

Federal Docket No. FWS-R6-ES-2019-0085

90-DAY FINDING ON THREE PETITIONS TO LIST THE YELLOWSTONE BISON AS THREATENED OR ENDANGERED UNDER THE ENDANGERED SPECIES ACT

Petitioned action being requested:

- ☒ List as an Endangered or a Threatened species
☐ Reclassify (uplist) from a Threatened to an Endangered species

Petitioned entity:

- ☐ Species
☐ Subspecies
☒ DPS of vertebrates
☐ Subset of listed entity (species, subspecies, DPS, etc.)

Background

Section 4(b)(3)(A) of the Endangered Species Act (Act) requires that we make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. Our standard for substantial scientific or commercial information within the Code of Federal Regulations (CFR) with regard to a 90-day petition finding is "information in support of the petition's claims such that a reasonable person conducting an impartial scientific review would conclude that the action proposed in the petition may be warranted" (50 CFR 424.14(h)(1)(i)).

Petition History

On November 14, 2014, we received a petition dated November 13, 2014, from Western Watersheds Project and Buffalo Field Campaign, requesting that Plains bison in and around Yellowstone National Park (YNP bison) be listed as threatened or endangered under the Act (first petition). The first petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(c). On March 2, 2015, we received a petition from James Horsley, which also requested that YNP bison be listed as threatened or endangered under the Act (second petition). We published a single finding for both petitions, concluding that the petitions did not provide substantial scientific or commercial information indicating that the petitioned action may be warranted (81 FR 1368, January 12, 2016). On September 26, 2016, petitioners from the first petition as well as a third party (Friends of Animals) brought suit under the Endangered Species Act and the Administrative Procedure Act asserting that our determination was arbitrary and capricious. An additional petition from James Horsley was filed in 2017, but was not accepted by the Service because it did not meet requirements to coordinate with the State agencies. On January 31, 2018, the United States District Court for the District of Columbia (Court) remanded the case for the Service to conduct a new 90-day finding. The Court found that the Service simply adopted White and Wallen's conclusion that "maintenance of subpopulation genetic differentiation and overall genetic diversity may not be crucial for preserving genes" and that the Service therefore need not maintain two subpopulations." (Memorandum Opinion, p. 10). The Court found that the Service

did not provide an explanation for why conclusions from Halbert *et al.* (2012) that the two YNP herds (central and north) each need a population large enough to ensure that each herd can survive were not accepted. This finding addresses this topic.

On March 16, 2018, we received a new petition dated February 28, 2018, from James Horsley, which requested emergency listing for YNP bison (third petition). This petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(c). Because the Act does not provide for petitions to emergency list, we are considering it as a petition to list YNP bison. However, we did consider the immediacy of possible threats to the species and whether emergency listing may be necessary at this time. We reviewed the information presented in the third petition and did not find that it warranted an emergency listing because population trends for YNP bison remain stable, despite intensive culling.

This finding addresses both the first and second petitions (from the 90-day finding remanded on January 31, 2018) and the third petition (received March 16, 2018). The second petition is also included in full in the third petition.

Evaluation of Three Petitions to List the YNP Bison as an Endangered or a Threatened Species Under the Act

Species and Range

Does the petition identify an entity that may be eligible for listing (i.e., is the entity a species, subspecies, or DPS)?

☒ Yes

☐ No

If yes, list common name (scientific name); and describe the current and historical range of the species.

Plains bison (population of *Bison bison bison*); in and around YNP. referred to as YNP bison

Historical Range: approximately 7,720 square miles (mi²) (20,000 square kilometers (km²) in and around YNP

Current Range: approximately 1,226 (mi²) (3,175 km²) in and around YNP

Bison taxonomy is controversial at both the species and subspecies level (Wilson and Ruff 1999, p. 342; Reynolds *et al.* 2003, p. 1009). Some experts assert that bison should be returned to the genus *Bos*, which includes domestic cattle (Halbert 2003, p. 2; Douglas *et al.* 2011, p. 173). Others assert that bison should remain in its current genus *Bison* (Reynolds *et al.* 2003, p. 1010; Gates *et al.* 2010, p. 15; IUCN 2017).

There is similar debate at the subspecies level. Some experts recommend that subspecies differentiation between wood bison (*Bison bison athabascæ*) and Plains bison (*Bison bison bison*) be removed (Halbert 2003, p. 11; Douglas *et al.* 2011, p. 167; Cronin *et al.* 2013, p. 8).

