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Natural Resource Stewardship and Science

Invasive Exotic Plant Monitoring at Fossil Butte National Monument

2021 Field Season

Natural Resource Report NPS/NCPN/NRR—2022/2451



ON THE COVER

Japanese brome (*Bromus japonicus*). Photo by Sarah Schumacher, Bugwood.org.

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Executive Summary

Invasive exotic plant (IEP) species are one of the biggest threats 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 during the 2021 field season at Fossil Butte National Monument (NM). From June 26 to 29, 2021, we recorded a total of 12 different priority IEP species during monitoring. A total of 763 priority IEP patches were recorded along 61.9 kilometers (38.5 mi) of 22 monitoring routes. Summer cypress (*Bassia scoparia*) was detected for the first time on monitoring routes along the Main Park Road. The highest densities of IEP patches were detected in several drainages and one trail: Sage Grouse Lek Drainage (32.7 patches/km), East Red Hill Drainage (19.4/km), Moose Bones Canyon (19.4/km), Main Park Road (19.0/km), West Fork Chicken Creek (17.6/km), Chicken Creek (15.0/km), Smallpox Creek (13.5/km) and the Historic Quarry Trail (11.1/km). The Fossil Butte Northwest, Wasatch Saddle, and North Dam Fork of Chicken Creek drainages were the only routes free of priority IEPs in 2021. Cheatgrass (*Bromus tectorum*), creeping foxtail (*Alopecurus arundinaceus*), and Japanese brome (*Bromus japonicus*) were the most widespread species. Creeping foxtail continues to increase parkwide and along the Main Park Road and southern drainages. The two brome species have declined somewhat since 2018, but these species can fluctuate widely based on precipitation. Flixweed (*Descurainia sophia*), whitetop (*Cardaria* sp.), and quackgrass (*Elymus repens*) all appear to have declined since 2018 and their previous highs in earlier years. Control efforts by park staff are likely helping to prevent some IEP increases in the park. Network staff plan to return to Fossil Butte NM for an eighth round of monitoring in 2023.

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1 Introduction

Invasive exotic species fragment native ecosystems, displace native plants and animals, and alter ecosystem function. Invasive species are among the top threats to biodiversity (Maxwell et al. 2016) and represent one of the most serious threats to natural ecosystem integrity (NRC 2002). Yet 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. Recognizing these challenges, Northern Colorado Plateau Network (NCPN) parks 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, NCPN IEP monitoring detects early invasions, identifies existing invasions, and, to the extent possible, tracks changes in the abundance and distribution of target 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, the consequences of these plant invasions present a significant challenge to the bureau'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.

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.

This report summarizes the 2021 field season and seventh complete monitoring rotation at Fossil Butte National Monument (NM).

2 Methods

We followed the invasive plant monitoring protocol developed by the NCPN (Perkins et al. 2016). The protocol emphasizes 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 park and NCPN staff reviewed the list of target invasive plants (see Section 2.1), we established a series of co-located monitoring routes and quadrats along all roads, major drainages, and trails in the park. The quadrats, which are sampled in a quantitative manner, are used to make inference to the percent cover of IEPs located along the park's invasive pathways (i.e., the monitoring routes) and allow us to estimate trends in IEP percent cover over time. The monitoring routes, which are not quantitatively sampled, are used to increase the spatial coverage of mapping performed, with the goal of maximizing our opportunities for detecting IEPs in the park.

All roads, trails, and riparian areas were surveyed previously with monitoring routes and quadrats in 2008–2009, 2010, 2012, 2014, 2016, and 2018 (Perkins 2010, 2011, 2013, 2015, 2017, Washuta and Perkins 2019). During the first rotation, the park was monitored over two years.

2.1 Developing a park target invasive exotic plant list

The original list of target IEPs was developed by reviewing past park literature and state and county weed lists, and consulting with park staff and county weed managers. The 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 target plants, instead of looking for every possible invasive plant species. Eradicating these target species, or containing them within a park, is possible.

Prior to the start of monitoring in 2021, NCPN and park staff reviewed the list of high-priority target IEPs (Table 2-1) that was developed in 2008 and then reviewed before each year of sampling. No new species were added to the list in 2021.

Table 2-1. Priority invasive plant list, Fossil Butte National Monument, 2008–2021.

Scientific name	Common name
Alopecurus arundinaceus	creeping foxtail
Arctium minus	burdock
Bassia scoparia	summer cypress
Bromus japonicus[1]	Japanese brome
Bromus tectorum[2]	cheatgrass
Cardaria sp.	whitetop
Carduus nutans	musk thistle
Centaurea diffusa	diffuse knapweed
Centaurea maculosa	spotted knapweed
Centaurea repens	Russian knapweed
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Convolvulus arvensis	field bindweed
Cynoglossum officinale	common houndstongue
Descurainia sophia[3]	flixweed
Elymus repens	quackgrass
Hyoscyamus niger	black henbane
Isatis tinctoria	dyer's woad
Lepidium latifolium	perennial pepperweed
Linaria dalmatica	Dalmatian toadflax
Melilotus officinalis	yellow sweetclover
Sonchus arvensis	perennial sowthistle
Tamarix sp.	tamarisk
Verbascum thapsus	woolly mullein

[1]Added to priority list in 2016, referred to in Perkins (2015) as Japanese chess.
[2]Added to priority list in 2014.
[3]Added to priority list in 2012.

2.2 Monitoring routes

2.2.1 Minimum detection target size

The minimum detection target size (MDTS) represents the patch size that was large enough to detect 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 that any missed patches smaller than the MDTS could still feasibly be eradicated if not found until the next scheduled monitoring visit. The NCPN has established an MDTS of 40 m^2 (0.01 acres, or approximately 20 × 20 ft) for all IEPs. Use of the MDTS is necessary because field technicians are not expected to find every single plant of every targeted weed species during route surveys. Although searching for single mature plants of some species, such as tamarisk (*Tamarix* sp.), is possible due to their large size, single plants of other species, such as field bindweed (*Convolvulus arvensis*), are nearly impossible to detect in most field conditions unless the observer is very close to the patch.

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 targeted species with at least 90% detection efficiency (Figure 2-1). Crew members are trained by walking away from fake plants of a targeted size and determining the maximum distance from which they could consistently see and recognize the patch with complete confidence. The size of the EDD is then estimated in the field by crew members. The distance is measured either by pacing or using a laser rangefinder. The EDD for Fossil Butte NM was between 4 and 10 meters in 2021, depending on surrounding vegetation.

2.2.3 Effective detection swath width

Effective detection swath width (EDSW) is defined as the maximum width of a linear search swath (band transect) in which a walking observer is confident of visually detecting 90% of all target species of the MDTS (Figure 2-1). The effective detection swath width (EDSW) is equal to two times the EDD, because the surveyor is able to effectively detect weeds for one EDD on either side of the search route. The EDSW ranged from 8 to 20 meters at Fossil Butte NM in 2021.

2.2.4 Patch separation resolution

We define patch separation resolution (PSR) as the minimum distance between plants that must be considered members of separate infestations, or patches. Individuals or clusters of a target species separated by the PSR distance or more are recorded as separate patches. We consider plants separated by less than the PSR to be a single patch. The PSR is set at 50 meters, based on the assumption that most plants or groups of plants separated by less than 50 meters are typically considered to be one patch during planning and implementation of weed-con-

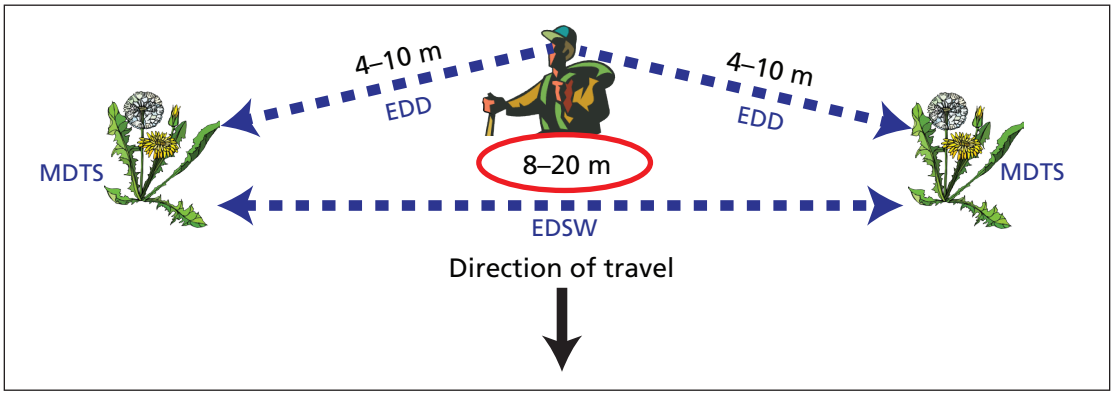


Figure 2-1. The maximum Effective Detection Distance (EDD) at Fossil Butte National Monument ranged from 4 to 10 meters in 2021, making the Effective Detection Swath Width (EDSW) 8–20 meters.

trol operations. If a patch is continuous for more than 50 meters, then cover estimates are made every 50 meters to aid in developing an effective management strategy for the entire patch.

2.2.5 Data collection methods

For the Main Park Road, we walked one EDD out from one side of the road and then returned to the starting point by walking back one EDD from the road on the other side. For secondary roads, single-track trails, and drainages, we walked the center of the trail or drainage in only one direction. While walking, we searched for 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 8–20 meters (the length of one EDSW) and visually scanned the area in all directions. As monitoring routes were traversed, locations of all target species were documented using GPS units with at least five-meter accuracy. Only species designated as priority were consistently recorded on monitoring routes.

When a priority IEP was discovered, we recorded the following information: (1) monitoring route, (2) sequential number of the invasion per monitoring route, (3) patch size class (see below), (4) whether the plant was pulled, and (5) cover class (see below). If several species were present with similar distributions at a single point, then we recorded a point for each individual species and assigned it its own sequential identification number. Invasions more than 50 meters apart were considered separate patches and recorded with a separate point.

Patch size class was estimated as follows:

1. 1–3 plants (used for isolated single plants or very small patches (≤2 × 2 m),
2. Four 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), and
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 in the patch 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. Percent cover 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: descriptive notes (e.g., hillside, distance to road, wetland, stream), the growth stage of exotic trees (i.e., sapling, pole, mature), evidence of prior treatment, and evidence of disturbances (e.g., recent fire, flood, small mammal disturbance).

2.3 Monitoring transects

Beginning in 2010, we established transects with three vegetation quadrats every 500 meters along monitoring routes. From 2010 to 2014, if no IEPs were detected for four consecutive transects (12 quadrats), then transects were established every 1,000 meters. If invasive plants were found in categories greater than 1 for cover class or patch size class, then we went back to establishing transects every 500 meters. From 2016 to 2021 transects were always completed every 500 meters.

2.3.1 Quadrat establishment

From 2010 to 2021, we centered vegetation quadrats at 0.5, 5, and 10 meters away from the edge of a road on the same side as the route that was being walked and on alternating sides for riparian areas, small roads, or trails. We placed a 1-m^2 sampling frame to sample vegetation cover and soil-surface features on the right side of the transect line as the technician walked the monitoring route. In some cases, we leveled the sampling frame by propping up quadrat corners.

Quadrat-sampling methods differed slightly in 2008 and 2009. In 2008, we used three 1-m^2 vegetation quadrats, placed in a circular macroplot (Perkins and Weissinger 2009). In 2009, quadrats were placed at 3, 8, and 13 meters away from the monitoring route. In 2008, all invasive species detected were recorded in monitoring quadrats. From 2009 to 2021, only priority species and cheatgrass were recorded in quadrats.

2.3.2 Data collection methods

In the monitoring quadrats, we recorded all priority IEP species and cheatgrass observed. 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, 100%. 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 Analyses

We calculated the mean number of patches per kilometer for monitoring routes. Percent cover estimates for monitoring routes or groups of monitoring routes were generated from the monitoring transect data. We calculated the mean and standard error of percent cover by species for monitoring quadrats. Due to differences in observers' knowledge, only priority species were used when comparing results from year to year.

3 Results

3.1 Monitoring routes

3.1.1 2021 results

In 2021, we recorded a total of 12 priority IEP species during monitoring in 763 patches along 61.9 kilometers (38.5 mi) of 22 monitoring routes (Tables 3-1, 3-2; Figures 3-1, 3-2, 3-3, 3-4; Appendix A) at Fossil Butte National Monument. Summer cypress (*Bassia scoparia*) was detected for the first time along monitoring routes at Fossil Butte NM, despite being on the priority list since 2008. It was detected along the Main Park Road. It had been previously detected in the park (Dorn et al. 1984, Fertig 2000). One additional non-priority species, African mustard (*Malcolmia africana*), was recorded in six patches along the Main Park Road. All patches of this species were in size class 2 (4 plants–40 m^2). This species was also noted, but not mapped, in some of the southern drainages.

Sage Grouse Lek Drainage (32.7 patches/km), East Red Hill Drainage (19.4/km), Moose Bones Canyon (19.4), Main Park Road (19.0/km), West Fork Chicken Creek (17.6/km), Chicken Creek (15.0/km), Smallpox Creek (13.5/km) and the Historic Quarry Trail (11.1/km) had the highest densities of IEP patches across all routes. Other roads and several other drainages had much lower patch densities (see Table 3-2).

