	698107.411	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324364.667	700078.809	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323765.326	699680.554	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323828.393	699673.152	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325523.805	701053.099	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323750.391	699623.06	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325365.658	700834.396	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323539.108	699507.79	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323402.433	699390.147	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324074.285	699843.142	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324140.348	699871.734	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324201.311	699980.015	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325458.835	701649.694	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324189.713	697509.12	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4324298.313	697313.13	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4325425.481	701741.926	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323933.589	698208.691	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323575.925	698580.286	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	–	4323313.306	698842.364	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4324666.708	700177.86	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4325173.201	700615.829	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4324732.558	700249.373	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4324901.855	700417.256	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4324797.428	700303.26	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4325270.345	700741.289	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4325130.211	700586.462	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4324578.029	700163.958	2	5	10
Ute Canyon	Tragopogon dubius	Yellow salsify	0	Sapling(s)	4325086.469	700559.364	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	Seedling(s)	4320933.179	703571.581	2	5	10
Hydro 95	Tragopogon dubius	Yellow salsify	0	Seedling(s)	4320973.349	703569.696	2	5	10
East Glade Park Road	Tragopogon dubius	Yellow salsify	0	–	4321256.134	702211.218	3	4	12
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4318110.948	699781.204	3	4	12
No Thoroughfare Trail	Tragopogon dubius	Yellow salsify	0	–	4318091.241	699747.928	3	5	15
Red Canyon	Ulmus pumila	Siberian elm	0	Seedling(s)	4324180.769	703714.169	2	2	4
Limekin Gulch	Ulmus pumila	Siberian elm	0	Mature Tree(s)	4325416.16	702495.287	5	1	5
No Thoroughfare Canyon	Ulmus pumila	Siberian elm	0	Sapling(s)	4319870.168	701466.57	5	1	5
Red Canyon	Ulmus pumila	Siberian elm	0	Sapling(s)	4323905.817	703251.004	5	1	5
Ute Canyon	Ulmus pumila	Siberian elm	0	Sapling(s)	4325263.919	702449.289	5	1	5
Ute Canyon	Ulmus pumila	Siberian elm	0	Sapling(s)	4325229.196	702354.288	5	1	5
Hydro 03	Ulmus pumila	Siberian elm	1	Seedling(s)	4332576.783	695517.418	5	1	5
Red Canyon	Ulmus pumila	Siberian elm	0	Seedling(s)	4323162.411	701365.115	5	1	5
Red Canyon	Ulmus pumila	Siberian elm	0	Seedling(s)	4323813.956	703088.127	5	1	5
Red Canyon	Ulmus pumila	Siberian elm	0	Seedling(s)	4323806.551	702861.601	5	1	5
Fenceline Route	Ulmus pumila	Siberian elm	0	Sapling(s)	4325184.056	702963.348	4	2	8
Red Canyon	Ulmus pumila	Siberian elm	0	Mature Tree(s)	4324179.2	703713.913	5	2	10
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4319118.187	700419.485	1	1	1
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318618.236	700102.026	1	2	2
Red Canyon	Verbascum thapsus	Woolly mullein	0	–	4323188.128	701423.756	1	2	2
Red Canyon	Verbascum thapsus	Woolly mullein	0	–	4323804.915	703114.616	1	2	2
Red Canyon	Verbascum thapsus	Woolly mullein	0	–	4324156.671	703559.392	1	2	2
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318422.136	700101.905	1	3	3
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4319809.766	701086.44	1	3	3
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318875.377	700217.611	1	3	3
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4319844.711	701146.308	1	3	3
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318492.337	700133.758	1	3	3

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4319756.752	700998.901	1	3	3
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4320655.376	703462.136	4	1	4
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4320546.797	703306.545	2	2	4
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319805.979	702496.552	2	2	4
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318559.909	700101.73	2	2	4
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4319802.691	701040.666	2	2	4
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4320600.746	703354.261	5	1	5
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319840.286	702536.084	5	1	5
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319682.646	702401.5	5	1	5
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318678.36	700108.807	5	1	5
Red Canyon	Verbascum thapsus	Woolly mullein	0	–	4323229.154	701560.953	5	1	5
Red Canyon	Verbascum thapsus	Woolly mullein	1	–	4323571.253	702379.404	5	1	5
Red Canyon	Verbascum thapsus	Woolly mullein	1	–	4323155.318	701335.253	5	1	5
Red Canyon	Verbascum thapsus	Woolly mullein	1	–	4323082.116	701252.229	5	1	5
Ute Canyon	Verbascum thapsus	Woolly mullein	0	–	4325239.897	702191.017	5	1	5
Hydro 95	Verbascum thapsus	Woolly mullein	0	Seedling(s)	4320699.701	703495.046	5	1	5
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319915.939	702608.393	2	3	6
No Thoroughfare Canyon	Verbascum thapsus	Woolly mullein	0	–	4318958.196	700244.418	2	3	6
Ute Canyon	Verbascum thapsus	Woolly mullein	0	–	4323750.136	698364.435	2	4	8
Ute Canyon	Verbascum thapsus	Woolly mullein	0	–	4323838.521	698279.381	2	4	8
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4320636.544	703394.997	2	5	10
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319204.988	702188.847	2	5	10
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319176.545	702141.557	2	5	10
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319387.303	702370.913	2	5	10
Hydro 95	Verbascum thapsus	Woolly mullein	0	–	4319313.448	702275.265	2	5	10
Fenceline Route	Agropyron cristatum	crested wheatgrass	0	–	4323512.185	704503.649	2	2	4
Fenceline Route	Anisantha tectorum	Cheatgrass	0	–	4332635.528	696615.068	3	5	15
Fenceline Route	Anisantha tectorum	Cheatgrass	0	–	4332631.574	696572.768	3	5	15
Fenceline Route	Anisantha tectorum	Cheatgrass	0	–	4332624.832	696521.728	4	5	20
Red Canyon	Asparagus officinalis	Asparagus	0	–	4323264.884	701661.735	5	1	5
Red Canyon	Asparagus officinalis	Asparagus	0	–	4323366.137	701954.833	5	1	5
Red Canyon	Asparagus officinalis	Asparagus	0	–	4323452.105	702171.607	5	1	5