Others recognize subspecies differentiation (Meagher 1986, p. 1; Boyd 2003, p. 32; Reynolds *et al.* 2003, p. 1010; Freese *et al.* 2007, p. 176; Hedrick 2009, p. 411; Gates *et al.* 2010, pp. 15–18; Aune *et al.* 2017, p. 2; IUCN 2017).

We will continue to designate Plains bison as *Bison bison bison* until further research reconciles molecular, behavioral, and morphological evidence and a change in genus and/or subspecies is supported by an expert group such as the American Society of Mammalogists or the American Bison Specialist Group of IUCN (Reynolds *et al.* 2003, p. 1010; Gates *et al.* 2010, pp. 15–18).

DPS: All petitions provide substantial information indicating that YNP bison may be a distinct population segment (DPS), living in a single population with at least two breeding herds (Plumb *et al.* 2009, p. 2385; Geremia *et al.* 2014, p. 348). Additional sources cited by the petitioners and present in our files note that YNP bison may be discrete from other populations of Plains bison due to geographical and physical isolation, and may be significant due to the absence of cattle gene introgression and their origin in part from the last remaining wild Plains bison (USDOI and USDA 2000, p. 3; Halbert 2003, p. 130; Fuller *et al.* 2007, p. 1930; Halbert and Derr 2008, p. 4975; Halbert *et al.* 2012, p. 1; Pérez-Figueroa *et al.* 2012, p. 160; White *et al.* 2015, p. 120).

The second and third petitions recommend that YNP bison be further subdivided into two DPSs (central herd and northern herd) based on the assertion that the two herds are discrete due to isolation from each other during the breeding season (Olexa and Gogan 2005, p. 1536; Gardipee 2007, p. 9; Halbert *et al.* 2012, p. 7), and significant due to the contention that the central herd is more migratory and descends from wood bison (Rhodes 1897; Skinner and Kaisen 1947; Meagher 1973; Halbert and Derr 2008; Jackson 2011; Pringle 2011; Forgacs *et al.* 2016).

Information present in our files regarding discreteness shows that there is exchange of breeding bison between the central and northern herds (Fuller *et al.* 2007, p. 1925; White and Wallen 2012, p. 751; Geremia *et al.* 2014, p. 353; Forgacs *et al.* 2016, p. 2). Information present in our files regarding significance indicates that winter migration out of YNP appears to be a relatively new phenomena, beginning during the severe winter of 1975/1976 (Meagher 1989, p. 670). Winter migration is likely dependent on severity of the winter and bison density (Gates *et al.* 2005, p. 17; Fuller *et al.* 2007, pp. 1930–1931; Plumb *et al.* 2009, pp. 2382, 2384–2385; Geremia *et al.* 2014, p. 359; White *et al.* 2015, p. 79). Lastly, with regard to significance, recent bison literature overwhelmingly supports a delineation between the ranges of wood bison and Plains bison that is far to the north of YNP, through northern Alberta, northeastern British Columbia, and northwestern Saskatchewan (Boyd 2003, p. 22; Freese *et al.* 2007, p. 176; Hedrick 2009, p. 411; Gates *et al.* 2010, p. 7; Cronin *et al.* 2013, p. 1; Forgacs *et al.* 2016, p. 3; Aune *et al.* 2017, p. 2).

Older references cited in the second and third petitions (Rhodes 1897; Skinner and Kaisen 1947) regarding possible wood bison ancestry in YNP are not supported by more recent investigations. The third petition cites Halbert and Derr (2008), Jackson (2011), Pringle (2011), and Forgacs *et al.* (2016) as evidence of recent support for the assertion that the central herd descends from wood bison. However, our conclusions from these same citations do not support

the assertion of the petitioner. Halbert and Derr (2008) discuss genetic variation in bison, but make no statements regarding wood bison in YNP. Jackson (2011) is an email exchange between the petitioner and a retired employee from YNP that provides no evidence beyond an offhand personal opinion. Pringle (2011) differentiates between the two herds, but makes no mention of wood bison ancestry in the central herd. Forgacs *et al.* (2016, p. 1) describe two distinct lineages of YNP bison—one representing descendants of the estimated 22 indigenous bison remaining in central YNP in 1902, the other representing descendants of 18 females introduced from northern Montana, three bulls from Texas, and three calves from the central herd—without any mention of either lineage descending from wood bison. Moreover, Forgacs *et al.* (2016, p. 2) note that wood bison are phenotypically distinct from Plains bison and historically limited to Canada and Alaska. Lastly, although Meagher (1973, p. v) asserts that the central herd derives from wood bison, later work by Meagher notes that the indigenous bison remaining in YNP by the early 20th century were remnants of the original herds of bison in the Great Plains (Dobson and Meagher 1996, p. 1027). Therefore, the Service does not support the assertion that a strain of wood bison exists in the central herd.