The only routes with no priority IEPs detected in 2021 were Eagle Nest Point Road and the Fossil Butte Northwest, Wasatch Saddle, and North Dam Fork of Chicken Creek drainages (see Table 3-2). Due to time constraints related to NCPN's coordination with the Northern Rockies Invasive Plant Management Team (IPMT) on an invasive-control experiment, the Fossil Butte East Drainage, Millet Canyon, Murder Hill Drainage, South Millet Canyon, and South Murder Hill Drainage routes were not completed in 2021.

Cheatgrass (*Bromus tectorum*), creeping foxtail (*Alopecurus arundinaceus*), and Japanese brome (*Bromus japonicus*) were by far the most widespread species, representing 84% of all priority patches detected (Table 3-3). The next-most widespread species was flixweed (*Descurainia sophia*), with 36 total patches detected. Only 3% of all patches were larger than 400 m^2, but 44% were between 40 and 400 m^2 (see Table 3-3). Creeping foxtail (61%) and Japanese brome (61%) had the largest percentage of patches in the 40–400 m^2 size class.

Table 3-1. Invasive exotic plants detected at Fossil Butte National Monument, June 26–29, 2021.

Scientific name	Common name	Method detected[1]		Park priority?
		Route	Transect	
Alopecurus arundinaceus	creeping foxtail	X	X	Yes
Bassia scoparia	summer cypress	X	–	Yes
Bromus japonicus	Japanese brome	X	X	Yes
Bromus tectorum	cheatgrass	X	X	Yes
Cardaria sp.	whitetop	X	–	Yes
Carduus nutans	musk thistle	X	–	Yes
Cirsium arvense	Canada thistle	X	–	Yes
Convolvulus arvensis	field bindweed	X	–	Yes
Descurainia sophia	flixweed	X	–	Yes
Elymus repens	quackgrass	X	–	Yes
Hyoscyamus niger	black henbane	X	–	Yes
Malcolmia africana	African mustard	X	X	No
Melilotus officinalis	yellow sweetclover	X	–	Yes

[1] "X" = Yes; "–" = No.

Table 3-2. Number of priority IEP patches per route, and number per kilometer by route type, Fossil Butte National Monument, June 26–29, 2021.

Route	Route type	Length (m)	Total priority patches	Priority patches/km
Chicken Creek	Riparian	7,198	108	15.0
East Fork Chicken Creek	Riparian	3,617	12	3.3
East Red Hill Drainage	Riparian	671	13	19.4
Fossil Butte Middle Drainage	Riparian	1,014	3	3.0
Fossil Butte Northwest Drainage	Riparian	834	0	0.0
Fossil Butte Southern Drainage	Riparian	1,166	1	0.9
Matate Drainage	Riparian	1,024	3	2.9
Moose Bones Canyon	Riparian	1,238	24	19.4
Northeast Fork Chicken Creek	Riparian	851	2	2.4
North Dam Fork Chicken Creek	Riparian	2,048	0	0.0
Sage Grouse Lek Drainage	Riparian	1,192	39	32.7
Smallpox Creek	Riparian	2,228	30	13.5
Wasatch Saddle Drainage	Riparian	723	0	0.0
West Fork Chicken Creek	Riparian	794	14	17.6
West Red Hill Drainage	Riparian	703	3	4.3
Bullpen Two Track	Road	829	4	4.8
Cundick Ridge Road	Road	1,978	1	0.5
Eagle Nest Point Road	Road	1,130	0	0.0
Main Park Road	Road	23,423	446	19.0
Rubey Point Road	Road	2,733	1	0.4
Chicken Creek Nature Trail	Trail	2,389	14	5.9
Historic Quarry Trail	Trail	4,069	45	11.1
All Riparian	–	25,302	252	10.0
All Roads/Trails	–	36,551	511	16.7
Total	–	61,853	763	12.3

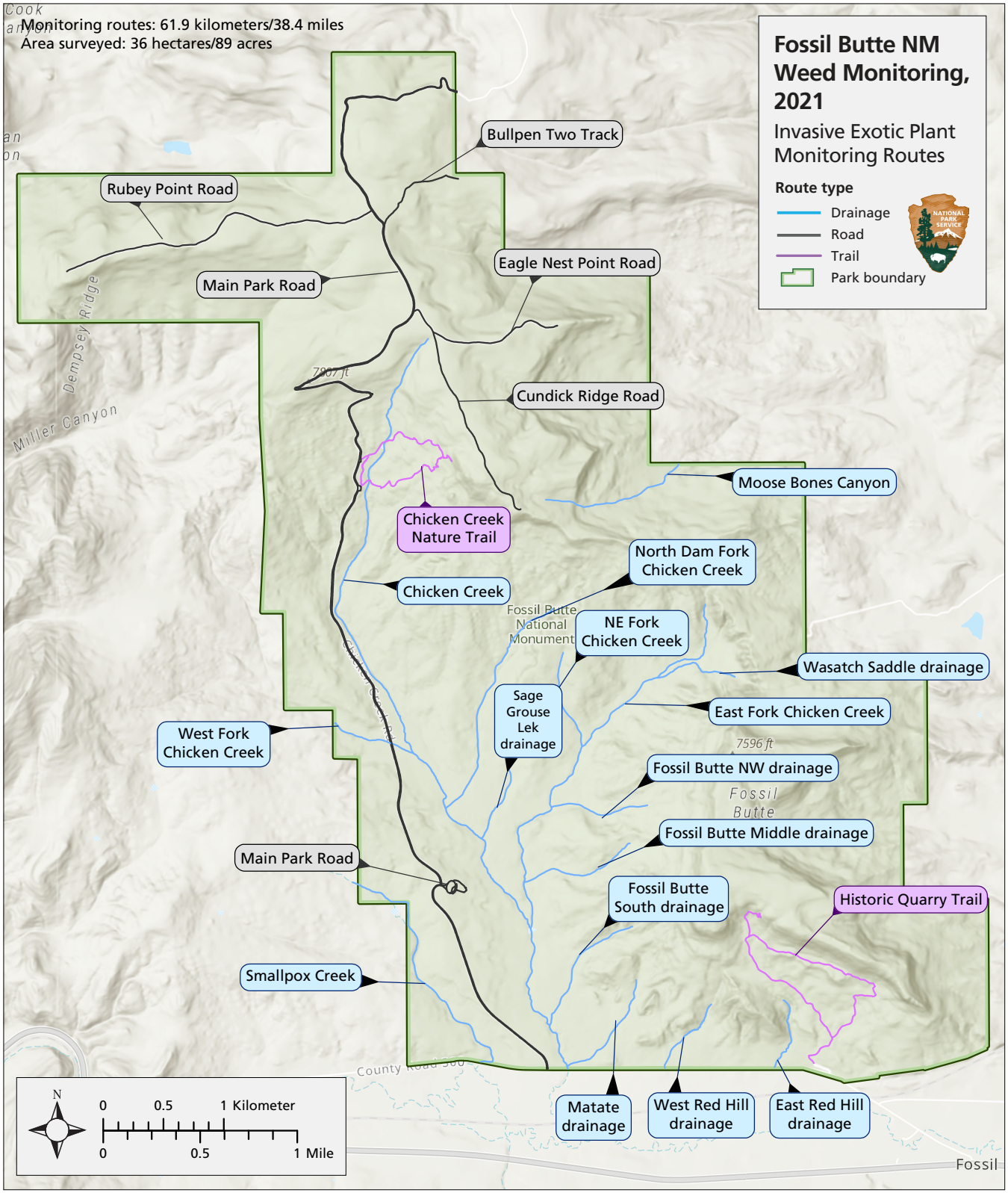


Figure 3-1. Invasive plant monitoring routes, Fossil Butte National Monument, June 26–29, 2021.

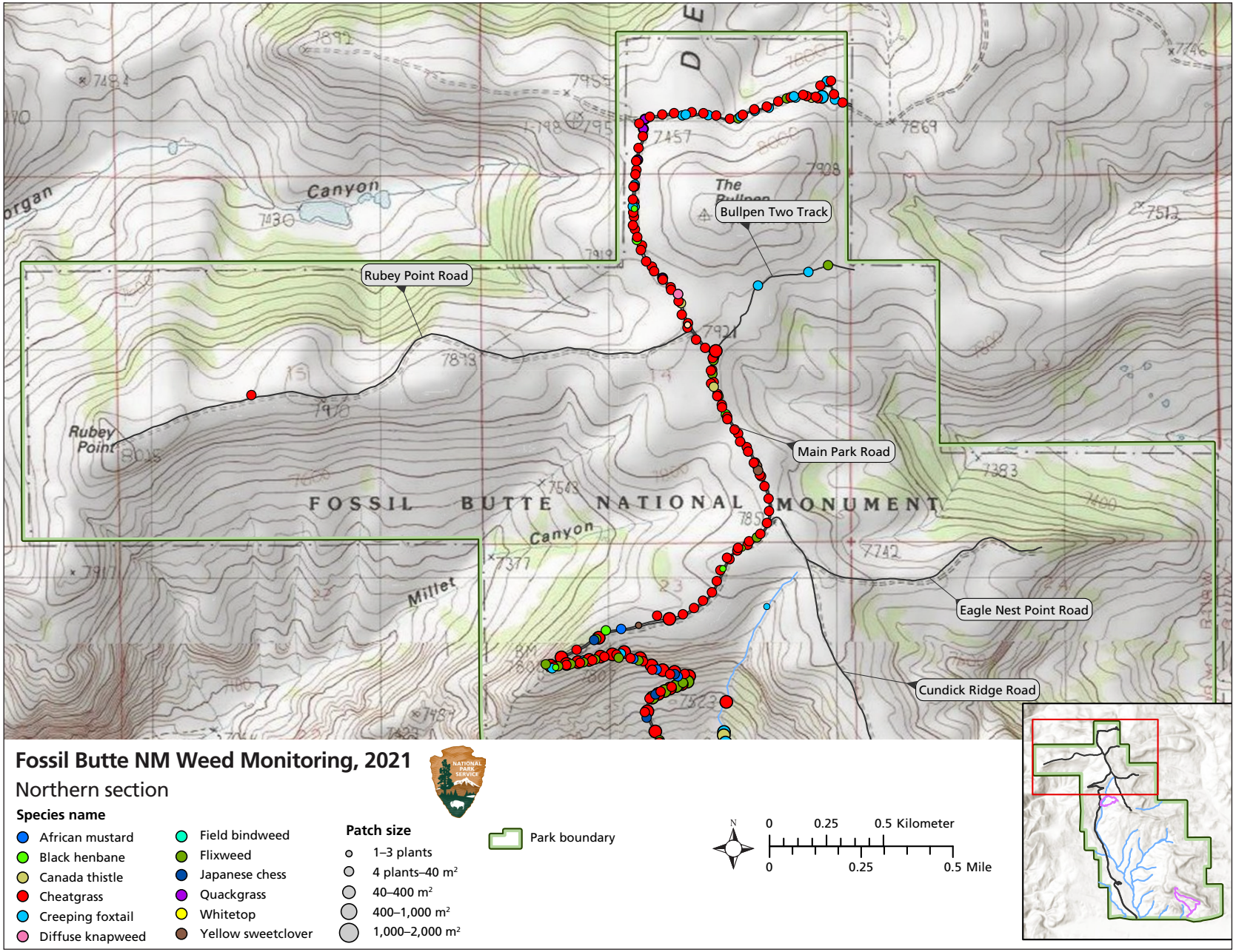


Figure 3-2. Invasive plant monitoring routes and invasive patches detected along monitoring routes in the northern section of Fossil Butte National Monument, June 26–29, 2021.