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
Fenceline Route	Erodium cicutarium	Stork's-bill	0	–	4332625.854	696581.343	1	5	5
No Thoroughfare Canyon	Populus alba	White poplar	0	Mature Tree(s)	4320965.849	703177.048	5	1	5
No Thoroughfare Canyon	Populus alba	White poplar	0	Sapling(s)	4322638.272	705189.267	5	1	5
Fenceline Route	Salsola sp.	Russian thistle	0	–	4332625.994	696569.002	2	5	10
Fenceline Route	Sisymbrium altissimum	Tumble mustard	0	–	4332633.086	696638.157	1	5	5
Fenceline Route	Sisymbrium altissimum	Tumble mustard	0	–	4332625.833	696542.404	2	5	10
Fenceline Route	Triticum aestivum	Wheat	0	–	4327609.361	701218.525	1	3	3
Fenceline Route	Triticum aestivum	Wheat	0	–	4330552.663	698779.178	4	1	4
East Glade Park Road	Triticum aestivum	Wheat	0	–	4320270.57	700573.592	5	1	5
Liberty Cap Trail	Triticum aestivum	Wheat	0	–	4325854.554	701339.903	5	1	5
Monument Canyon Trail	Triticum aestivum	Wheat	0	–	4331339.994	698645.049	5	1	5
No Thoroughfare Trail	Triticum aestivum	Wheat	0	–	4319850.591	701305.098	5	1	5
No Thoroughfare Trail	Triticum aestivum	Wheat	0	–	4319753.277	700773.676	5	1	5
Fenceline Route	Triticum aestivum	Wheat	0	–	4327208.535	701645.959	2	3	6
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332538.196	696492.343	1	2	2
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332400.928	696344.25	1	3	3
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332384.879	696388.623	2	2	4
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332584.988	696582.238	2	2	4
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332317.02	696216.43	1	4	4
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332582.151	696630.418	2	3	6
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332611.748	696246.759	2	3	6
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332603.215	696368.586	2	3	6
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332576	696194.265	2	3	6
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332463.953	696293.599	2	4	8
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332595.82	696675.672	2	4	8
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332450.97	696414.595	2	4	8
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332348.754	696251.702	2	4	8
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332587.339	696345.366	2	5	10
West Entrance Extra Area	Chorispora tenella	Blue mustard	0	–	4332453.592	696320.078	3	4	12
West Entrance Extra Area	Convolvulus arvensis	Field bindweed	0	–	4332555.968	696238.933	2	3	6
West Entrance Extra Area	Convolvulus arvensis	Field bindweed	0	–	4332463.176	696316.48	2	3	6
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332478.936	696427.342	1	2	2

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332338.224	696234.867	1	3	3
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332447.747	696489.981	2	2	4
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332582.365	696536.942	2	2	4
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332622.388	696472.662	2	3	6
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332292.352	696189.799	2	3	6
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332372.704	696440.463	2	4	8
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332583.922	696614.005	2	5	10
West Entrance Extra Area	Descurainia sophia	Flixweed	0	–	4332591.921	696537.671	2	5	10
West Entrance Extra Area	Melilotus officinale	Yellow sweet-clover	0	–	4332466.563	696319.014	2	2	4
West Entrance Extra Area	Melilotus officinale	Yellow sweet-clover	0	–	4332583.152	696612.236	2	3	6
West Entrance Extra Area	Agropyron cristatum	crested wheatgrass	0	–	4332595.365	696301.953	3	2	6
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332240.99	696522.113	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332403.605	696370.711	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332226	696563.89	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332415.892	696427.827	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332341.9	696464.349	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331950.897	697011.605	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332075.766	697007.181	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331947.754	697057.226	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332007.292	696913.251	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332113.725	696869.51	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332182.884	696839.278	2	5	10
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332447.163	696518.454	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332357.317	696514.235	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332620.054	696089.17	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332559.803	696284.543	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332503.512	696279.579	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332401	696519.331	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332542.675	696239.562	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332417.417	696274.441	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332263.755	696662.059	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332587.982	696613.709	3	5	15

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332267.947	696574.406	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332318.296	696574.177	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332228.152	696660.917	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332451.925	696656.695	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331967.94	697086.955	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332532.736	696665.763	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332490.381	696664.028	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331976.474	696947.931	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332492.431	696323.085	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332236.832	696201.266	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332480.895	696180.631	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332544.398	696373.195	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332615	696235.856	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332530.277	696185.882	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332464.954	696411.956	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332392.286	696469.718	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332496.895	696228.3	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332511.325	696469.298	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332405.73	696231.086	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332588.112	696194.821	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332448.314	696470.792	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332260.294	696199.153	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332145.509	696984.738	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332526.913	696091.064	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332384.952	696328.426	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332382.321	696186.414	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332604.76	696323.629	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332319.395	696233.64	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332488.97	696125.072	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332362.417	696238.046	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332428.572	696173.013	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332536.423	696126.33	3	5	15