We conclude that there is substantial information supporting a potential designation of YNP bison as a single DPS of the Plains bison subspecies. Within the YNP bison DPS, there are two lineages, generally distinguished as follows: (1) the central herd, which includes descendants of the estimated 22 indigenous Plains bison remaining in YNP in 1902, and (2) the northern herd, which includes descendants of Plains bison introduced in 1902 to develop a second herd in YNP, including 18 females from northern Montana, three bulls from Texas, and three calves from the central herd (Halbert 2003, p. 130; Forgacs *et al.* 2016, p. 1). However, the two herds have intermixed seasonally since 1915, and the central herd was augmented with 71 bison from the northern herd in 1936 (Meagher 1973, p. 31; Fuller *et al.* 2007, p. 1925; White and Wallen 2012, p. 751; Geremia *et al.* 2014, p. 353; White *et al.* 2015, p. 124; Forgacs *et al.* 2016, pp. 2 and 10). Therefore, we do not support further subdividing the YNP bison DPS.

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an “endangered species” or a “threatened species.” The Act defines an endangered species as a species that is “in danger of extinction throughout all or a significant portion of its range.” and a threatened species as a species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The Act requires that we determine whether any species is an “endangered species” or a “threatened species” because of any of the following factors:

- (A) The present or threatened destruction, modification, or curtailment of its habitat or range;
- (B) Overutilization for commercial, recreational, scientific, or educational purposes;
- (C) Disease or predation;
- (D) The inadequacy of existing regulatory mechanisms; or
- (E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species’ continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as

well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term “threat” to refer in general to actions or conditions that may be, or are reasonably likely to negatively affect, individuals of a species. The term “threat” includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term “threat” may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species may meet the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species may meet either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level.

Information in the Petition

Factor A—Present or threatened destruction, modification, or curtailment of the species’ habitat or range

1. Do the petitioners claim the entity warrants listing because of the present or threatened destruction, modification, or curtailment of the species’ habitat or range?

☒ Yes

☐ No

- a. If the answer to 1 is yes:

Identify the activity(ies) that the petitioners claim result(s) in present or threatened destruction, modification, or curtailment of the species’ habitat or range such that listing may be warranted.

- Range curtailment
- Livestock grazing
- Development and infrastructure
- Invasive species

- b. If the answer to 1 is yes:

Do the sources cited in the petitions provide substantial information to support the claim? Include consideration of existing regulatory mechanisms or conservation efforts identified in the petitions or from other readily available information that may ameliorate the threats.

☐ Yes

☒ No

Range curtailment

All petitions note that YNP bison now occupy approximately 1,226 mi² (3,175 km²), which is about 16 percent of their historic range in and around YNP (Plumb *et al.* 2009, pp. 2377–2378). Most YNP bison exhibit seasonal migration between winter and summer ranges (Meagher 1989, p. 670; Plumb *et al.* 2009, p. 2382). Many YNP bison from both the northern and central herds migrate across the north boundary of YNP in late February and March in response to snow conditions, available forage, and bison density; other YNP bison from the central herd migrate across the west boundary in April and May to calve (White *et al.* 2015, pp. 78–79). Migration back into YNP typically occurs April through June (White *et al.* 2015, p. 78).

All petitions assert that the range of YNP bison is curtailed by the Interagency Bison Management Plan (IBMP), which limits winter movement of YNP bison beyond the northern and western boundaries of YNP through both lethal (culling and hunting) and non-lethal (hazing and quarantine) measures. These actions are taken to control the potential spread of brucellosis from YNP bison to cattle grazing on public and private lands adjacent to YNP (see factor C for further discussion of brucellosis). The third petition acknowledges that there is some tolerance of YNP bison that migrate across the western boundary to calve in Hebgen Basin.

We recognize that range curtailment due to the loss of migration routes and the lack of tolerance for bison beyond YNP boundaries has occurred. Furthermore, management actions such as culling, hunting, and hazing taken by the IBMP to control the potential spread of brucellosis from YNP bison to cattle grazing on adjacent lands may exacerbate impacts from range curtailment. However, recent population estimates for YNP bison do not support an assertion that listing may be warranted due to range curtailment. The historical population estimate of YNP bison was approximately 1,000 animals; estimates from 1870–1890 were 500 animals or less (Meagher 1973, p. 17; Keigley 2018, p. 400). The most recent estimate for YNP bison is 4,527 animals—3,337 in the northern herd and 1,190 in the central herd (U.S. National Park Service 2018a). YNP bison have increased over the past few decades to levels that have no historical precedent (Keigley 2018, p. 399). Furthermore, Plumb *et al.* (2009, p. 2377) estimated total carrying capacity for YNP bison at 6,200; specifically, 2,400 for the northern herd and 3,800 for the central herd. White *et al.* (2015, pp. 78–79) had a similar estimate for carrying capacity of 5,500–7,500 bison park-wide. Consequently, carrying capacity may have already been exceeded for the northern herd, and recent estimates of 5,500 YNP bison in 2016 (Geremia *et al.* 2016, p. 1) match the lower limits of estimated carrying capacity park-wide. Bison populations above carrying capacity would likely lead to more bison migrating out of YNP during the winter and consequently, more rigorous winter culling.