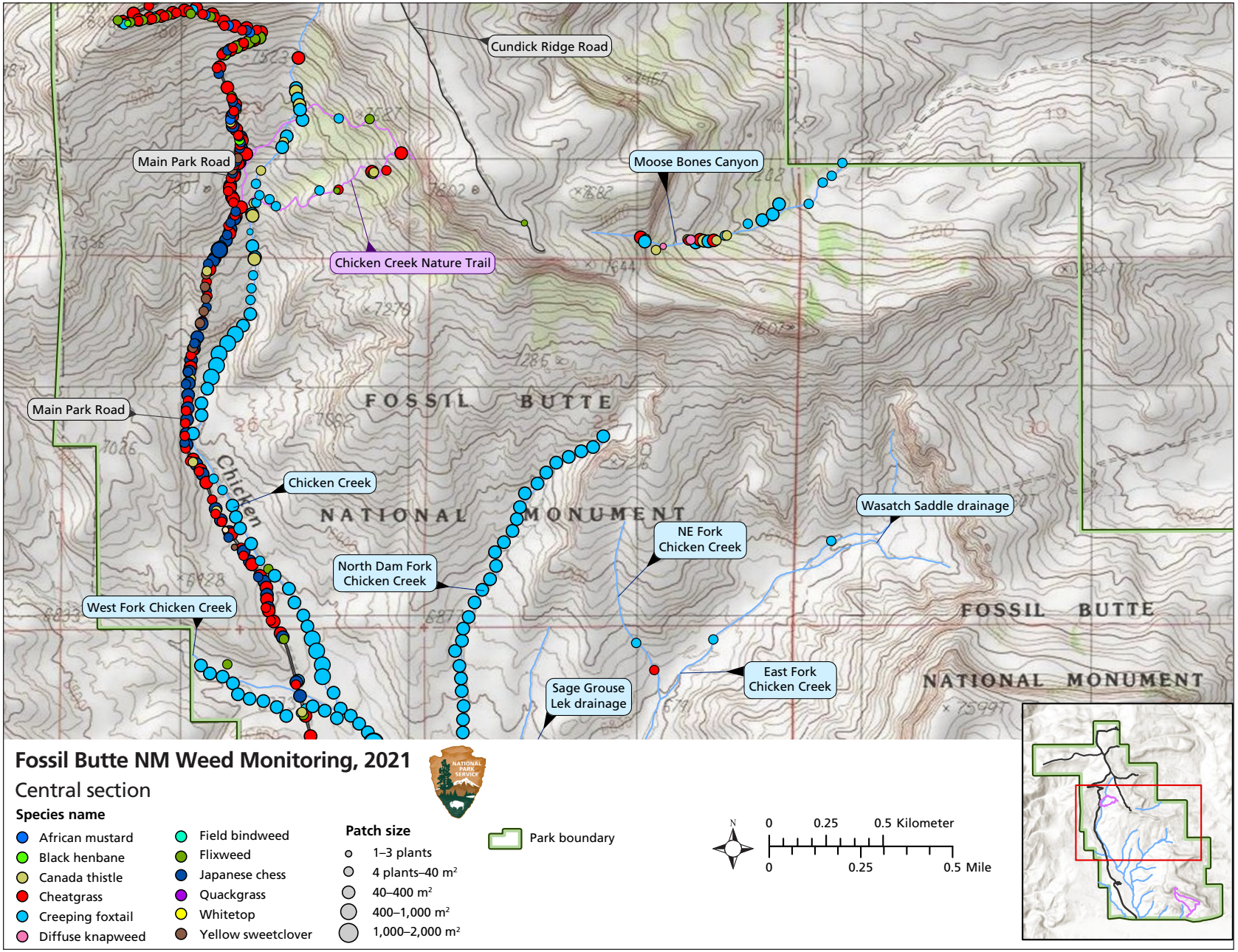


Figure 3-3. Invasive plant monitoring routes and invasive patches detected along monitoring routes in the central section of Fossil Butte National Monument, June 26–29, 2021.

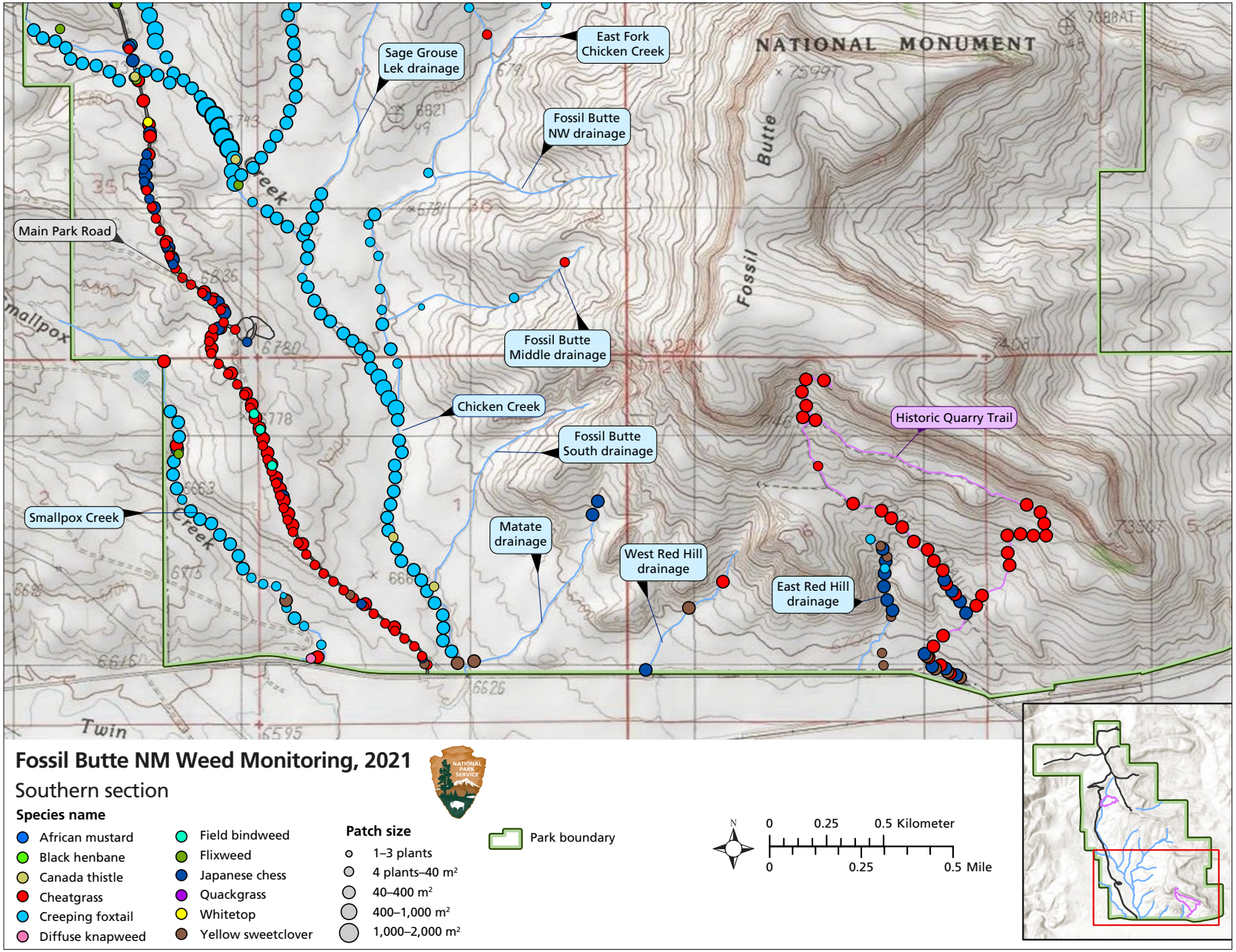


Figure 3-4. Invasive plant monitoring routes and invasive patches detected along monitoring routes in the southern section of Fossil Butte National Monument, June 26–29, 2021.

Table 3-3. Number of patches of IEP priority species by patch size class and patch management index detected along monitoring routes, Fossil Butte National Monument, June 26–29, 2021.

Scientific name	Common name	Total patches	Patch size class[1]				
			1	2	3	4	5
Alopecurus arundinaceus	creeping foxtail	229	5	64	139	16	5
Bassia scoparia	summer cypress	2	0	2	0	0	0
Bromus japonicus	Japanese brome	103	0	39	63	1	0
Bromus tectorum	cheatgrass	312	0	192	120	0	0
Cardaria sp.	whitetop	1	0	1	0	0	0
Carduus nutans	musk thistle	4	1	3	0	0	0
Cirsium arvense	Canada thistle	27	1	21	5	0	0
Convolvulus arvensis	field bindweed	3	0	3	0	0	0
Descurainia sophia	flixweed	36	4	28	4	0	0
Elymus repens	quackgrass	5	0	5	0	0	0
Hyoscyamus niger	black henbane	9	3	6	0	0	0
Melilotus officinalis	yellow sweetclover	32	6	18	8	0	0
Totals	–	763	20	382	339	17	5

[1] Patch size classes: 1 = 1–a few plants (≤2 × 2 m), 2 = few 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

3.1.2 Monitoring routes over time

Only priority species were examined when comparing years and areas, as these were the only species consistently recorded by all observers. Overall, the number of priority patches per kilometer has stayed relatively stable over the sample period, with 5.04 patches/km in 2021 compared to 5.21/km in 2008–2009. However, individual species have had increases and decreases over time.

Patch density of three priority IEP grass species has increased notably over time. The number of patches per kilometer of creeping foxtail rose between 2014 (0.96/km) and 2021 (3.70/km) (Table 3-4). Perkins (2011) noted that observers had difficulty identifying this plant in 2008 and 2010 due to misidentification, so early numbers from those years are suspect. Cheatgrass had been increasing in patches per kilometer since it was added to the IEP priority list in 2014 (from 3.01/km in 2014 to 6.96/km in 2018) but declined to 5.04 patches/km in 2021 (Table 3-4). Japanese brome also increased from 1.37 patches/km in 2016 (when it was added to IEP priority list) to 2.39 patches/km in 2018, but then declined to 1.66 patches/km in 2021.

Notable declines or absences in 2021 included:

- Whitetop (*Cardaria* sp.) was found in just 1 patch, down from 7 in 2016 and 6 in 2018.
- Musk thistle (*Carduus nutans*) was found in 4 patches (0.06/km), down from a high of 37 patches (0.57/km) in 2010 and 14 (0.21) in 2018, the last monitoring period.
- Flixweed declined to 36 patches (0.58/km), down from 55 (0.85) in 2018 and a high of 165 (2.50/km) in 2014.
- Quackgrass (*Elymus repens*) declined to 5 patches (0.08/km), down from 20 (0.30) in 2018 and a high of 73 (1.21) in 2008–2009.
- Spotted knapweed (*Centaurea maculosa*) and bull thistle (*Cirsium vulgare*) were not found. Neither has been detected since 2016.

To examine IEP species across time in different areas of Fossil Butte NM, we combined routes into five areas:

- *Northern drainages:* Murder Hill, South Murder Hill, Millet Canyon, South

Table 3-4. Total patches (per kilometer) and size class of patches of IEP species detected, Fossil Butte National Monument, 2008–2021.[1]

Scientific name	Common name	Year	Total patches (per km)	Patch size class[2]				
				1	2	3	4	5
Alopecurus arundinaceus	creeping foxtail	2008–2009	26 (0.43)	12	10	2	2	0
Alopecurus arundinaceus	creeping foxtail	2010	63 (0.96)	33	24	4	2	0
Alopecurus arundinaceus	creeping foxtail	2012	58 (0.88)	1	35	17	4	1
Alopecurus arundinaceus	creeping foxtail	2014	123 (1.86)	17	49	40	10	7
Alopecurus arundinaceus	creeping foxtail	2016	188 (2.82)	16	80	64	11	17
Alopecurus arundinaceus	creeping foxtail	2018	199 (3.05)	5	76	68	17	33
Alopecurus arundinaceus	creeping foxtail	2021	229 (3.70)	5	64	139	16	5
Bassia scoparia	summer cypress	2021	2 (0.03)	0	2	0	0	0
Bromus japonicus[3]	Japanese brome	2016	91 (1.37)	3	62	24	2	0
Bromus japonicus[3]	Japanese brome	2018	158 (2.39)	1	37	103	16	1
Bromus japonicus[3]	Japanese brome	2021	103 (1.66)	0	39	63	1	0
Bromus tectorum[4]	cheatgrass	2014	199 (3.01)	5	89	66	22	17
Bromus tectorum[4]	cheatgrass	2016	337 (5.06)	6	127	139	49	16
Bromus tectorum[4]	cheatgrass	2018	453 (6.96)	0	54	256	51	92
Bromus tectorum[4]	cheatgrass	2021	312 (5.04)	0	192	120	0	0
Cardaria sp.	whitetop	2008–2009	2 (0.03)	1	1	0	0	0
Cardaria sp.	whitetop	2010	1 (0.02)	0	1	0	0	0
Cardaria sp.	whitetop	2012	0	0	0	0	0	0
Cardaria sp.	whitetop	2014	1 (0.02)	0	1	0	0	0
Cardaria sp.	whitetop	2016	7 (0.11)	2	4	1	0	0
Cardaria sp.	whitetop	2018	6 (0.09)	0	4	2	0	0
Cardaria sp.	whitetop	2021	1 (0.02)	0	1	0	0	0
Carduus nutans	musk thistle	2008–2009	33 (0.46)	22	11	0	0	0
Carduus nutans	musk thistle	2010	37 (0.57)	24	7	5	1	0
Carduus nutans	musk thistle	2012	19 (0.29)	6	11	1	1	0
Carduus nutans	musk thistle	2014	30 (0.45)	18	10	1	1	0
Carduus nutans	musk thistle	2016	17 (0.26)	9	6	1	1	0
Carduus nutans	musk thistle	2018	14 (0.21)	7	7	1	0	0
Carduus nutans	musk thistle	2021	4 (0.06)	1	3	0	0	0
Centaurea maculosa	spotted knapweed	2008–2009	0	0	0	0	0	0
Centaurea maculosa	spotted knapweed	2010	1 (0.02)	0	1	0	0	0
Centaurea maculosa	spotted knapweed	2012	4 (0.06)	2	2	0	0	0
Centaurea maculosa	spotted knapweed	2014	6 (0.09)	1	4	1	0	0
Centaurea maculosa	spotted knapweed	2016	1 (0.02)	1	0	0	0	0
Centaurea maculosa	spotted knapweed	2018	0	0	0	0	0	0
Centaurea maculosa	spotted knapweed	2021	0	0	0	0	0	0
Cirsium arvense	Canada thistle	2008–2009	89 (1.47)	35	40	11	3	0
Cirsium arvense	Canada thistle	2010	54 (0.83)	12	30	10	2	0
Cirsium arvense	Canada thistle	2012	9 (0.14)	1	6	1	1	0
Cirsium arvense	Canada thistle	2014	19 (0.29)	2	12	4	1	0
Cirsium arvense	Canada thistle	2016	27 (0.41)	5	20	1	1	0
Cirsium arvense	Canada thistle	2018	18 (0.27)	2	15	1	0	0
Cirsium arvense	Canada thistle	2021	27 (0.44)	1	21	5	0	0