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332338.641	696185.852	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332360.315	696424.663	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332457.071	696222.415	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332572.326	696412.254	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332586.386	696131.832	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332452.801	696274.949	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332325.356	696273.799	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332572.411	696095.145	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332542.186	696327.299	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332046.594	696929.694	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332583.244	696663.393	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332184.875	697001.072	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332075.664	697107.11	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332042.156	697006.641	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332072.92	696915.384	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332048.377	696883.422	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332048.818	697048.853	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332002.38	696972.826	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332005.095	697090.278	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331973.744	697045.972	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331975.449	697010.426	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4331979.725	696975.559	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332181.928	696954.196	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332147.629	696922.592	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332114.411	697000.155	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332111.506	697054.457	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332076.484	697060.372	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332075.62	696957.428	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332044.338	696964.104	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332309.714	696657.685	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332142.025	696862.046	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332040.132	697106.758	3	5	15

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332179.584	697052.405	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332005.185	697027.772	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332147.154	696816.979	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332178.913	696896.164	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332072.421	696862.991	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332117.627	696926.743	3	5	15
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332384.116	696604.653	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332262.278	696610.429	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332493.533	696510.541	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332574.144	696522.317	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332276.447	696516.432	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332531.775	696518.346	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332410.429	696562.633	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332578.15	696563.067	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332537.154	696565.184	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332442.32	696366.708	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332318.627	696510.089	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332520.874	696413.933	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332546.779	696609.476	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332418.937	696600.057	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332223.222	696606.523	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332301.793	696606.18	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332367.494	696574.05	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332465.365	696605.194	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332400.806	696664.6	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332342.962	696606.538	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332454.116	696563.615	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332618.663	696471.798	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332488.373	696363.769	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332564.365	696476.54	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332356.507	696658.22	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332365.577	696280.749	4	5	20

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332607.37	696282.92	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332305.876	696190.105	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332597.327	696370.27	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332432.437	696320.458	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332420.562	696120.657	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332490.504	696563.775	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332509.58	696602.46	4	5	20
West Entrance Extra Area	Anisantha tectorum	Cheatgrass	0	–	4332152.981	697050.552	4	5	20
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332573.998	696631.96	1	4	4
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332282.936	696589.395	1	4	4
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332298.072	696176.753	1	4	4
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332473.462	696105.412	1	4	4
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332130.974	697056.333	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332200.801	696980.608	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332198.651	697035.041	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332166.713	696846.116	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332416.418	696621.43	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332201.38	696811.305	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332165.911	696963.354	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332372.164	696490.817	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332400.669	696534.454	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332288.207	696629.36	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332256.673	696682.819	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4331943.208	697054.476	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332486.154	696686.779	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332464.15	696530.498	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332133.284	697004.929	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332391.757	696574.129	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332611.215	696678.135	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332198.744	696923.857	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332339.2	696583.41	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332597.221	696630.622	1	5	5

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332544.775	696157.895	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332441.916	696189.051	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332383.765	696436.748	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332059.565	696929.631	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4331983.363	697061.199	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332025.675	697072.616	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332060.073	696992.684	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332405.932	696241.255	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332417.189	696296.235	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332128.905	696890.033	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332589.611	696490.003	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332166.486	697019.358	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332165.584	696910.356	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332096.727	696876.705	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332387.417	696205.803	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332058.455	697115.936	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332326.259	696210.368	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332588.439	696107.707	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332604.936	696154.553	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332531.565	696107.02	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332491.645	696553.628	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332460.819	696429.02	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332353.593	696628.186	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332603.775	696345.136	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332528.127	696630.861	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332560.014	696578.375	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332431.361	696402.192	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332381.649	696351.803	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332454.673	696574.798	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332546.16	696683.289	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332094.638	697061.99	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332466.42	696239.471	1	5	5

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332057.15	697057.077	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332454.999	696489.497	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332383.892	696686.932	1	5	5
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332575.356	696391.791	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332523.347	696429.568	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332134.73	696948.106	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332581.833	696431.57	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332200.31	696869.096	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332013.238	697022.916	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332615.646	696081.146	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332132.856	696834.467	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332498.707	696198.167	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332479.256	696148.726	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332462.79	696384.832	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332436.897	696336.67	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332485.03	696332.512	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332516.014	696392.497	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332094.754	696937.433	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332096.587	696999.57	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332525.157	696253.979	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332423.274	696144.948	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332523.567	696304.228	2	5	10
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332536.849	696338.345	3	5	15
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332614.888	696213.642	3	5	15
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332558.061	696206.602	3	5	15
West Entrance Extra Area	Erodium cicutarium	Stork's-bill	0	–	4332580.848	696259.551	4	5	20
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332403.749	696276.035	2	2	4
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332563.876	696128.284	1	5	5
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332460.04	696318.71	2	4	8
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332507.374	696184.336	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332074.375	697033.842	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332615.655	696193.365	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332446.237	696418.699	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332604.57	696399.92	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332045.276	697066.51	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332590.339	696475.142	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332570.675	696329.87	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332571.563	696373.4	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332500.659	696407.544	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332546.218	696416.025	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332537.407	696473.492	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332481.936	696460.119	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332589.592	696236.151	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332005.335	697069.266	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332442.38	696228.589	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332579.975	696611.751	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332151.557	697014.92	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332451.327	696172.364	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332552.124	696190.01	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332527.709	696286.702	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332515.578	696319.293	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332412.262	696663.615	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332587.879	696565.168	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332592.955	696659.063	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332110.929	697078.299	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332517.127	696372.152	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332181.422	697025.93	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332466.673	696122.594	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332074.007	697086.871	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332078.446	696981.132	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332115.071	697031.256	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332585.905	696285.408	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332141.71	696890.785	2	5	10
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332520.592	696230.876	3	5	15