The Court's Memorandum Opinion notes that Halbert *et al.* (2012) calls into question the 3,000 population target set by the IBMP for the entire herd by indicating that each of the two herds in YNP need a population large enough to

ensure that herd's individual survival, and also notes that since other studies have suggested approximately 3,000 bison are needed to ensure survival of a herd, a population target of 3,000 for both herds is too low to ensure that each herd will survive (Memorandum Opinion, p. 10). However, Halbert *et al.* (2012) does not recommend specific herd sizes; instead, the study recommends that a population viability analysis be conducted (Halbert *et al.* 2012, p. 9). The third petition suggests that the minimum viable population (MVP) is 7,000 bison for each herd, or 14,000 total bison, based on a study of MVPs for vertebrates. An MVP of 14,000 YNP bison is approximately twice the estimated carrying capacity for bison in YNP.

A wide range of MVP estimates have been derived specifically for bison in YNP including: a minimum of 1,000 (Dratch and Gogan 2010, p. vii), 1,000–2,000 (Jones and Roffe 2008, p. 8), 2,000 (Freese *et al.* 2007, p. 180), 2,000–3,000 (Hedrick 2009, p. 419), and 2,500–4,500 (Plumb *et al.* 2009, p. 2385). These MVP estimates are all less than YNP's carrying capacity for bison. A reasonable and scientifically defensible herd size for YNP bison should be less than carrying capacities for individual herds as well as less than the estimated carrying capacity park-wide. Furthermore, recent population estimates for YNP bison, which are more than 4X greater than historical estimates, do not support an assertion that listing may be warranted due to range curtailment. Therefore, we do not agree with the third petition's recommendation that 7,000 bison for each herd, or 14,000 total bison is an appropriate population goal for YNP.

Livestock grazing

All petitions assert that livestock grazing on public and private lands adjacent to YNP directly (through competition for food resources and disease transmission) and indirectly (through altered vegetation and developments associated with grazing such as fencing) impact YNP bison. The primary concern of the petitions is disease risk management under the IBMP, which the petitions assert is carried out to protect the livestock industry rather than protecting YNP bison. We address impacts related to management under the IBMP in Range curtailment and in other factors. We address disease issues under factor C. In this discussion of livestock grazing, we only consider impacts from direct competition with livestock and the associated development.

The third petition notes that in 2015, in Gardiner Basin along the northern boundary of YNP, an estimated 186 cattle grazed public allotments and 87 cattle grazed private land. Similarly, in Hebgen Basin along the western boundary of YNP, an estimated 140 cattle grazed on public allotments and 1,099 cattle grazed private land. Therefore, approximately 1,500 cattle may seasonally compete for forage with YNP bison that migrate beyond YNP boundaries. The IBMP uses risk management—including hazing, quarantine, and culling—to maintain spatial and temporal separation between YNP bison and nearby cattle (White *et al.* 2011, p. 1325). Therefore, direct competition between YNP bison and cattle is likely

rare. The petitions and the sources cited do not present substantial information suggesting that direct competition for forage and associated development from 1,500 cattle grazing outside the northern and western boundaries of YNP adversely impact YNP bison.

Development and infrastructure

The first petition states that the historic range of the bison has changed due to cultivation, cattle ranching, commercial bison ranching, natural resource extraction, and urban expansion (Boyd and Gates 2006, p. 16).

This citation describes habitat conditions for Plains bison rangewide, but does not specifically address YNP bison. The first petition also lists a number of new residential areas as well as the current bison capture and quarantine facility that lay outside YNP, but within IBMP management zones. These land use changes occurred outside of YNP and information concerning the extent to which this development is posing a threat to the YNP bison was not found within the petition or the sources it cites.

Invasive species

The first petition notes that non-native plants can alter native plant communities and soil properties, thereby impacting ungulate foraging. A number of non-native plants found in YNP were mentioned in the petition. However, only leafy spurge (*Euphorbia esula*) was cited as having a negative impact on bison by reducing the forage value of Plains bison habitat in North Dakota (DiTomaso 2000, p. 257). The petition and the sources cited do not provide information regarding the extent to which this plant or others mentioned are a threat to YNP bison.