Table 3-4, cont. Total patches (per kilometer) and size class of patches of IEP species detected, Fossil Butte National Monument, 2008–2021.[1]

Scientific name	Common name	Year	Total patches (per km)	Patch size class[2]				
				1	2	3	4	5
Cirsium vulgare	bull thistle	2008–2009	8 (0.13)	6	2	0	0	0
Cirsium vulgare	bull thistle	2010	9 (0.14)	6	3	0	0	0
Cirsium vulgare	bull thistle	2012	6 (0.09)	2	4	0	0	0
Cirsium vulgare	bull thistle	2014	0	0	0	0	0	0
Cirsium vulgare	bull thistle	2016	4 (0.06)	2	2	0	0	0
Cirsium vulgare	bull thistle	2018	0	0	0	0	0	0
Cirsium vulgare	bull thistle	2021	0	0	0	0	0	0
Convolvulus arvensis	field bindweed	2008–2009	5 (0.06)	0	5	0	0	0
Convolvulus arvensis	field bindweed	2010	1 (0.02)	0	1	0	0	0
Convolvulus arvensis	field bindweed	2012	0	0	0	0	0	0
Convolvulus arvensis	field bindweed	2014	2 (0.03)	0	2	0	0	0
Convolvulus arvensis	field bindweed	2016	2 (0.03)	0	2	0	0	0
Convolvulus arvensis	field bindweed	2018	2 (0.03)	0	2	0	0	0
Convolvulus arvensis	field bindweed	2021	3 (0.05)	0	3	0	0	0
Descurainia sophia[5]	flixweed	2012	3 (0.50)	2	1	0	0	0
Descurainia sophia[5]	flixweed	2014	165 (2.50)	7	103	26	8	21
Descurainia sophia[5]	flixweed	2016	81 (1.22)	19	57	5	0	0
Descurainia sophia[5]	flixweed	2018	55 (0.85)	2	35	13	2	3
Descurainia sophia[5]	flixweed	2021	36 (.58)	4	28	4	0	0
Elymus repens	quackgrass	2008–2009	73 (1.21)	20	29	15	9	0
Elymus repens	quackgrass	2010	95 (1.45)	12	31	29	16	7
Elymus repens	quackgrass	2012	23 (0.35)	1	18	3	1	0
Elymus repens	quackgrass	2014	5 (0.08)	1	4	0	0	0
Elymus repens	quackgrass	2016	31 (0.47)	2	25	4	0	0
Elymus repens	quackgrass	2018	20 (0.30)	0	11	9	0	0
Elymus repens	quackgrass	2021	5 (0.31)	0	5	0	0	0
Hyoscyamus niger	black henbane	2008–2009	19 (0.31)	17	1	1	0	0
Hyoscyamus niger	black henbane	2010	5 (0.02)	4	1	0	0	0
Hyoscyamus niger	black henbane	2012	4 (0.06)	0	4	0	0	0
Hyoscyamus niger	black henbane	2014	4 (0.06)	1	3	0	0	0
Hyoscyamus niger	black henbane	2016	10 (0.15)	4	6	0	0	0
Hyoscyamus niger	black henbane	2018	3 (0.04)	3	0	0	0	0
Hyoscyamus niger	black henbane	2021	9 (0.15)	3	6	0	0	0
Isatis tinctoria	dyer's woad	2008–2009	2 (0.02)	2	0	0	0	0
Isatis tinctoria	dyer's woad	2010	0	0	0	0	0	0
Isatis tinctoria	dyer's woad	2012	0	0	0	0	0	0
Isatis tinctoria	dyer's woad	2014	0	0	0	0	0	0
Isatis tinctoria	dyer's woad	2016	0	0	0	0	0	0
Isatis tinctoria	dyer's woad	2018	0	0	0	0	0	0
Isatis tinctoria	dyer's woad	2021	0	0	0	0	0	0
Melilotus officinalis	yellow sweetclover	2008–2009	56 (0.93)	39	10	5	2	0
Melilotus officinalis	yellow sweetclover	2010	54 (0.83)	28	21	5	0	0
Melilotus officinalis	yellow sweetclover	2012	10 (0.15)	3	6	1	0	0
Melilotus officinalis	yellow sweetclover	2014	20 (0.30)	9	9	2	0	0

Table 3-4, cont. Total patches (per kilometer) and size class of patches of IEP species detected, Fossil Butte National Monument, 2008–2021.[1]

Scientific name	Common name	Year	Total patches (per km)	Patch size class[2]				
				1	2	3	4	5
Melilotus officinalis	yellow sweetclover	2016	23 (0.35)	12	11	0	0	0
Melilotus officinalis	yellow sweetclover	2018	21 (0.31)	3	12	6	0	0
Melilotus officinalis	yellow sweetclover	2021	32 (0.52)	6	18	8	0	0
All priority species monitoring over all time periods[6]	—	2008–2009	315 (5.21)	154	109	35	16	0
	—	2010	320 (4.90)	119	120	53	21	7
	—	2012	133 (2.02)	16	86	23	7	1
	—	2014	375 (5.68)	56	197	74	20	28
	—	2016	310 (4.66)	53	156	71	13	17
	—	2018	281 (4.21)	19	125	87	17	33
	—	2021	312 (5.04)	16	123	152	16	5

[1]Distances and dates surveyed were 60.44 km (July 14–15, 2008 and August 6–8, 2009), 65.35 km (July 24–28, 2010), 65.87 km (August 2–5, 2012), 66.03 km (July 19–22, 2014), 66.56 km (June 30–July 4, 2016), 66.82 km (June 28–July 1, 2018) and 61.9 km June 26–29,2021.

[2] Patch size classes: 1 = 1–a few plants (≤2 × 2 m), 2 = few 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

[3] Added to priority list in 2016.

[4] Added to priority list in 2014.

[5] Added to priority list in 2012.

[6] Does not include cheatgrass, flixweed, or Japanese brome because these species were added to the IEP priority list after the early monitoring years.

Millet Canyon, and Moose Bones Canyon (however, only Moose Bones was completed in 2021);

- *Southern drainages:* Smallpox, Matate, West Red Hill, East Red Hill, Fossil Butte East, Fossil Butte Northwest, Fossil Butte Middle, Wasatch Saddle, Sage Grouse Lek, Northeast Fork of Chicken Creek, East Fork of Chicken Creek, West Fork of Chicken Creek, North Dam Fork of Chicken Creek, and Chicken Creek;
- *Main Park Road:* Main Park Road;
- *Other Roads:* Eagle Nest Point, Rubey Point, Bullpen Two Track, and Cundick Ridge; and
- *Trails:* Chicken Creek and Historic Quarry.

Patch density of all IEP priority species was compared across the five areas over time, excluding cheatgrass, Japanese brome, and flixweed, which were added to the list after early monitoring years. Southern drainages saw increases in overall IEP patch densities across all monitoring years, from 2.87 patches/km in 2008–2009 to 8.59 patches/km in 2021 (Table 3-5). This was driven mostly by an increase in creeping foxtail. Conversely, the Main Park Road has seen a decrease in overall IEP patch densities of consistently monitored species, from 8.85 patches/km in 2008–2009 to 2.51 patches/km in 2018 (although they increased in 2021 to 3.33 patches/km). This was due mostly to declines in patch densities of Canada thistle (*Cirsium arvense*), quackgrass, and yellow sweetclover (*Melilotus officinalis*). Creeping foxtail increased along the Main Park Road, northern drainages, and southern drainages from 2010 to 2021. Throughout all monitoring years, black henbane (*Hyoscyamus niger*) has only been found on the Main Park Road.

3.2 Monitoring transects

3.2.1 2021 transect results

A total of 123 transects were sampled in 2021 (Figure 3-5, Appendix B). Three IEP priority species were detected on transects: cheatgrass, creeping foxtail, Japanese brome,

and one non-priority species, African mustard (see Tables 3-1, 3-6). Cheatgrass was the most commonly detected species, found on 20 transects. Creeping foxtail and Japanese brome were found on 7 and 6 transects, respectively. A total of 32 transects had at least one IEP species present. The highest cover for a species on a route was 1.5% (SE=1.2) for creeping foxtail on the Chicken Creek route. All other cover was below 0.1%. The average cover of IEP species across all transects in the park was 0.2% (SE=0.1). Transects along the Main Park Road accounted for the majority of IEP occurrences, with 25 of 46 transects containing at least one IEP priority species, but total cover was only 0.1% (SD=0.02) on that route. Estimated percent covers of cheatgrass along the Main Park Road in 2009, 2010, 2012, and 2014 were 0.4% (0.3 SE), 0.4% (0.2 SE), 0.1% (0.1 SE), and 0.9% (0.5 SE), respectively.

3.2.2 Transects over time

Only IEP priority species and cheatgrass have been reliably recorded on transects across all study years. Percent cover of all priority IEPs has been low over time (Table 3-6). Estimated percent covers of cheatgrass along the Main Park Road have fluctuated at below 1% (range 0.1%–0.9%) across all monitoring years. From 2008–2009 to 2021, the percentage of transects containing cheatgrass parkwide rose from 2.9% to 27.2% in 2018 before declining to 16.3% in 2021.

Table 3-5. Total number of patches (number per km) detected parkwide and by route type, Fossil Butte National Monument, 2008–2021.

Scientific name	Common name	Year	Total patches (per km)					
			Parkwide (61.9 km)	Northern drainages[1] (1.2 km)	Southern drainages[2] (24.1 km)	Main Park Road (23.4 km)	Other roads (6.7 km)[3]	Trails (6.5 km)[4]
Alopecurus arundinaceus	creeping foxtail	2008–2009	24 (0.40)	2 (0.41)	22 (0.87)	0	0	0
Alopecurus arundinaceus	creeping foxtail	2010	63 (0.96)	8 (1.75)	43 (1.70)	6 (0.27)	2 (0.29)	4 (0.66)
Alopecurus arundinaceus	creeping foxtail	2012	58 (0.88)	1 (0.23)	55 (2.18)	2 (0.08)	0	0
Alopecurus arundinaceus	creeping foxtail	2014	123 (1.86)	15 (3.07)	95 (3.72)	9 (0.38)	3 (0.45)	1 (0.18)
Alopecurus arundinaceus	creeping foxtail	2016	186 (2.79)	14 (2.89)	149 (5.92)	16 (0.68)	5 (0.75)	2 (0.32)
Alopecurus arundinaceus	creeping foxtail	2018	199 (2.98)	15 (3.10)	160 (6.28)	17 (0.72)	5 (0.75)	2 (0.32)
Alopecurus arundinaceus	creeping foxtail	2021	318 (5.13)	20 (16.67)	187 (7.76)	78 (3.33)	2 (0.30)	11 (1.69)
Bromus japonicus[5]	Japanese brome	2016	91 (1.37)	0	8 (0.32)	77 (3.27)	0	6 (0.95)
Bromus japonicus[5]	Japanese brome	2018	158 (2.38)	0	18 (0.71)	126 (5.35)	0	14 (2.23)
Bromus japonicus[5]	Japanese brome	2021	103 (1.66)	0	9 (0.37)	86 (3.68)	0	8 (1.23)
Bromus tectorum[6]	cheatgrass	2014	199 (3.01)	13 (2.66)	31 (1.21)	139 (5.92)	3 (0.45)	13 (2.38)
Bromus tectorum[6]	cheatgrass	2016	333 (5.00)	11 (2.27)	51 (2.02)	234 (9.94)	7 (1.05)	30 (4.77)
Bromus tectorum[6]	cheatgrass	2018	453 (6.78)	19 (3.92)	80 (3.14)	302 (12.83)	6 (0.90)	46 (7.31)
Bromus tectorum[6]	cheatgrass	2021	312 (5.04)	4 (3.33)	7 (0.29)	262 (11.20)	2 (0.30)	37 (5.69)
Cardaria sp.	whitetop	2008–2009	2 (0.03)	0	0	2 (0.11)	0	0
Cardaria sp.	whitetop	2010	1 (0.02)	0	1 (0.04)	0	0	0
Cardaria sp.	whitetop	2012	0	0	0	0	0	0
Cardaria sp.	whitetop	2014	1 (0.02)	0	0	1 (0.04)	0	0
Cardaria sp.	whitetop	2016	7 (0.11)	0	3 (0.12)	4 (0.17)	0	0
Cardaria sp.	whitetop	2018	6 (0.09)	4 (0.83)	1 (0.04)	1 (0.04)	0	0
Cardaria sp.	whitetop	2021	1 (0.02)	0	0	1 (0.04)	0	0
Carduus nutans	musk thistle	2008–2009	27 (0.45)	8 (1.65)	12 (0.47)	7 (0.39)	0	0
Carduus nutans	musk thistle	2010	37 (0.57)	7 (1.53)	16 (0.63)	13 (0.58)	1 (0.14)	0
Carduus nutans	musk thistle	2012	18 (0.27)	5 (1.15)	10 (0.40)	2 (0.08)	0	1 (0.17)
Carduus nutans	musk thistle	2014	30 (0.45)	9 (1.84)	11 (0.43)	9 (0.38)	1 (0.15)	0
Carduus nutans	musk thistle	2016	16 (0.24)	4 (0.83)	5 (0.20)	6 (0.25)	0	1 (0.16)
Carduus nutans	musk thistle	2018	12 (0.18)	2 (0.41)	3 (0.12)	6 (0.25)	1 (0.15)	0
Carduus nutans	musk thistle	2021	4 (0.06)	2 (1.67)	1 (0.04)	1 (0.04)	0	0
Centaurea maculosa	spotted knapweed	2008–2009	0	0	0	0	0	0

Table 3-5, cont. Total number of patches (number per km) detected parkwide and by route type, Fossil Butte National Monument, 2008–2021.