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332115.336	696966.201	3	5	15
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332622.272	696136.933	3	5	15
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332179.542	696926.401	3	5	15
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332181.759	696977.396	3	5	15
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332600.669	696522.705	3	5	15
West Entrance Extra Area	Salsola sp.	Russian thistle	0	–	4332145.655	696955.913	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332499.212	696107.505	1	4	4
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332380.034	696151.962	1	4	4
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332382.958	696296.872	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332560.99	696489.942	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332445.939	696623.843	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332351.117	696442.341	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332436.728	696488.765	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332495.97	696431.17	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332283.496	696179.926	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332566.857	696108.647	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332621.909	696112.426	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332515.187	696683.462	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332018.254	696947.846	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332470.78	696195.99	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332477.783	696572.647	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332495.487	696489.163	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332402.127	696685.015	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332259.789	696626.594	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332445.548	696149.73	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332319.675	696628.836	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332023.613	696898.225	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4331986.379	697034.613	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332412.442	696434.234	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332439.533	696533.576	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332289.923	696681.691	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4331989.511	696983.763	1	5	5

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332413.206	696196.424	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332498.698	696627.351	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332384.732	696623.556	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4331950.694	697026.206	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332554.37	696632.587	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332457.172	696684.653	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332376.73	696386.022	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332500.318	696523.973	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332533.046	696579.081	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332607.546	696302.14	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332555.791	696532.969	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332279.963	696532.914	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332415.098	696574.852	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332431.758	696386.72	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332379.062	696532.814	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332133.062	696976.774	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332296.808	696586.542	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332436.347	696236.865	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332354.424	696582.081	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332505.768	696150.948	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332213.293	696625.224	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332238.401	696585.042	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332328.83	696530.904	1	5	5
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332332.249	696167.514	2	4	8
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4331987.999	697089.391	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332022.396	697040.958	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332018.27	696991.787	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332496.437	696244.795	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332459.426	696335.438	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332552.763	696259.45	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332551.626	696306.752	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332230.927	696201.047	2	5	10

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332055.61	697086.283	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332094.311	697030.133	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332603.93	696431.988	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332553.306	696429.855	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332572.982	696157.386	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332621.02	696487.467	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332331.921	696254.127	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332355.613	696205.402	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332164.351	696993.497	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332094.523	696844.636	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332597.715	696581.709	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332201.036	696952.598	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332129.47	697031.366	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332162.515	696881.174	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332166.283	697049.348	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332578.449	696676.181	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332342.107	696683.977	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332094.795	697090.665	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332232.403	696681.09	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332511.576	696334.811	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332453.878	696294.44	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332487.478	696294.196	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332412.217	696342.549	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332503.202	696391.124	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332489.335	696386.587	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332165.939	696815.693	2	5	10
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332130.78	696861.489	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332196.211	697062.823	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332299.697	696223.032	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332612.289	696253.143	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332379.448	696246.556	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332057.469	697023.814	3	5	15

Exotic plant patches detected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Monitoring Route	Species	Master Common Name	Pulled	Growth Stage	N_Coord	E_Coord	Cover Class	Size Class	PMI
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332133.788	696919.459	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332586.67	696208.941	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332528.188	696204.802	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332061.738	696902.177	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332199.527	696897.947	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332200.662	697006.461	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332198.151	696841.61	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332619.425	696069.901	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332571.107	696346.437	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332603.665	696391.933	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332096.117	696969.399	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332165.246	696936.029	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332057.856	696962.413	3	5	15
West Entrance Extra Area	Sisymbrium altissimum	Tumble mustard	0	–	4332094.218	696907.043	4	5	20

Appendix B. Exotic Plant Transect Data

Exotic plant transect data collected along monitoring routes, Colorado National Monument, June 12–19, 2019.