In summary, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating that listing the YNP bison may be warranted due to the present or threatened destruction, modification, or curtailment of the species' habitat or range.

Factor B—Overutilization for commercial, recreational, scientific, or educational purposes

2. Do the petitioners claim the entity warrants listing because of overutilization for commercial, recreational, scientific, or educational purposes?

☒ Yes

☐ No

- a. If the answer to 2 is yes:

Identify the purpose(s) for which the petitioners claim the entity is being overutilized such that listing may be warranted (check all that apply):

☒ Commercial

☒ Recreational

☒ Scientific

☐ Educational

☐ Other:

b. If the answer to 2 is yes:

Do the sources cited in the petitions provide substantial information to support the claim? Include consideration of existing regulatory mechanisms or conservation efforts identified in the petition or from other readily available information that may ameliorate the threats.

☐ Yes

☒ No

Commercial

All petitions assert that the general health and genetic viability of YNP bison may be degraded by winter culling conducted for commercial purposes (to support the livestock industry) under the guidance of the IBMP (Dobson and Meagher 1996, p. 1034; Treanor *et al.* 2015, p. 3795). Large numbers of YNP bison have been culled in recent years. For example, 1,560 YNP bison were culled in the winter of 2007/2008, more than 1,200 in the winter of 2016/2017, and an estimated 1,155 in the winter of 2017/2018 (White *et al.* 2015, p. 17; Geremia *et al.* 2016, p. 1; Greenwire 2018). The intent of winter culling of YNP bison is to minimize the risk of brucellosis transmission to domestic cattle grazing outside of YNP (USDOI and USDA 2000, p. 6; Nishi 2010, pp. 21–22; White *et al.* 2011, pp. 1324–1325) (see factor C for further discussion of brucellosis). Additionally, there are political and social concerns regarding Plains bison outside of YNP due to human safety, property damage, and livestock competition (White *et al.* 2015, p. 17; U.S. National Park Service 2018b, p. 1). The petitions contend that minimizing the risk of disease transmission is not accomplished because there are no management actions taken regarding elk (*Cervus canadensis*), which also carry and transmit the disease (Dobson and Meagher 1996, p. 1031; White *et al.* 2015, p. 143; Kamath *et al.* 2016, pp. 2, 4; Brennan *et al.* 2017, p. 11; O'Brien *et al.* 2010, p. 342). The first petition cites Halbert *et al.* (2012) asserting that the northern herd has been disproportionately culled. The second and third petitions assert that the disproportionate removal of the more migratory Plains bison from the central herd is adversely affecting the genetic diversity of that herd (Halbert 2003, p. 133; Halbert *et al.* 2012, p. 9).

In 2012, the northern herd was estimated to contain 16–31 percent of the total YNP bison population (Halbert *et al.* 2012, p. 9). In contrast, the most recent counts estimate approximately three times as many bison in the northern herd—3,337 animals compared with 1,190 in the central herd (U.S. National Park Service 2018a). The recent decrease in population of the central herd is primarily due to dispersal of YNP bison from central to northern YNP and disproportionate culls of YNP bison from the central herd (White *et al.* 2015, p. 17; Geremia *et al.*

2017, p. 1). The total YNP bison population remains stable despite annual culling and is approaching the carrying capacity of YNP for bison. (White *et al.* 2015, p. 79).

The indigenous central herd and introduced northern herd began mixing and interbreeding to some extent several decades after the northern herd was established, but were still believed to be distinct breeding subpopulations when the IBMP was implemented during early 2000s (Geremia *et al.* 2017, p. 9). The IBMP's intent was to consider two breeding herds when informing culling and other management actions, in order to maintain equal numbers of YNP bison in the northern and central herds and thereby maintain the genetic diversity currently present within the two herds (White and Wallen 2012, p. 752).

However, larger herd sizes in recent decades have resulted in increased mixing between the two herds (Fuller *et al.* 2007, p. 1925; White and Wallen 2012, p. 751; Geremia *et al.* 2014, p. 353; Forgacs *et al.* 2016, p. 2; Geremia *et al.* 2017, p. 9). This mixing suggests that the substructure of two distinct lineages in two distinct herds may not be sustained over time (Geremia *et al.* 2017, p. 9). Recent spatial analysis of mitochondrial DNA (inherited only through the maternal lineage) did not detect geographic population subdivision; however, two independent lineages were identified—one representing descendants of the 22 indigenous bison remaining in central Yellowstone in 1902, the other representing descendants of 18 females from northern Montana (along with three bulls from Texas) introduced in 1902 in the northern region of YNP to develop a new herd (Forgacs *et al.* 2016, p. 1). We conclude that the lineage representing the original bison in YNP continues to be represented, but is no longer confined to the central herd.