Scientific name	Common name	Year	Total patches (per km)					
			Parkwide (61.9 km)	Northern drainages[1] (1.2 km)	Southern drainages[2] (24.1 km)	Main Park Road (23.4 km)	Other roads (6.7 km)[3]	Trails (6.5 km)[4]
Centaurea maculosa	spotted knapweed	2010	1 (0.02)	0	1 (0.04)	0	0	0
Centaurea maculosa	spotted knapweed	2012	4 (0.06)	0	0	4 (0.17)	0	0
Centaurea maculosa	spotted knapweed	2014	6 (0.09)	0	0	6 (0.26)	0	0
Centaurea maculosa	spotted knapweed	2016	1 (0.02)	0	0	1 (0.04)	0	0
Centaurea maculosa	spotted knapweed	2018	0	0	0	0	0	0
Centaurea maculosa	spotted knapweed	2021	0	0	0	0	0	0
Cirsium arvense	Canada thistle	2008–2009	67 (1.11)	10 (2.07)	25 (0.98)	32 (1.78)	0	0
Cirsium arvense	Canada thistle	2010	53 (0.81)	13 (2.85)	21 (0.83)	12 (0.53)	3 (0.43)	4 (0.66)
Cirsium arvense	Canada thistle	2012	9 (0.14)	5 (1.15)	1 (0.04)	2 (0.08)	0	1 (0.17)
Cirsium arvense	Canada thistle	2014	19 (0.29)	6 (1.23)	11 (0.43)	2 (0.09)	0	0
Cirsium arvense	Canada thistle	2016	27 (0.41)	9 (1.86)	5 (0.20)	13 (0.55)	0	0
Cirsium arvense	Canada thistle	2018	18 (0.27)	8 (1.65)	5 (0.20)	5 (0.21)	0	0
Cirsium arvense	Canada thistle	2021	27 (0.44)	6 (5.0)	10 (0.41)	10 (0.43)	0	1 (0.15)
Cirsium vulgare	bull thistle	2008–2009	6 (0.10)	1 (0.21)	3 (0.12)	1 (0.06)	0	1 (0.18)
Cirsium vulgare	bull thistle	2010	9 (0.14)	4 (0.88)	3 (0.12)	1 (0.04)	0	1 (0.17)
Cirsium vulgare	bull thistle	2012	6 (0.09)	1 (0.23)	2 (0.08)	3 (0.13)	0	0
Cirsium vulgare	bull thistle	2014	0	0	0	0	0	0
Cirsium vulgare	bull thistle	2016	4 (0.06)	0	3 (0.12)	1 (0.04)	0	0
Cirsium vulgare	bull thistle	2018	0	0	0	0	0	0
Cirsium vulgare	bull thistle	2021	0	0	0	0	0	0
Convolvulus arvensis	field bindweed	2008–2009	4 (0.07)	0	0	4 (0.22)	0	0
Convolvulus arvensis	field bindweed	2010	1 (0.02)	0	0	1 (0.04)	0	0
Convolvulus arvensis	field bindweed	2012	0	0	0	0	0	0
Convolvulus arvensis	field bindweed	2014	2 (0.03)	0	0	2 (0.09)	0	0
Convolvulus arvensis	field bindweed	2016	2 (0.03)	0	0	2 (0.08)	0	0
Convolvulus arvensis	field bindweed	2018	2 (0.03)	0	0	2 (0.08)	0	0
Convolvulus arvensis	field bindweed	2021	3 (0.05)	0	0	3 (0.13)	0	0
Descurainia sophia[7]	flixweed	2012	3 (0.05)	0	1 (0.04)	2 (0.08)	0	0
Descurainia sophia[7]	flixweed	2014	164 (2.48)	6 (1.23)	64 (2.51)	75 (3.19)	9 (1.35)	10 (1.83)

Table 3-5, cont. Total number of patches (number per km) detected parkwide and by route type, Fossil Butte National Monument, 2008–2021.

Scientific name	Common name	Year	Total patches (per km)					
			Parkwide (61.9 km)	Northern drainages[1] (1.2 km)	Southern drainages[2] (24.1 km)	Main Park Road (23.4 km)	Other roads (6.7 km)[3]	Trails (6.5 km)[4]
Descurainia sophia[7]	flixweed	2016	80 (1.20)	3 (0.62)	23 (0.91)	43 (1.83)	0	11 (1.75)
Descurainia sophia[7]	flixweed	2018	55 (0.82)	6 (1.24)	6 (0.24)	33 (1.40)	3 (0.45)	7 (1.11)
Descurainia sophia[7]	flixweed	2021	36 (0.58)	0	5 (0.25)	26 (1.11)	2 (0.30)	3 (0.46)
Elymus repens	quackgrass	2008–2009	53 (0.88)	0	3 (0.12)	49 (2.73)	1 (0.15)	0
Elymus repens	quackgrass	2010	95 (1.45)	13 (2.85)	0	69 (3.06)	8 (1.15)	5 (0.83)
Elymus repens	quackgrass	2012	23 (0.35)	0	2 (0.08)	21 (0.89)	0	0
Elymus repens	quackgrass	2014	5 (0.35)	1 (0.20)	0	4 (0.17)	0	0
Elymus repens	quackgrass	2016	31 (0.47)	0	2 (0.08)	25 (1.06)	0	4 (0.64)
Elymus repens	quackgrass	2018	20 (0.30)	0	1 (0.04)	19 (0.81)	0	0
Elymus repens	quackgrass	2021	5 (0.08)	0	0	5 (0.21)	0	0
Hyoscyamus niger	black henbane	2008–2009	19 (0.31)	1 (0.21)	2 (0.08)	16 (0.89)	0	0
Hyoscyamus niger	black henbane	2010	5 (0.08)	1 (0.22)	2 (0.08)	2 (0.09)	0	0
Hyoscyamus niger	black henbane	2012	4 (0.06)	0	0	4 (0.17)	0	0
Hyoscyamus niger	black henbane	2014	4 (0.06)	0	0	4 (0.17)	0	0
Hyoscyamus niger	black henbane	2016	10 (0.15)	0	0	10 (0.42)	0	0
Hyoscyamus niger	black henbane	2018	3 (0.04)	0	0	3 (0.13)	0	0
Hyoscyamus niger	black henbane	2021	9 (0.15)	0	0	9 (0.38)	0	0
Melilotus officinalis	yellow sweetclover	2008–2009	54 (0.89)	0	6 (0.24)	48 (2.67)	0	0
Melilotus officinalis	yellow sweetclover	2010	54 (0.83)	0	18 (0.71)	35 (1.55)	0	1 (0.17)
Melilotus officinalis	yellow sweetclover	2012	10 (0.15)	0	3 (0.12)	6 (0.25)	0	1 (0.17)
Melilotus officinalis	yellow sweetclover	2014	20 (0.30)	0	5 (0.20)	15 (0.64)	0	0
Melilotus officinalis	yellow sweetclover	2016	23 (0.35)	0	8 (0.32)	14 (0.59)	0	1 (0.16)
Melilotus officinalis	yellow sweetclover	2018	21 (0.31)	0	11 (0.43)	6 (0.25)	0	4 (0.64)
Melilotus officinalis	yellow sweetclover	2021	32 (0.52)	0	9 (0.37)	19 (0.81)	0	4 (0.62)
All IEP species[8]	—	2008–2009	256 (4.24)	22 (4.54)	73 (2.87)	159 (8.85)	1 (0.15)	1 (0.18)
All IEP species[8]	—	2010	319 (4.88)	46 (10.08)	105 (4.16)	139 (6.17)	14 (2.01)	15 (2.49)
All IEP species[8]	—	2012	132 (2.00)	12 (2.77)	73 (2.89)	44 (1.87)	0	3 (0.50)
All IEP species[8]	—	2014	210 (3.18)	31 (6.35)	122 (4.78)	52 (2.21)	4 (0.60)	1 (0.18)
All IEP species[8]	—	2016	307 (4.61)	27 (5.58)	175 (6.95)	92 (3.91)	5 (0.75)	8 (1.27)

Table 3-5, cont. Total number of patches (number per km) detected parkwide and by route type, Fossil Butte National Monument, 2008–2021.

Scientific name	Common name	Year	Total patches (per km)					
			Parkwide (61.9 km)	Northern drainages[1] (1.2 km)	Southern drainages[2] (24.1 km)	Main Park Road (23.4 km)	Other roads (6.7 km)[3]	Trails (6.5 km)[4]
All IEP species[8]	—	2018	281 (4.21)	29 (5.99)	181 (7.11)	59 (2.51)	6 (0.90)	6 (0.95)
All IEP species[8]	—	2021	318 (5.14)	20 (16.67)	207 (8.59)	78 (3.33)	2 (0.30)	11 (1.69)

[1] Northern drainages: Only Moose Bones Canyon was completed in 2021. Millet Canyon, Murder Hill, South Millet Canyon, South Murder Hill were not completed.
[2] Southern drainages: All Chicken Creek tributaries, Smallpox Creek, Matate, Sage Grouse Lek, Wasatch Saddle, Red Hill, and Fossil Butte drainages.
[3] Other Roads: Rubey Point, Bullpen Two Track, Eagle Nest Point, and Cundick Ridge
[4] Trails: Chicken Creek Nature Trail, Historic Quarry Trail.
[5] Added to priority list in 2016.
[6] Added to priority list in 2014.
[7] Added to priority list in 2012.
[8] Does not include cheatgrass, flixweed, or Japanese, brome because these species were added to the IEP priority list after the early monitoring years.

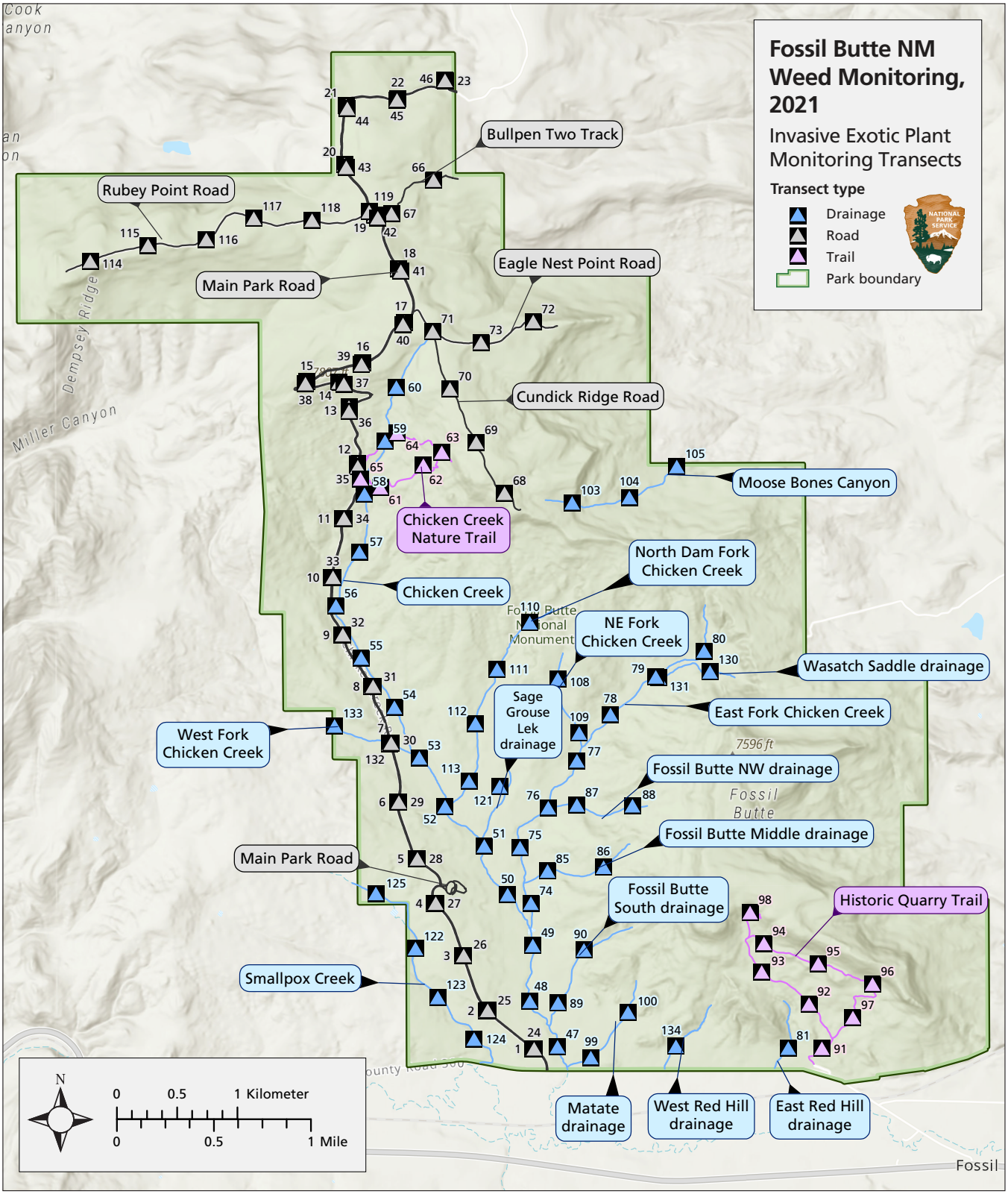


Figure 3-5. Invasive plant monitoring transects, Fossil Butte National Monument, June 26–29, 2021.