Route	Transect	E_Coord	N_Coord	Species	Master Common Name	Average Cover	Alive?
Hydro 82	479	703889.893	4322690.135	Anisantha tectorum	Cheatgrass	0.333	Y
Hydro 82	481	704776.044	4322610.524	Anisantha tectorum	Cheatgrass	1.333	Y
Hydro 85	537	703496.728	4321700.57	Anisantha tectorum	Cheatgrass	0.167	Y
Hydro 85	537	703496.728	4321700.57	Melilotus officinale	Yellow sweet-clover	0.333	Y
Hydro 95	482	703521.884	4321013.32	Anisantha tectorum	Cheatgrass	0.167	Y
Hydro 95	482	703521.884	4321013.32	Melilotus officinale	Yellow sweet-clover	1	Y
Hydro 95	483	703393.255	4320661.576	Anisantha tectorum	Cheatgrass	4.5	Y
Hydro 95	483	703393.255	4320661.576	Melilotus officinale	Yellow sweet-clover	0.25	Y
Hydro 95	484	702999.205	4320493.409	Erodium cicutarium	Stork's-bill	0.167	Y
Hydro 95	484	702999.205	4320493.409	Melilotus officinale	Yellow sweet-clover	1.667	Y
Hydro 95	485	702712.849	4320108.748	Anisantha tectorum	Cheatgrass	0.167	Y
Hydro 95	486	702430.843	4319711.95	Anisantha tectorum	Cheatgrass	0.167	Y
Hydro 95	486	702430.843	4319711.95	Melilotus officinale	Yellow sweet-clover	0.167	Y
Limekin Gulch	478	702639.115	4325463.826	Anisantha tectorum	Cheatgrass	1	Y
No Thoroughfare Canyon	428	700074.822	4318287.484	Melilotus officinale	Yellow sweet-clover	0.167	Y
No Thoroughfare Canyon	429	700127.073	4318764.802	Melilotus officinale	Yellow sweet-clover	0.25	Y
No Thoroughfare Canyon	430	700393.42	4319102.843	Anisantha tectorum	Cheatgrass	0.167	Y
No Thoroughfare Canyon	431	700690.945	4319444.097	Anisantha tectorum	Cheatgrass	1.5	Y
No Thoroughfare Canyon	432	701022.039	4319804.81	Melilotus officinale	Yellow sweet-clover	0.25	Y
No Thoroughfare Canyon	433	701457.603	4319814.521	Anisantha tectorum	Cheatgrass	0.833	Y
No Thoroughfare Canyon	433	701457.603	4319814.521	Melilotus officinale	Yellow sweet-clover	0.167	Y
No Thoroughfare Canyon	434	701790.943	4320075.333	Anisantha tectorum	Cheatgrass	5	Y
No Thoroughfare Canyon	435	702164.607	4320365.597	Anisantha tectorum	Cheatgrass	0.25	Y
No Thoroughfare Canyon	436	702476.669	4320567.233	Anisantha tectorum	Cheatgrass	0.833	Y
No Thoroughfare Canyon	437	702877.046	4320771.008	Anisantha tectorum	Cheatgrass	0.333	Y
No Thoroughfare Canyon	437	702877.046	4320771.008	Melilotus officinale	Yellow sweet-clover	0.167	Y
No Thoroughfare Canyon	438	703195.047	4320990.408	Anisantha tectorum	Cheatgrass	0.5	Y
No Thoroughfare Canyon	440	703705.205	4321643.718	Anisantha tectorum	Cheatgrass	0.333	Y
No Thoroughfare Canyon	441	704060.427	4321816.842	Melilotus officinale	Yellow sweet-clover	1	Y
No Thoroughfare Canyon	442	704320.865	4322090.126	Anisantha tectorum	Cheatgrass	3.5	Y
No Thoroughfare Canyon	442	704320.865	4322090.126	Melilotus officinale	Yellow sweet-clover	0.25	Y

Exotic plant data collected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Route	Transect	E_Coord	N_Coord	Species	Master Common Name	Average Cover	Alive?
No Thoroughfare Canyon	443	704650.863	4322224.942	Anisantha tectorum	Cheatgrass	0.5	Y
No Thoroughfare Canyon	444	705032.394	4322466.445	Anisantha tectorum	Cheatgrass	2.5	Y
No Thoroughfare Canyon	445	705384.676	4322731.655	Anisantha tectorum	Cheatgrass	0.667	Y
No Thoroughfare Canyon	445	705384.676	4322731.655	Erodium cicutarium	Stork's-bill	0.167	Y
Red Canyon	386	703552.958	4324156.647	Anisantha tectorum	Cheatgrass	0.5	Y
Red Canyon	386	703552.958	4324156.647	Melilotus officinale	Yellow sweet-clover	0.167	Y
Red Canyon	386	703552.958	4324156.647	Salsola sp.	Russian thistle	0.167	Y
Red Canyon	387	703234.663	4323898.672	Anisantha tectorum	Cheatgrass	0.5	Y
Red Canyon	389	702387.124	4323579.823	Anisantha tectorum	Cheatgrass	0.5	Y
Red Canyon	391	701519.229	4323222.289	Anisantha tectorum	Cheatgrass	0.667	Y
Red Canyon	392	701074.626	4323060.464	Anisantha tectorum	Cheatgrass	0.5	Y
Red Canyon	393	700678.284	4322872.411	Melilotus officinale	Yellow sweet-clover	0.167	Y
Ute Canyon	411	697218.373	4324348.619	Anisantha tectorum	Cheatgrass	1	Y
Ute Canyon	412	697678.466	4324136.541	Anisantha tectorum	Cheatgrass	1	Y
Ute Canyon	413	697998.791	4324056.564	Anisantha tectorum	Cheatgrass	2	Y
Ute Canyon	413	697998.791	4324056.564	Melilotus officinale	Yellow sweet-clover	0.167	Y
Ute Canyon	417	699293.386	4323231.162	Anisantha tectorum	Cheatgrass	0.5	Y
Ute Canyon	417	699293.386	4323231.162	Erodium cicutarium	Stork's-bill	0.333	Y
Ute Canyon	418	699487.835	4323601.172	Anisantha tectorum	Cheatgrass	0.5	Y
Ute Canyon	419	699677.47	4323920.865	Anisantha tectorum	Cheatgrass	0.167	Y
Ute Canyon	419	699677.47	4323920.865	Melilotus officinale	Yellow sweet-clover	0.167	Y
Ute Canyon	420	700008.479	4324237.195	Anisantha tectorum	Cheatgrass	0.333	Y
Ute Canyon	421	700186.606	4324698.456	Anisantha tectorum	Cheatgrass	4	Y
Ute Canyon	421	700186.606	4324698.456	Melilotus officinale	Yellow sweet-clover	0.667	Y
Ute Canyon	422	700529.487	4325024.264	Anisantha tectorum	Cheatgrass	0.333	Y
Ute Canyon	423	700841.038	4325387.447	Anisantha tectorum	Cheatgrass	0.833	Y
Ute Canyon	423	700841.038	4325387.447	Erodium cicutarium	Stork's-bill	2.5	Y
Ute Canyon	423	700841.038	4325387.447	Melilotus officinale	Yellow sweet-clover	0.167	Y
Ute Canyon	424	701185.549	4325493.118	Anisantha tectorum	Cheatgrass	4.167	Y
Ute Canyon	424	701185.549	4325493.118	Erodium cicutarium	Stork's-bill	10.667	Y
Ute Canyon	424	701185.549	4325493.118	Salsola sp.	Russian thistle	0.333	Y
Ute Canyon	425	701647.65	4325459.25	Anisantha tectorum	Cheatgrass	0.5	Y
Ute Canyon	425	701647.65	4325459.25	Erodium cicutarium	Stork's-bill	2.5	Y