Recreational

The first petition asserts that recreational hunting disproportionately affects the central herd of YNP bison because its migration out of YNP at both the northern and western boundaries exposes more bison to hunting than in the northern herd, which only migrates across the northern boundary. Conversely, the second and third petitions support hunting, particularly hunting rights of Native Americans, as a means of controlling the excess population of YNP bison. References cited in the first petition refer to the loss of genetic diversity and maternal lineages due to disproportionate culling of YNP bison from the central herd (Halbert 2003, p. 133; Gardipee 2007, p. 7; Halbert *et al.* 2012, p. 9). Regardless, the numbers of bison removed by hunting are only a small portion of total numbers culled. The first petition states 790 YNP bison were killed by hunters in Montana since 2005 (compared to several thousands of YNP bison culled during the same period).

Scientific

The second and third petitions assert that YNP bison are overutilized for scientific purposes by imposing separation of bison from cattle to control brucellosis through lethal removals, hazing, and quarantine. This assertion is duplicative of that made regarding commercial overutilization and is addressed in that section.

In summary, given the survey information on the impact of winter culling and maintenance of the genetic integrity of YNP bison, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating that listing the YNP bison may be warranted due to overutilization associated with management actions of the IBMP.

Factor C—Disease or predation

3. Do the petitioners claim the entity warrants listing because of disease or predation?

☒ Yes

☐ No

a. If the answer to 3 is yes:

Identify which occurrence the petitioners claim is the reason that listing may be warranted (check all that apply)

☒ Disease

☐ Predation

b. If the answer to 3 is yes:

Do the sources cited in the petitions provide substantial information to support the claim? Include consideration of existing regulatory mechanisms or conservation efforts identified in the petitions or from other readily available information that may ameliorate the threats.

☐ Yes

☒ No

Disease

Brucellosis

All petitions discuss direct and indirect impacts to YNP bison from brucellosis. Brucellosis is caused by infection with the bacterium *Brucella abortus*, and is typically transmitted when susceptible animals come into contact with tissues or discharges from infectious animals (Abatih *et al.* 2015, p. 3818). Brucellosis was likely introduced to YNP bison (and elk) from infected cattle sometime prior to 1917 (Meagher and Meyer 1994, p. 645; Kamath *et al.* 2016, p. 2). The livestock industry is concerned that YNP bison will re-infect cattle; although transmission has only been demonstrated in captive studies, never in the wild (Boyd and Gates 2006, p. 19; White *et al.* 2015, pp. 23, 143). The IBMP uses risk management—including hazing, quarantine, and culling—to maintain

spatial and temporal separation between YNP bison and nearby cattle (White *et al.* 2011, p. 1325). Additionally, recent research indicates that elk may be the primary source of transmission to livestock due to more co-mingling of elk and livestock (Dobson and Meagher 1996, p. 1031; White *et al.* 2015, pp. 23–26; Kamath *et al.* 2016, pp. 2, 4; Brennan *et al.* 2017, p. 11; O’Brien *et al.* 2017, p. 342).

The direct impact of brucellosis to YNP bison is infection in the reproductive system, causing abortion during the last third of pregnancy (Gates *et al.* 2010, p. 33; Abatih *et al.* 2015, p. 3818). More than 90 percent of infected female bison abort during their first pregnancy; however, naturally acquired immunity reduces abortion rate to 20 percent after the second pregnancy and nearly 0 after the third pregnancy (Boyd 2003, p. 78; Aune *et al.* 2007, p. 205; Gates *et al.* 2010, p. 33). Direct mortality from brucellosis likely is not a threat to YNP bison (Meagher and Meyer 1994, p. 646; Dobson and Meagher 1996, p. 1027).

The larger impact to YNP bison from brucellosis is the indirect impact from hazing and culling of bison migrating outside of YNP boundaries (Dobson and Meagher 1996, p. 1034). Culling of YNP bison is conducted according to IBMP guidelines to prevent potential transmission of the disease to adjacent livestock (USDOI and USDA 2000, p. 11). The petitions assert that culling is currently conducted without adequate regard to possible subpopulation structure, and may reduce genetic diversity over the long-term (Halbert 2003, p. 133; Gates *et al.* 2010, p. 34). However, as described under factor B-Commercial, two distinct lineages remain, although those lineages are not clearly separated into two distinct herds.