Table 3-6. Detections and mean percent cover of four common IEP species in transects in monitoring areas parkwide, Fossil Butte National Monument, 2008–2021.[1]

Year	Creeping foxtail[2]		Japanese brome[3]		Cheatgrass		Flixweed[4]	
	Detected/ Total	% cover (SE)	Detected/ Total	% cover (SE)	Detected/ Total	% cover (SE)	Detected/ Total	% cover (SE)
2008–2009[5]	0/102	0	–	–	3/102	0.08 (0.05)	–	–
2010	1/96	0.24 (0.24)	–	–	9/96	0.09 (0.04)	–	–
2012	2/100	0.03 (0.02)	–	–	3/100	0.29 (0.27)	0/100	0
2014	1/122	0.04 (0.02)	–	–	12/122	0.37 (0.19)	8/122	0.04 (0.01)
2016	8/142	0.16 (0.13)	6/142	0.02 (0.01)	27/142	0.08 (0.02)	3/142	0.02 (0.01)
2018	7/125	0.54 (0.29)	14/125	0.06 (0.03)	34/125	0.11 (0.03)	5/125	0.01 (0.01)
2021	7/123	0.17 (0.14)	6/123	0.01 (<0.01)	20/125	0.04 (0.01)	0/125	0.00

[1] Note: The density of transects along the Main Park Road and Other Roads was lower in early monitoring years than in recent years.
[2] Not identified in 2008.
[3] Added to priority list in 2016.
[4] Added to priority list in 2012.
[5] In 2008 and 2009, transect methods differed slightly in placement of 1-m^2 quadrats from all subsequent years.

4 Discussion

4.1 Control efforts by park staff, 2019–2021

Fossil Butte National Monument staff treated 15 IEP species in 2019–2020, 13 of which were priority species. In both years, work focused on roadsides, the Historic Quarry area, Millet Canyon, Chicken Creek Nature Trial, Murder Hill, and around the park visitor center and maintenance buildings (including an area affected by burying a cable line in 2017). Declines in some treated species along the Main Park Road (particularly Canada thistle, black henbane, flixweed, and yellow sweetclover) were likely due to these treatments (see Table 3-5).

In 2019, a total of 25,528 IEPs were pulled, 16.48 acres of IEPs were sprayed with herbicide, and 70 thirty-three-gallon bags of mowed cheatgrass were removed. In 2020, a total of 108,067 IEPs were pulled (75,128 of which were yellow sweetclover, which had a regional bloom), 6.06 acres of IEPs were sprayed with herbicide, and 14.5 thirty-three-gallon bags of mowed cheatgrass were removed. The intense efforts of controlling yellow sweetclover likely kept the increase in that population along the Main Park Road smaller than it otherwise would have been. Patches of Canada thistle and black henbane also saw small increases along the Main Park Road since 2018, but flixweed declined. The intensive work on these species along the Historic Quarry Trail and Chicken Creek Nature Trail appears to have been successful, as Canada thistle, black henbane, flixweed, and yellow sweetclover all declined or stayed the same. Creeping foxtail was not a management target along these trails, and it was the only species to increase, going from 2 patches in 2018 to 11 in 2021.

4.2 Possibilities for management control

The NCPN will continue to work with Fossil Butte NM staff and area weed experts to review and update the list of priority species each year. Based on current control efforts, yellow salsify could be considered for addition to the park's IEP priority list.

Presence and absence data for most priority species should be reliable for the areas searched. However, absence data for other species are suspect, as they are not consistently recorded from year to year.

Despite control efforts, patch density of cheatgrass remained high in 2021, although it declined somewhat from 2018. The percentage of transects containing IEPs followed a similar pattern, with a slight decline in 2021 compared to 2018, but an overall increase since 2008–2009. The overall percent cover of cheatgrass across the park has remained below 1% and fluctuated in recent years. This suggests cheatgrass is becoming more widespread but is often sparse in distribution. However, park managers should be congratulated for even being able to consider controlling cheatgrass, as its levels at many parks are too high for control efforts to be effective. Japanese brome also decreased throughout the park from 2018 to 2021, after seeing increases from 2016 to 2018. These two annual brome species are also known to fluctuate based on annual precipitation.

Creeping foxtail continues to increase throughout the park, in the southern drainages, and along the Main Park Road. The increases seen in the northern drainages may be misleading, as only one route was completed in this area in 2021 (because NCPN staff was assisting with plot establishment for control efforts with the Northern Rockies IPMT). The increases in foxtail have driven an overall increase in priority IEPs in the southern drainages.

Apparent declines in quackgrass across monitoring years may be due, at least in part, to the difficulty in distinguishing this species from native *Elymus* species and their hybrids.

Summer cypress was detected for the first time along the Main Park Road and should be a target for immediate control.

Control efforts remain ongoing and are likely slowing the spread of IEPs. Whitetop, musk thistle, flixweed, and quackgrass all declined since 2018. Spotted knapweed and bull thistle have remained absent from

monitoring routes since 2016. Overall, patch densities of consistently recorded species (i.e., not including cheatgrass, Japanese brome, or flixweed) have been relatively stable over the monitoring period, likely due to control efforts. If control efforts ceased, several priority IEP species would likely increase over time.

Areas away from riparian routes and the Main Park Road continued to have fewer IEPs. In 2021, the Wasatch Saddle drainage, North Dam Fork of Chicken Creek, and Fossil Butte Northwest drainage were free of priority weed species. Efforts should be made to eliminate patches in nearby drainages and trails, to prevent increases in these areas. Additionally, in the central area of the park, the East and Northeast forks of Chicken Creek, Fossil Butte Middle drainage, and Cundick Ridge Road had low patch densities in 2021. However, patches in the Sage Grouse Lek Drainage, in this same area, increased dramatically from 2018, all due to creeping foxtail. These areas should be priority locations for future control efforts of creeping foxtail.

Estimates of percent cover in this report (see Section 3.2) 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 along areas most likely to be invaded by a broad suite of IEPs, it is plausible that the percent cover for most IEP species is lower in the interior of the park than along the monitoring routes. Data from monitoring routes are meant to provide information for control efforts. Unlike the monitoring transects and associated quadrats, the routes are not designed to make statistical comparisons between years and areas.

4.3 Future monitoring efforts

IEPs at Fossil Butte NM will generally be monitored biennially, at the same time of year. Consistency in timing of monitoring should ensure consistency in detection probabilities and cover estimates of most species. For many species, sampling at any time from June to August is not expected to drastically alter the chances of detecting invasive species larger than the minimum detection target size. A complete eighth rotation of monitoring routes is planned for 2023. Long-term trend reporting will focus on trends in species distributions and percent cover of individual species, and changes in IEP percent cover of priority species by monitoring route. Extra-area surveys will also be considered for inventories at the park's request.