Exotic plant data collected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Route	Transect	E_Coord	N_Coord	Species	Master Common Name	Average Cover	Alive?
Ute Canyon	425	701647.65	4325459.25	Melilotus officinale	Yellow sweet-clover	0.333	Y
East Glade Park Road	542	699775.889	4319824.337	Anisantha tectorum	Cheatgrass	0.5	Y
East Glade Park Road	542	699775.889	4319824.337	Convolvulus arvensis	Field bindweed	1.5	Y
East Glade Park Road	543	700227.289	4320013.345	Anisantha tectorum	Cheatgrass	0.5	Y
East Glade Park Road	543	700227.289	4320013.345	Erodium cicutarium	Stork's-bill	0.167	Y
East Glade Park Road	543	700227.289	4320013.345	Melilotus officinale	Yellow sweet-clover	0.333	Y
East Glade Park Road	543	700227.289	4320013.345	Tragopogon dubius	Yellow salsify	0.167	Y
East Glade Park Road	544	700647.961	4320299.27	Anisantha tectorum	Cheatgrass	1.5	Y
East Glade Park Road	545	701122.545	4320440.328	Anisantha tectorum	Cheatgrass	0.667	Y
East Glade Park Road	546	701527.578	4320686.411	Anisantha tectorum	Cheatgrass	7	Y
East Glade Park Road	547	701755.7	4321127.018	Anisantha tectorum	Cheatgrass	0.333	Y
East Glade Park Road	547	701755.7	4321127.018	Melilotus officinale	Yellow sweet-clover	0.333	Y
East Glade Park Road	548	702233.471	4321259.162	Anisantha tectorum	Cheatgrass	1	Y
East Glade Park Road	549	702602.62	4321549.697	Melilotus officinale	Yellow sweet-clover	1.333	Y
East Glade Park Road	550	702580.103	4322026.665	Anisantha tectorum	Cheatgrass	0.333	Y
East Glade Park Road	550	702580.103	4322026.665	Melilotus officinale	Yellow sweet-clover	0.167	Y
East Glade Park Road	551	702822.517	4322385.203	Anisantha tectorum	Cheatgrass	0.5	Y
East Glade Park Road	552	699777.621	4319830.404	Anisantha tectorum	Cheatgrass	0.833	Y
East Glade Park Road	552	699777.621	4319830.404	Erodium cicutarium	Stork's-bill	1	Y
East Glade Park Road	554	700639.247	4320302.453	Anisantha tectorum	Cheatgrass	0.333	Y
East Glade Park Road	555	701119.263	4320446.083	Anisantha tectorum	Cheatgrass	0.25	Y
East Glade Park Road	556	701527.414	4320699.705	Anisantha tectorum	Cheatgrass	0.167	Y
East Glade Park Road	557	701753.654	4321135.891	Anisantha tectorum	Cheatgrass	0.667	Y
East Glade Park Road	558	702230.987	4321264.998	Anisantha tectorum	Cheatgrass	0.667	Y
East Glade Park Road	558	702230.987	4321264.998	Tragopogon dubius	Yellow salsify	0.167	Y
East Glade Park Road	559	702596.069	4321564.108	Melilotus officinale	Yellow sweet-clover	0.333	Y
Fenceline Route	311	704901.36	4323432.209	Anisantha tectorum	Cheatgrass	2.167	Y
Fenceline Route	311	704901.36	4323432.209	Salsola sp.	Russian thistle	0.167	Y
Fenceline Route	312	704466.412	4323545.376	Sisymbrium altissimum	Tumble mustard	0.167	Y
Fenceline Route	315	703409.61	4324504.818	Anisantha tectorum	Cheatgrass	1.167	Y
Fenceline Route	315	703409.61	4324504.818	Erodium cicutarium	Stork's-bill	2.333	Y
Fenceline Route	316	703137.973	4324803.379	Anisantha tectorum	Cheatgrass	0.167	Y
Fenceline Route	318	702931.67	4325575.175	Anisantha tectorum	Cheatgrass	5.333	Y