Confining bison within YNP boundaries during late winter—when reproductive demands are greatest and body resources are depleted—can prevent access to nutritious food and extend the period of food restriction (Treanor 2012, pp. 100–101). This may contribute to the maintenance of brucellosis in YNP bison by suppressing immune function and facilitating disease transmission (Treanor *et al.* 2015, pp. 3784, 3795). However, similar to conclusions under factors A and B, overall numbers of bison are stable despite culling and the presence of brucellosis and are approaching the carrying capacity of YNP.

Hemorrhagic septicemia

The first petition discusses the direct impacts of hemorrhagic septicemia to bison herds in the past and suggests that the disease poses a threat to YNP bison. In 1965, an outbreak of hemorrhagic septicemia occurred among a herd of bison in Montana; following vaccination, there were no further signs of the disease (Heddleston and Wessman 1973, p. 306). The petition notes that there have been no recent reported cases of hemorrhagic septicemia in YNP bison. No information in the petition or the sources it cites suggest an outbreak is likely in

the future.

Malignant catarrhal fever

The first petition discusses high mortality rates from malignant catarrhal fever to bison herds in the past and suggests that the disease poses a threat to YNP bison. However, no outbreaks have occurred in YNP bison. The disease can be spread from sheep to bison and the petition cites concerns for YNP bison-sheep interactions because sheep are ranches within the northern Greater Yellowstone Ecosystem and three YNP bison bulls were seen comingling with domestic sheep in 2013 on private land approximately half a mile from the YNP boundary.

Outbreaks of malignant catarrhal fever should be monitored closely to prevent its spread to YNP bison. However no recent reports of the disease have been made concerning YNP bison or sheep from nearby ranches, so we do not consider the disease to be a threat to the YNP bison at this time.

In summary, we find that the information provided in the petitions does not present substantial scientific or commercial information indication that listing the YNP bison may be warranted due to disease or predation.

Factor E—Other natural or manmade factors affecting the species' continued existence

4. Do the petitioners claim the entity warrants listing because of other natural or manmade factors affecting its continued existence?

☒ Yes

☐ No

- a. If the answer to 4 is yes:

Identify the other natural or manmade factors that the petitioners claim is the reason that listing may be warranted.

- Genetic diversity
- Climate change

- b. If the answer to 4 is yes:

Do the sources cited in the petitions provide substantial information to support the claim? Include consideration of existing regulatory mechanisms or conservation efforts identified in the petitions or from other readily available information that may ameliorate the threats.

☐ Yes

☒ No

Genetic diversity

All petitions assert that loss of genetic diversity is a threat to YNP bison.

The first petition discusses private ownership of bison for commercial purposes and hybridization with cattle. Both factors impact Plains bison rangewide, but are not relevant to YNP bison, which are primarily federally managed and have no evidence of introgression with cattle genes. The first petition also suggests that YNP bison may be significantly impaired regarding escape from predators, winter cold tolerance, breeding combat, and other aerobic activities due to a high frequency of deleterious mitochondrial DNA (Pringle 2011, p. 9). However, more recent research has disagreed with the findings in Pringle (2011), noting that no evidence of detrimental effects from these mutations in bison mitochondrial DNA has ever been described (Forgacs *et al.* 2016, p. 3). Furthermore, if these mutations caused detrimental effects, a substantial reduction in their frequency would be expected due to strong negative selection; however, this has not occurred (Forgacs *et al.* 2016, p. 8).

The second and third petitions assert that culling YNP bison under IBMP guidelines could reduce genetic diversity by disproportionately impacting the unique genetics of the more migratory central herd (Hobbs *et al.* 2015, p. 547; Geremia *et al.* 2016, p. 3). As discussed in the Species and Range section, we do not support the assertion that the central herd descends from wood bison. However, the central herd descends, in part, from an estimated 22 indigenous wild Plains bison remaining in central YNP in 1902, and may contribute unique genetic traits to both YNP bison specifically and to Plains bison in general (when bison from the central herd are used to establish or augment other herds). As described under factor B-Commercial, in recent years, there has been more mixing between the two herds. YNP bison appear genetically healthy, and can be managed as a single population with multiple breeding segments (Geremia *et al.* 2014, p. 348; Forgacs *et al.* 2016, p. 10).