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Appendix A. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
West Red Hill drainage	*Bromus tectorum*	Cheatgrass	FALSE	4630567	521058.2	1	3	Yes	Southern	No
West Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630180	520719.7	1	3	Yes	Southern	No
West Red Hill drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630452	520908.9	3	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632779	518474.3	2	2	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632808	518525.7	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632756	518632.1	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632841	518249.2	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632938	518131.1	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632860	518198.1	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632789	518579	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632952	518075.2	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632908	518176.3	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632831	518309.9	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632765	518410.3	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632804	518368.3	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632987	518035.9	2	3	Yes	Southern	Yes
West Fork Chicken Creek	*Descurainia sophia*	Flixweed	FALSE	4632992	518151.5	1	2	Yes	Southern	No
Smallpox Creek	*Bromus tectorum*	Cheatgrass	FALSE	4630236	519281.1	1	3	Yes	Southern	No
Smallpox Creek	*Bromus tectorum*	Cheatgrass	FALSE	4631165	518662.3	1	3	Yes	Southern	No
Smallpox Creek	*Bromus tectorum*	Cheatgrass	FALSE	4631534	518607.1	1	3	Yes	Southern	No
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630506	519131.2	2	1	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630372	519221.4	3	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630547	519099.5	2	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630557	519042.1	2	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630927	518686.8	2	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630290	519297.2	2	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630584	518990.3	2	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630452	519144.5	2	2	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630235	519261.7	2	2	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631093	518650.3	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630732	518897.2	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630624	518953.4	3	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631314	518634.8	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630822	518814.8	3	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630976	518662.8	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630680	518933.6	3	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630877	518724.3	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631266	518669.5	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630772	518852.1	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630407	519179.9	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631150	518665	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631202	518673.6	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631037	518646.9	2	3	Yes	Southern	Yes
Smallpox Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630841	518764.8	2	3	Yes	Southern	Yes
Smallpox Creek	*Descurainia sophia*	Flixweed	FALSE	4631128	518671.5	1	2	Yes	Southern	No
Smallpox Creek	*Carduus nutans*	Musk thistle	FALSE	4630230	519251.4	2	2	Yes	Southern	Yes
Smallpox Creek	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630485	519142.4	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633200	519209.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633319	519269.6	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632162	519257.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633051	519150.6	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632875	519179.6	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633877	519594.1	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632268	519296.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633927	519703.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632427	519033.3	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633629	519421.1	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633785	519511.8	2	3	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632749	519185.3	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633833	519550.4	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632633	519158.3	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632351	518945.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632579	519143.7	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632809	519187.8	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632476	519071	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633682	519434.8	3	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633902	519648.7	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633993	519800.5	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633577	519402.3	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633945	519755.7	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632113	519230.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632383	518997.1	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633742	519456.8	3	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633484	519325.7	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632985	519169.4	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632930	519176.2	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633424	519330.3	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632693	519184.4	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632522	519099.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633096	519180.6	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633528	519364.6	3	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632215	519277	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633366	519303.9	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633263	519236	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633149	519186.2	2	3	Yes	Southern	Yes
Sage Grouse Lek drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632085	519217.5	2	3	Yes	Southern	Yes
Rubey Point Road	*Bromus tectorum*	Cheatgrass	FALSE	4636999	516380.1	1	2	Yes	Road	No
NE Fork Chicken Creek	*Bromus tectorum*	Cheatgrass	FALSE	4632967	520024.2	1	2	Yes	Southern	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
NE Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633086	519944.9	1	2	Yes	Southern	Yes
Moose Bones Canyon	*Cirsium arvense*	Canada thistle	FALSE	4634874	520342.5	2	2	Yes	Northern	Yes
Moose Bones Canyon	*Cirsium arvense*	Canada thistle	FALSE	4634859	519986	2	2	Yes	Northern	Yes
Moose Bones Canyon	*Cirsium arvense*	Canada thistle	FALSE	4634852	520297	1	2	Yes	Northern	Yes
Moose Bones Canyon	*Cirsium arvense*	Canada thistle	FALSE	4634810	520031.6	2	2	Yes	Northern	Yes
Moose Bones Canyon	*Cirsium arvense*	Canada thistle	FALSE	4634856	520169.7	2	2	Yes	Northern	Yes
Moose Bones Canyon	*Cirsium arvense*	Canada thistle	FALSE	4634850	520242	1	3	Yes	Northern	Yes
Moose Bones Canyon	*Bromus tectorum*	Cheatgrass	FALSE	4634851	520174.6	1	2	Yes	Northern	No
Moose Bones Canyon	*Bromus tectorum*	Cheatgrass	FALSE	4634852	520284.8	1	3	Yes	Northern	No
Moose Bones Canyon	*Bromus tectorum*	Cheatgrass	FALSE	4634865	519964.9	1	3	Yes	Northern	No
Moose Bones Canyon	*Bromus tectorum*	Cheatgrass	FALSE	4634854	520225	1	3	Yes	Northern	No
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634925	520434.4	3	2	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635135	520802.4	3	2	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635012	520701.3	1	2	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635192	520849.2	2	2	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635106	520763	3	2	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634873	520333.4	2	2	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634847	519982.3	2	3	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634843	520205.9	3	3	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634848	520261.2	2	3	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634941	520497.8	2	3	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634966	520543.5	2	3	Yes	Northern	Yes
Moose Bones Canyon	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635011	520571.4	2	3	Yes	Northern	Yes
Moose Bones Canyon	*Carduus nutans*	Musk thistle	TRUE	4634826	520063.3	5	1	Yes	Northern	Yes
Moose Bones Canyon	*Carduus nutans*	Musk thistle	FALSE	4634855	520184.1	1	2	Yes	Northern	Yes
Matate drainage	*Bromus japonicus*	Japanese chess	FALSE	4630861	520486.4	1	3	Yes	Southern	No
Matate drainage	*Bromus japonicus*	Japanese chess	FALSE	4630920	520509.6	1	3	Yes	Southern	No
Matate drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630218	519967.2	2	3	Yes	Southern	Yes
Main Park Road	*Malcolmia africana*	African mustard	FALSE	4635382	518164.7	2	2	No	MPR	Yes
Main Park Road	*Malcolmia africana*	African mustard	FALSE	4635283	518209.4	3	2	No	MPR	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Malcolmia africana*	African mustard	FALSE	4635794	518157.9	2	2	No	MPR	Yes
Main Park Road	*Malcolmia africana*	African mustard	FALSE	4635764	518250.6	2	2	No	MPR	Yes
Main Park Road	*Malcolmia africana*	African mustard	FALSE	4635841	518055.5	2	2	No	MPR	Yes
Main Park Road	*Malcolmia africana*	African mustard	FALSE	4635972	518001.9	2	2	No	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4637816	518060.1	5	1	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4635804	517714.8	5	1	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4636237	518448.3	5	1	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4635475	518174.8	2	2	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4635966	517935	2	2	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4636914	518461.5	1	2	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4637680	518070.9	2	2	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4635427	518192.4	4	2	Yes	MPR	Yes
Main Park Road	*Hyoscyamus niger*	Black henbane	FALSE	4635291	518204.9	3	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4633110	518385.7	5	1	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4632783	518479.6	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4634244	517992	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4637402	518264.5	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4637035	518408.2	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4633666	518104	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4635370	518166	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4638303	518837.5	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4634717	518062.4	2	2	Yes	MPR	Yes
Main Park Road	*Cirsium arvense*	Canada thistle	FALSE	4633879	518001.1	2	2	Yes	MPR	Yes
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635270	518206.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630426	519526.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630786	519172.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630890	519132	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635775	518281	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631522	518846.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630640	519268.9	1	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631103	519061.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634348	517991.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631051	519079.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631479	518888.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635018	518177.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630568	519350.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634962	518184.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630603	519307.2	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630384	519577.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632107	518590.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633994	517964.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634050	517967	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634104	517970.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632160	518571.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631996	518631.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635068	518155.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635475	518169.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633714	518085.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631387	518960	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630530	519395	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635718	518223.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631279	519002.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635419	518180.2	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631329	518985.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630838	519149.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631226	519019.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630737	519196.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630686	519231.2	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635807	517706.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635608	518105.8	1	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635698	518175.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635667	518126.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631432	518928.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630998	519098.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630944	519115.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635835	517875.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630317	519661.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635844	518043.2	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630240	519738.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635814	517761.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631870	518725.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631900	518687.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631941	518656.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631673	518919.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635881	517806.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630495	519439.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635851	517928.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630203	519762.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635183	518184.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631676	518823.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631704	518868.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631164	519040.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632050	518611.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635124	518166.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631568	518814.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630461	519482.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630351	519619.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632211	518554.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630283	519704.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633618	518127.2	1	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635313	518199.9	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631833	518775.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635362	518172.2	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634014	517973.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631800	518819.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633468	518222.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631620	518805.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633240	518320.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633184	518342.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632284	518530.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631759	518856.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636357	518563.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637410	518253.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636490	518650.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637106	518395.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638287	518691.1	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637744	518053.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638211	518479	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638305	518745.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636031	518160	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637635	518088.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637206	518370.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636182	518421.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634498	518042.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634670	518060.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638265	518640.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638025	518067.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638316	518800.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636794	518523.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636544	518648.7	2	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636599	518630.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636649	518610	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638240	518311.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636437	518641.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637049	518396.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638319	518935.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637692	518072.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637460	518221.1	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638307	518855.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637242	518330.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636328	518514.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632903	518452.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633883	517988.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638282	518973.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638253	518586.1	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637857	518053.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636751	518559	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638357	518876	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637967	518064.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637585	518111.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638083	518078.2	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638190	518081.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638230	518182.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638236	518234.1	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637913	518056	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637159	518407.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638134	518097.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638220	518127.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636904	518467.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636317	518511.5	1	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634370	518004.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637655	518093.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636956	518443.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637003	518424.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636830	518515.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635774	518216.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634087	517975.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638235	518362.9	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636847	518499.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637726	518062.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634607	518064.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634148	517979.2	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637562	518137.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637472	518219.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634916	518156.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637781	518058.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636230	518437.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636994	518423.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633939	517968.5	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636945	518444.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636893	518468	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635793	518138.6	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637505	518184.9	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638228	518535.6	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637542	518146.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636097	518361	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635824	517821.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636064	518321.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637352	518267.9	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636285	518466.3	2	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636390	518612.4	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636133	518400.3	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636701	518584	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637294	518292.9	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637913	518061	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636037	518272.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633838	518027.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633652	518100	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635831	518098	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638301	518865.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636770	518552.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637314	518295.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637986	518069	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638372	518910.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633503	518213.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637800	518054.7	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637845	518060	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637161	518403.2	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636342	518556.7	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637055	518408	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638377	518922.5	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636643	518615.9	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638310	518816.1	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635860	517981.9	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4638225	518418.8	2	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636703	518589.8	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4637108	518401.3	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636278	518477.4	1	2	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633563	518169.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633430	518259.4	1	3	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635033	518177.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635397	518173.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633789	518059.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633845	518033.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633891	518001.8	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635871	518015.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635836	517861.6	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634882	518160.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633227	518333.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631806	518823.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631642	518815.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635851	517911.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635844	518085.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631392	518967.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635339	518190.8	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4636017	518213.6	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635848	517740.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630732	519213.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630469	519489.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635827	517812.5	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631590	518816.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635135	518180.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635861	517963.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635448	518186.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631990	518642.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635765	518300.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635784	518236.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631680	518854.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631344	518992	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635711	518216.2	1	3	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635523	518151.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632057	518618	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635792	518184.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635082	518162.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635812	517692.5	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635189	518198.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635687	518164.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635730	518267.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635934	517903.6	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635611	518117	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635240	518211.8	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633380	518295.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635291	518215.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632677	518516.5	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635812	518135.5	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634956	518188.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631287	519008.4	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634819	518123.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634774	518096.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634725	518073.4	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635231	518234.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631194	519042.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630975	519115.6	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634296	517990.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630815	519171.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630922	519133.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630864	519153.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631242	519025.8	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631132	519061.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631082	519078.3	1	3	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4630367	519617.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631023	519099.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631759	518866.8	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632440	518540.7	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631837	518783.1	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4635819	517762.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632766	518494.4	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632573	518541.3	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4632521	518546.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4631482	518901.8	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4634998	518211.6	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633329	518322.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633180	518354.9	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633128	518385.2	1	3	Yes	MPR	No
Main Park Road	*Bromus tectorum*	Cheatgrass	FALSE	4633278	518325.6	1	3	Yes	MPR	No
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4637635	518094	4	1	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4637922	518062	3	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4637827	518053	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638295	518939.8	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638259	518649.5	1	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638376	518904.9	1	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638226	518270.6	3	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635194	518183	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635864	518001	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638304	518767.2	4	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638221	518525.8	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638229	518285.1	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632798	518495.2	3	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638309	518759.8	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635727	518261.6	2	2	Yes	MPR	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635835	517838.5	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638227	518383.6	3	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635800	517699.4	2	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638246	518588.3	3	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4637825	518061.6	3	2	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632920	518461.8	2	3	Yes	MPR	Yes
Main Park Road	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4638307	518883	1	3	Yes	MPR	Yes
Main Park Road	*Convolvulus arvensis*	Field bindweed	FALSE	4631076	519081.6	3	2	Yes	MPR	Yes
Main Park Road	*Convolvulus arvensis*	Field bindweed	FALSE	4631304	519002.3	2	2	Yes	MPR	Yes
Main Park Road	*Convolvulus arvensis*	Field bindweed	FALSE	4631234	519029.3	4	2	Yes	MPR	Yes
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4631933	518671.3	2	1	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	TRUE	4636327	518533.5	5	1	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635838	517888.2	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635826	517836.5	2	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4633103	518399.7	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4637092	518402.3	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4633306	518325.1	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635818	517781.2	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4636994	518428.7	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635809	517725.9	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4637151	518406.8	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635817	517671.5	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635834	518078.5	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4636374	518597.5	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635929	517892.7	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635211	518215.8	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4638213	518515.9	2	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635484	518171	2	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635846	517991.3	2	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4632769	518486.1	2	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4638300	518728.6	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635736	518273.2	1	2	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635671	518139	1	3	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635722	518243.6	1	3	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635700	518192.6	1	3	Yes	MPR	No
Main Park Road	*Descurainia sophia*	Flixweed	FALSE	4635741	518293.2	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631959	518646.9	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4630469	519473	2	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635685	518152.4	2	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635146	518175	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631618	518971.9	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635227	518226.6	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631820	518792.3	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635256	518205.7	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635774	518237.2	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634979	518188	2	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631002	519106.3	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635924	517883.5	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632247	518542.7	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634558	518060.2	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634876	518150.6	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634749	518067.5	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633548	518157	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634221	517970.3	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633964	517964.3	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633881	517999.1	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634400	518007.5	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635308	518203.7	3	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633375	518287.2	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635583	518113.9	2	2	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4630232	519741.1	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635408	518173.7	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635202	518195	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634275	517979.1	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635461	518175.2	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634831	518122.6	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632322	518519.9	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634929	518166.1	2	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635434	518191.1	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632441	518531.1	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631210	519037.1	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634631	518060.9	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4630874	519151.6	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632376	518517.3	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632038	518616	1	2	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635145	518182.7	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635093	518164.5	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632031	518627.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631979	518646.5	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635194	518205.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635043	518172	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633870	518015.8	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632853	518470.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631678	518844.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632401	518530.2	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632297	518533.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632207	518563.5	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633572	518161.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632914	518454.2	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634116	517977.9	1	3	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633625	518123.4	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633355	518313.9	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633240	518331	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635354	518175.1	3	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633297	518325.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631746	518872.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633488	518223.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633111	518394.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633674	518100.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633956	517973	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634003	517972.9	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633443	518250.3	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632537	518545.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4632350	518526.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634065	517974.8	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635254	518212.9	2	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4635305	518210.8	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634327	517992.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4633826	518043.2	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634174	517979.7	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634947	518182.9	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634225	517982.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634276	517985.1	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634901	518165.5	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4631791	518844.2	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4630941	519128.5	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634486	518039	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634427	518020	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634852	518145.6	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634376	518004.8	1	3	Yes	MPR	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634763	518089.4	1	3	Yes	MPR	No
Main Park Road	*Bromus japonicus*	Japanese chess	FALSE	4634810	518116.8	1	4	Yes	MPR	No
Main Park Road	*Carduus nutans*	Musk thistle	FALSE	4637442	518251.8	1	2	Yes	MPR	Yes
Main Park Road	*Elymus repens*	Quackgrass	FALSE	4638167	518099.3	1	2	Yes	MPR	Yes
Main Park Road	*Elymus repens*	Quackgrass	FALSE	4637169	518409.5	3	2	Yes	MPR	Yes
Main Park Road	*Elymus repens*	Quackgrass	FALSE	4637512	518183.9	2	2	Yes	MPR	Yes
Main Park Road	*Elymus repens*	Quackgrass	FALSE	4638031	518074.5	3	2	Yes	MPR	Yes
Main Park Road	*Elymus repens*	Quackgrass	FALSE	4638209	518106.3	2	2	Yes	MPR	Yes
Main Park Road	*Bassia sieversiana*	Summer-cypress	FALSE	4633582	518143.5	2	2	Yes	MPR	Yes
Main Park Road	*Bassia sieversiana*	Summer-cypress	FALSE	4637306	518293.2	2	2	Yes	MPR	Yes
Main Park Road	*Cardaria sp.*	whitetop	FALSE	4632584	518537.3	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4635224	518219.3	5	1	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4633506	518183.1	5	1	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4635988	518078.7	5	1	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4632024	518632.6	5	1	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634288	517988.5	3	1	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634927	518172.8	5	1	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634381	518000.2	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634541	518048.2	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634398	518013.4	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4635160	518173.3	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634489	518031.6	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630206	519749.7	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4636668	518602.8	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634596	518057.6	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634703	518058.5	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630509	519423.2	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4635213	518198.1	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4634648	518053.5	2	2	Yes	MPR	Yes
Main Park Road	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4636687	518598.5	1	2	Yes	MPR	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631074	521475.5	1	2	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630743	521895.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630512	522076.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630462	522169.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630769	522419.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630769	522475.4	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630200	522012.5	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631288	521408.7	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630806	521844.4	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630910	521628.7	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630556	522037.6	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630707	521956.1	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630872	522450.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630506	522194.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631339	521423.4	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630283	521981	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630770	522305.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630878	521753.4	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630776	522362.9	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630330	522023.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630165	522054.6	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630904	522390.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630639	522315.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630617	522022.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630845	521796.6	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630658	521983.5	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631454	521422.6	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630234	521960.5	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631400	521404.4	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631275	521464.1	1	3	Yes	Trail	No