Exotic plant data collected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Route	Transect	E_Coord	N_Coord	Species	Master Common Name	Average Cover	Alive?
Fenceline Route	318	702931.67	4325575.175	Erodium cicutarium	Stork's-bill	1.167	Y
Fenceline Route	318	702931.67	4325575.175	Sisymbrium altissimum	Tumble mustard	0.667	Y
Fenceline Route	320	702528.506	4326092.712	Anisantha tectorum	Cheatgrass	0.167	Y
Fenceline Route	320	702528.506	4326092.712	Erodium cicutarium	Stork's-bill	0.667	Y
Fenceline Route	321	702329.702	4326387.413	Anisantha tectorum	Cheatgrass	0.333	Y
Fenceline Route	321	702329.702	4326387.413	Erodium cicutarium	Stork's-bill	0.333	Y
Fenceline Route	322	702099.001	4326651.099	Anisantha tectorum	Cheatgrass	2.667	Y
Fenceline Route	322	702099.001	4326651.099	Erodium cicutarium	Stork's-bill	0.167	Y
Fenceline Route	323	702081.345	4327135.88	Anisantha tectorum	Cheatgrass	0.667	Y
Fenceline Route	324	701593.305	4327217.96	Erodium cicutarium	Stork's-bill	8	Y
Fenceline Route	324	701593.305	4327217.96	Sisymbrium altissimum	Tumble mustard	4.333	Y
Fenceline Route	325	701246.181	4327578.551	Anisantha tectorum	Cheatgrass	1	Y
Fenceline Route	325	701246.181	4327578.551	Sisymbrium altissimum	Tumble mustard	0.167	Y
Fenceline Route	326	700884.816	4327923.062	Anisantha tectorum	Cheatgrass	4	Y
Fenceline Route	326	700884.816	4327923.062	Chorispora tenella	Blue mustard	0.167	Y
Fenceline Route	326	700884.816	4327923.062	Erodium cicutarium	Stork's-bill	11.667	Y
Fenceline Route	326	700884.816	4327923.062	Sisymbrium altissimum	Tumble mustard	0.167	Y
Fenceline Route	327	700583.971	4328333.781	Anisantha tectorum	Cheatgrass	15	Y
Fenceline Route	327	700583.971	4328333.781	Erodium cicutarium	Stork's-bill	1.5	Y
Fenceline Route	327	700583.971	4328333.781	Sisymbrium altissimum	Tumble mustard	0.167	Y
Fenceline Route	328	700406.793	4328775.824	Anisantha tectorum	Cheatgrass	26.667	Y
Fenceline Route	328	700406.793	4328775.824	Salsola sp.	Russian thistle	0.167	Y
Fenceline Route	328	700406.793	4328775.824	Sisymbrium altissimum	Tumble mustard	1	Y
Fenceline Route	329	700038.583	4329125.767	Anisantha tectorum	Cheatgrass	0.5	Y
Fenceline Route	329	700038.583	4329125.767	Sisymbrium altissimum	Tumble mustard	0.167	Y
Fenceline Route	330	699665.175	4329465.59	Anisantha tectorum	Cheatgrass	3	Y
Fenceline Route	330	699665.175	4329465.59	Chorispora tenella	Blue mustard	0.333	Y
Fenceline Route	330	699665.175	4329465.59	Erodium cicutarium	Stork's-bill	9.667	Y
Fenceline Route	331	699303.459	4329808.234	Anisantha tectorum	Cheatgrass	0.5	Y
Fenceline Route	331	699303.459	4329808.234	Erodium cicutarium	Stork's-bill	0.833	Y
Fenceline Route	331	699303.459	4329808.234	Sisymbrium altissimum	Tumble mustard	4	Y
Fenceline Route	332	698974.363	4330203.673	Anisantha tectorum	Cheatgrass	0.167	Y
Fenceline Route	333	698729.488	4330613.808	Anisantha tectorum	Cheatgrass	7	Y