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630822	522467.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4630694	522307	2	3	Yes	Trail	No
Historic Quarry Trail	*Bromus tectorum*	Cheatgrass	FALSE	4631450	521501.3	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630186	522034.5	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630526	522062.4	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630195	521975.7	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630480	522098.1	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630157	522081.8	2	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630250	521942	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630430	522124.2	1	3	Yes	Trail	No
Historic Quarry Trail	*Bromus japonicus*	Japanese chess	FALSE	4630575	522028.8	1	3	Yes	Trail	No
Historic Quarry Trail	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630240	521952.6	2	3	Yes	Trail	Yes
Historic Quarry Trail	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630185	521989	2	3	Yes	Trail	Yes
Historic Quarry Trail	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630172	522043.2	2	3	Yes	Trail	Yes
Historic Quarry Trail	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630147	522098.4	2	3	Yes	Trail	Yes
Fossil Butte south drainage	*Cirsium arvense*	Canada thistle	FALSE	4630546	519791.5	3	2	Yes	Southern	Yes
Fossil Butte middle drainage	*Bromus tectorum*	Cheatgrass	FALSE	4631968	520364.6	1	2	Yes	Southern	No
Fossil Butte middle drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631772	519736.6	1	1	Yes	Southern	Yes
Fossil Butte middle drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631812	520142.1	2	2	Yes	Southern	Yes
East Red Hill drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630753	521705	2	2	Yes	Southern	Yes
East Red Hill drainage	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630625	521768.3	2	2	Yes	Southern	Yes
East Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630604	521767.1	1	3	Yes	Southern	No
East Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630441	521801.7	1	3	Yes	Southern	No
East Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630487	521778.2	1	3	Yes	Southern	No
East Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630546	521764.4	1	3	Yes	Southern	No
East Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630711	521759.2	1	3	Yes	Southern	No
East Red Hill drainage	*Bromus japonicus*	Japanese chess	FALSE	4630657	521772	1	3	Yes	Southern	No
East Red Hill drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630414	521795.6	2	2	Yes	Southern	Yes
East Red Hill drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630676	521778.4	2	2	Yes	Southern	Yes
East Red Hill drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630254	521755.8	2	2	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
East Red Hill drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630723	521750.1	2	2	Yes	Southern	Yes
East Red Hill drainage	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630200	521762.4	2	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631760	519562.3	1	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631996	519547.6	3	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632057	519511.3	2	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631524	519631.4	3	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631850	519554.9	2	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632360	519766.4	2	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633101	520283.1	2	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632134	519504.4	2	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633534	520800.1	3	2	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631587	519601.4	1	3	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631696	519564.7	1	3	Yes	Southern	Yes
East Fork Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632178	519530.3	2	3	Yes	Southern	Yes
Cundick Ridge Road	*Descurainia sophia*	Flixweed	TRUE	4634928	519454.4	5	1	Yes	Road	No
Chicken Creek Nature Trail	*Cirsium arvense*	Canada thistle	FALSE	4635151	518794.2	3	2	Yes	Trail	Yes
Chicken Creek Nature Trail	*Bromus tectorum*	Cheatgrass	FALSE	4635074	518639.3	1	2	Yes	Trail	No
Chicken Creek Nature Trail	*Bromus tectorum*	Cheatgrass	FALSE	4635159	518849.3	1	2	Yes	Trail	No
Chicken Creek Nature Trail	*Bromus tectorum*	Cheatgrass	FALSE	4635235	518914.3	1	3	Yes	Trail	No
Chicken Creek Nature Trail	*Bromus tectorum*	Cheatgrass	FALSE	4635153	518786.2	1	3	Yes	Trail	No
Chicken Creek Nature Trail	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635387	518640.1	2	2	Yes	Trail	Yes
Chicken Creek Nature Trail	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635002	518364.6	3	2	Yes	Trail	Yes
Chicken Creek Nature Trail	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635032	518336.5	3	2	Yes	Trail	Yes
Chicken Creek Nature Trail	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635071	518555.8	2	2	Yes	Trail	Yes
Chicken Creek Nature Trail	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635050	518292.4	2	2	Yes	Trail	Yes
Chicken Creek Nature Trail	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635380	518481.5	2	3	Yes	Trail	Yes
Chicken Creek Nature Trail	*Descurainia sophia*	Flixweed	TRUE	4635070	518632.3	1	1	Yes	Trail	No
Chicken Creek Nature Trail	*Descurainia sophia*	Flixweed	FALSE	4635144	518790.4	1	2	Yes	Trail	No
Chicken Creek Nature Trail	*Descurainia sophia*	Flixweed	FALSE	4635384	518775.7	2	2	Yes	Trail	No
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4632419	518921.2	2	2	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4635159	518299	2	2	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4635015	518267.3	3	2	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4635284	518399.1	1	2	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4630762	519612.7	2	2	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4635506	518452.1	1	3	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4634770	518270.1	1	3	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4634960	518262.3	1	3	Yes	Southern	Yes
Chicken Creek	*Cirsium arvense*	Canada thistle	FALSE	4635447	518468.4	1	3	Yes	Southern	Yes
Chicken Creek	*Bromus tectorum*	Cheatgrass	FALSE	4635652	518463.4	1	3	Yes	Southern	No
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	TRUE	4636071	518641	5	1	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634889	518251.1	3	1	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632233	518995.7	2	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635018	518278.4	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633446	518295	2	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633806	518091.5	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635100	518277.1	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634699	518264.5	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634591	518253	2	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633756	518130.4	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631899	519213.6	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634641	518257.2	1	2	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632731	518729.8	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631800	519266.4	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631743	519294	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632867	518617.6	3	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632798	518648.6	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631860	519237.5	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631985	519233.7	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632040	519240.2	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632125	519147.9	2	3	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632192	519060	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632767	518692.7	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634137	518038.2	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630261	519868.3	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631077	519618.9	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633521	518255.8	3	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634085	518038.4	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634004	518001.1	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633381	518359.2	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633324	518421.5	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633263	518446.1	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633206	518484.9	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633159	518502.8	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634529	518252.3	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634478	518220.5	3	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633689	518174.3	3	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630421	519829.4	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633588	518207.3	3	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634201	518064	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630905	519600.9	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635520	518453.2	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632694	518767.6	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635474	518459.8	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635309	518412.2	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635261	518392.4	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633639	518189	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634968	518260	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630619	519702.3	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630308	519830.1	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631025	519621.6	2	3	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631656	519393.6	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634827	518261.7	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634778	518273	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630657	519648	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630713	519628.6	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630526	519760.3	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630364	519832.3	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630473	519794	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630574	519735.4	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630792	519590.8	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631277	519632	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631503	519515.4	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630849	519585.9	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4635425	518470.4	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631623	519433.9	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631589	519470.8	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631135	519650.4	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631709	519335.9	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632161	519101	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631186	519638.4	1	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4630963	519614.5	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631553	519504	2	3	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634354	518115.2	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634303	518104.2	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634400	518153.4	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632367	518906.4	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632421	518914.8	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633104	518523.9	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632315	518917.6	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632938	518569	1	4	Yes	Southern	Yes

Appendix A, cont. Exotic plant patches detected on monitoring routes at Fossil Butte NM, June 26–29, 2021.

Plot ID	Species	Common Name	Pulled	N Coord	E Coord	Cover Class	Size Class	Priority?	Grouping	Historic species
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4633051	518543.3	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631464	519549.5	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631417	519569.9	3	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634252	518081.1	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4634440	518186.9	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631329	519624.7	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632990	518568.1	1	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4631370	519592.9	2	4	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632467	518894.4	2	5	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632562	518850.2	3	5	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632648	518793.4	3	5	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632610	518828.6	3	5	Yes	Southern	Yes
Chicken Creek	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4632514	518868.6	3	5	Yes	Southern	Yes
Chicken Creek	*Descurainia sophia*	Flixweed	FALSE	4632307	518933.7	1	2	Yes	Southern	No
Chicken Creek	*Descurainia sophia*	Flixweed	FALSE	4633410	518331.7	2	2	Yes	Southern	No
Chicken Creek	*Descurainia sophia*	Flixweed	FALSE	4632999	518565.7	1	2	Yes	Southern	No
Chicken Creek	*Melilotus officinalis*	Yellow sweet-clover	FALSE	4630210	519894.7	2	3	Yes	Southern	Yes
Bullpen Two Track	*Bromus tectorum*	Cheatgrass	FALSE	4637192	518417.2	1	3	Yes	Road	No
Bullpen Two Track	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4637539	518823.3	3	2	Yes	Road	Yes
Bullpen Two Track	*Alopecurus arundinaceus*	Creeping foxtail	FALSE	4637479	518602.1	2	2	Yes	Road	Yes
Bullpen Two Track	*Descurainia sophia*	Flixweed	FALSE	4637569	518909.6	1	2	Yes	Road	No

Appendix B. Detected exotic plant cover in transects at Fossil Butte NM, June 26–29, 2021.

Route	Transect	E Coord	N Coord	Species	Common Name	Alive?	Average Cover
Chicken Creek	47	519849.2	4630356	*Alopecurus arundinaceus*	Creeping foxtail	Y	0.166667
Chicken Creek	50	519435.4	4631617	*Alopecurus arundinaceus*	Creeping foxtail	Y	0.166667
Chicken Creek	55	518221	4633578	*Alopecurus arundinaceus*	Creeping foxtail	Y	3.333333
Chicken Creek	56	518012	4634011	*Alopecurus arundinaceus*	Creeping foxtail	Y	0.333333
Chicken Creek	57	518206.1	4634457	*Alopecurus arundinaceus*	Creeping foxtail	Y	16.66667
North Dam Fork Chicken Creek	112	519168.6	4633035	*Alopecurus arundinaceus*	Creeping foxtail	Y	0.166667
Smallpox Creek	123	518856	4630765	*Alopecurus arundinaceus*	Creeping foxtail	Y	0.333333
Main Park Road	10	517976.3	4634245	*Bromus japonicus*	Japanese chess	Y	0.166667
Main Park Road	11	518067.9	4634735	*Bromus japonicus*	Japanese chess	Y	0.166667
Main Park Road	30	518470.2	4632872	*Bromus japonicus*	Japanese chess	Y	0.166667
Main Park Road	33	517988	4634247	*Bromus japonicus*	Japanese chess	Y	0.333333
Main Park Road	34	518079.4	4634735	*Bromus japonicus*	Japanese chess	Y	0.166667
Main Park Road	35	518193.2	4635164	*Bromus japonicus*	Japanese chess	Y	0.166667
Historic Quarry Trail	96	522460.6	4630875	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	1	519646.1	4630336	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	2	519259.6	4630654	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	3	519059.4	4631110	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	5	518675.9	4631913	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	6	518523.2	4632384	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	13	518119.6	4635657	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	14	518037.7	4635864	*Bromus tectorum*	Cheatgrass	Y	0.5
Main Park Road	16	518234.9	4636027	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	22	518524.8	4638214	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	23	518922.6	4638360	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	26	519071.2	4631112	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	31	518319.9	4633343	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	32	518069.3	4633772	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	35	518193.2	4635164	*Bromus tectorum*	Cheatgrass	Y	0.5
Main Park Road	36	518120.2	4635622	*Bromus tectorum*	Cheatgrass	Y	0.333333
Main Park Road	37	518077.8	4635848	*Bromus tectorum*	Cheatgrass	Y	0.5
Main Park Road	39	518224.4	4636011	*Bromus tectorum*	Cheatgrass	Y	0.166667

Appendix B. Detected exotic plant cover in transects at Fossil Butte NM, June 26–29, 2021.

Route	Transect	E Coord	N Coord	Species	Common Name	Alive?	Average Cover
Main Park Road	43	518097.2	4637645	*Bromus tectorum*	Cheatgrass	Y	0.166667
Smallpox Creek	122	518671.2	4631170	*Bromus tectorum*	Cheatgrass	Y	0.166667
Main Park Road	14	518037.7	4635864	*Malcolmia africana*	African mustard	Y	0.166667

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.

NPS 174/185233, September 2022

National Park Service
U.S. Department of the Interior

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