Exotic plant data collected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Route	Transect	E_Coord	N_Coord	Species	Master Common Name	Average Cover	Alive?
Fenceline Route	333	698729.488	4330613.808	Erodium cicutarium	Stork's-bill	2	Y
Fenceline Route	333	698729.488	4330613.808	Sisymbrium altissimum	Tumble mustard	1	Y
Fenceline Route	334	698591.288	4331020.16	Anisantha tectorum	Cheatgrass	3	Y
Fenceline Route	334	698591.288	4331020.16	Chorispora tenella	Blue mustard	0.333	Y
Fenceline Route	334	698591.288	4331020.16	Erodium cicutarium	Stork's-bill	1.333	Y
Fenceline Route	334	698591.288	4331020.16	Sisymbrium altissimum	Tumble mustard	0.333	Y
Fenceline Route	336	697843.687	4331375.764	Anisantha tectorum	Cheatgrass	0.333	Y
Fenceline Route	337	697433.323	4331639.556	Anisantha tectorum	Cheatgrass	0.667	Y
Fenceline Route	337	697433.323	4331639.556	Erodium cicutarium	Stork's-bill	0.667	Y
Fenceline Route	338	697133.905	4331970.757	Anisantha tectorum	Cheatgrass	1.833	Y
Fenceline Route	338	697133.905	4331970.757	Sisymbrium altissimum	Tumble mustard	0.667	Y
Fenceline Route	339	696932.428	4332225.85	Anisantha tectorum	Cheatgrass	2.333	Y
Fenceline Route	339	696932.428	4332225.85	Erodium cicutarium	Stork's-bill	3.333	Y
Fenceline Route	339	696932.428	4332225.85	Salsola sp.	Russian thistle	1	Y
Fenceline Route	339	696932.428	4332225.85	Sisymbrium altissimum	Tumble mustard	2	Y
Fenceline Route	340	696699.946	4332555.514	Anisantha tectorum	Cheatgrass	6.667	Y
Fenceline Route	341	696279.285	4332608.086	Anisantha tectorum	Cheatgrass	8.333	Y
Fenceline Route	341	696279.285	4332608.086	Erodium cicutarium	Stork's-bill	0.167	Y
Fenceline Route	341	696279.285	4332608.086	Salsola sp.	Russian thistle	0.5	Y
Fenceline Route	341	696279.285	4332608.086	Sisymbrium altissimum	Tumble mustard	2	Y
Liberty Cap Trail	448	696591.367	4325011.277	Anisantha tectorum	Cheatgrass	0.333	Y
Liberty Cap Trail	450	697439.452	4325254.829	Anisantha tectorum	Cheatgrass	0.167	Y
Liberty Cap Trail	451	697870.326	4325267.074	Anisantha tectorum	Cheatgrass	0.333	Y
Liberty Cap Trail	452	698219.53	4325072.567	Anisantha tectorum	Cheatgrass	0.667	Y
Liberty Cap Trail	456	699360.738	4326028.021	Anisantha tectorum	Cheatgrass	1.667	Y
Liberty Cap Trail	457	699763.126	4326251.527	Anisantha tectorum	Cheatgrass	1	Y
Liberty Cap Trail	463	701583.848	4325957.021	Anisantha tectorum	Cheatgrass	0.167	Y
Liberty Cap Trail	464	701873.388	4325953.813	Anisantha tectorum	Cheatgrass	0.833	Y
Liberty Cap Trail	465	701902.796	4326347.101	Anisantha tectorum	Cheatgrass	0.5	Y
Monument Canyon Trail	342	698642.708	4330454.908	Anisantha diandra	Ripgut brome	0.667	Y
Monument Canyon Trail	342	698642.708	4330454.908	Anisantha tectorum	Cheatgrass	2.667	Y
Monument Canyon Trail	342	698642.708	4330454.908	Erodium cicutarium	Stork's-bill	1.333	Y
Monument Canyon Trail	342	698642.708	4330454.908	Tragopogon dubius	Yellow salsify	0.333	Y

Exotic plant data collected along monitoring routes, Colorado National Monument, June 12–19, 2019, cont.

Route	Transect	E_Coord	N_Coord	Species	Master Common Name	Average Cover	Alive?
Monument Canyon Trail	343	698289.283	4330405.319	Anisantha tectorum	Cheatgrass	1	Y
Monument Canyon Trail	343	698289.283	4330405.319	Erodium cicutarium	Stork's-bill	0.5	Y
Monument Canyon Trail	344	697875.72	4330561.046	Anisantha tectorum	Cheatgrass	0.5	Y
Monument Canyon Trail	344	697875.72	4330561.046	Erodium cicutarium	Stork's-bill	0.167	Y
Monument Canyon Trail	345	697679.075	4330201.637	Anisantha tectorum	Cheatgrass	0.167	Y
Monument Canyon Trail	345	697679.075	4330201.637	Erodium cicutarium	Stork's-bill	0.167	Y
Monument Canyon Trail	346	697333.969	4330023.462	Anisantha tectorum	Cheatgrass	0.167	Y
Monument Canyon Trail	346	697333.969	4330023.462	Erodium cicutarium	Stork's-bill	0.333	Y
Monument Canyon Trail	347	696973.688	4329819.374	Anisantha tectorum	Cheatgrass	0.167	Y
Monument Canyon Trail	348	696859.204	4329520.964	Anisantha tectorum	Cheatgrass	0.5	Y
Monument Canyon Trail	349	697140.054	4329305.86	Anisantha tectorum	Cheatgrass	0.333	Y
Monument Canyon Trail	350	697367.52	4329036.991	Anisantha tectorum	Cheatgrass	0.167	Y
Monument Canyon Trail	354	697324.165	4327868.251	Anisantha tectorum	Cheatgrass	0.167	Y
Monument Canyon Trail	355	696869.73	4327885.155	Anisantha tectorum	Cheatgrass	0.167	Y
Monument Canyon Trail	356	696645.59	4327731.153	Anisantha tectorum	Cheatgrass	0.5	Y
No Thoroughfare Trail	470	699549.246	4317695.831	Anisantha tectorum	Cheatgrass	2	Y
No Thoroughfare Trail	472	699991.992	4318335.62	Anisantha tectorum	Cheatgrass	0.167	Y
No Thoroughfare Trail	473	699986.004	4318732.127	Anisantha tectorum	Cheatgrass	1	Y
No Thoroughfare Trail	474	700113.556	4319032.679	Anisantha tectorum	Cheatgrass	7.167	Y
No Thoroughfare Trail	475	700482.59	4319267.706	Anisantha tectorum	Cheatgrass	0.5	Y
No Thoroughfare Trail	476	700719.003	4319596.714	Anisantha tectorum	Cheatgrass	0.5	Y
No Thoroughfare Trail	477	701032.506	4319901.625	Anisantha tectorum	Cheatgrass	0.167	Y
Old Gordon Trail	301	703947.551	4319261.806	Anisantha tectorum	Cheatgrass	0.167	Y
Old Gordon Trail	304	704593.017	4320450.944	Anisantha tectorum	Cheatgrass	0.333	Y
Old Gordon Trail	308	705353.498	4322019.423	Anisantha tectorum	Cheatgrass	0.167	Y

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
U.S. Department of the Interior

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