The Court's Memorandum Opinion states that the Service adopted conclusions of White and Wallen (2012) that maintenance of subpopulation genetic differentiation and overall genetic diversity may not be crucial for preserving genes; negating the need to maintain two subpopulations. The Service fully supports maintenance of genetic diversity within YNP bison and recognizes the presence of different lineages and multiple breeding segments. However, as total numbers of YNP bison have increased, the two herds have experienced increased mixing (Fuller *et al.* 2007, p. 1925; White and Wallen 2012, p. 751; Geremia *et al.* 2014, p. 353; Forgacs *et al.* 2016, p. 2; Geremia *et al.* 2017, p. 9). This mixing suggests that the substructure of two distinct lineages in two distinct herds may not be sustained over time (Geremia *et al.* 2017, p. 9). A similar situation occurred when YNP bison numbers increased above 3,000 in the mid-1990s—the three herds historically described in YNP (Mary Mountain, Pelican Valley, and Lamar Valley) merged to form the central herd (Mary Mountain and Pelican Valley) and the northern herd (Lamar Valley) (Halbert *et al.* 2012, p. 2). Recent spatial analysis of mitochondrial DNA did not detect geographic population subdivision; however, two independent lineages were identified—one representing descendants of the 22 indigenous bison remaining in central

Yellowstone in 1902, the other representing descendants of 18 females from northern Montana and three bulls from Texas introduced in 1902 to develop the northern herd (Forgacs *et al.* 2016, p. 1). We conclude that the lineage representing the original bison in YNP continues to be represented, but is no longer confined to the central herd. Furthermore, as we previously described under *Species and Range*, mixing between the two herds supports our conclusion that YNP bison should be considered a single DPS, without further subdivision.

Climate change

The first petition asserts that climate change will result in decreased precipitation, increased temperatures, widespread drought conditions, and reduced snow pack in YNP. However, Plains bison exhibit flexibility regarding climatic conditions, as evidenced by their historic range, which covered most of the continental United States, northern Mexico, and southwestern Canada (Reynolds *et al.* 2003, p. 1012). No information is provided in the petitions or the sources they cite that suggests climate change will occur to an extent that YNP bison will be negatively impacted within the foreseeable future, which, based on available climate projections, we conservatively estimate as the next 75 years (Saunders *et al.* 2008, p. 5; Karl *et al.* 2009, p. 29; American Meteorological Society 2012, p. 7; Ault *et al.* 2014, p. 7545, Foden and Young 2016, p. 14; McGuire *et al.* 2016, p. 1; Schwalm *et al.* 2016, p. 1). One recent study suggests that bison body mass may decline as global temperatures warm (Martin *et al.* 2018, p. 4569).

In summary, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating that listing the YNP bison may be warranted due to loss of genetic diversity or climate change.

Factor D—Inadequacy of existing regulatory mechanisms

Factor D is considered in light of the other factors discussed above, not in a vacuum. The discussion of the claims under each factor above included a summary of information provided in the petitions and contained other readily available information regarding how activities identified in the petition negatively affect the status of the entity and the extent to which existing regulatory mechanisms may ameliorate the threats such that the petitioned entity may or may not warrant listing or uplisting.

We have concluded that the petitions do not provide substantial information indicating that the YNP bison may warrant listing because of factors A, B, C, or E. Since there is not substantial information indicating that the entity may warrant listing, it follows that existing regulatory mechanisms (primarily the IBMP) are not inadequate; factor D cannot be an independent basis for listing. We therefore conclude there is not substantial information to indicate that existing regulatory mechanisms are inadequate.

Cumulative Effects

If none of the answers to 1b, 2b, 3b, 4b, or 5 is “Yes,” then we must consider whether there is substantial information indicating that the synergistic or cumulative effects of the threats may affect the entity such that it may warrant listing. Do the sources cited in the petition(s) provide substantial information indicating that the threats they have identified may have synergistic or cumulative effects such that the entity may warrant listing?

☐ Yes

☒ No

The first petition states that IBMP management strategies do not consider synergistic effects of disease risk management, demographic stochasticity, and environmental stochastic events such as severe winter mortality or disease outbreak on YNP bison population viability and genetic diversity. The petitioners also note that the adaptive management threshold of 2,100 YNP bison is triggered based on summer population estimates without considering additive winter mortality or other causes of mortality. However, the threshold of 2,100 is more than twice historical estimates of bison population in YNP. Furthermore, in recent years, the YNP bison population has remained at approximately twice the threshold number, despite regular, intensive culling.

Petitioners also suggest that population viability analyses (PVA) should consider a time frame of 100 years or more when assessing extinction risk. When forecasting population trends, we limit our estimates of foreseeable future to time frames for which we can reasonably rely on predictions about the future. For YNP bison we consider the foreseeable future to be 75 years, based on typical climate projections (see factor E-Climate change). Furthermore, for a 90-day finding, we consider the best available information, but do not initiate additional studies such as a PVA. Therefore, we conclude that synergistic or cumulative effects are not impacting YNP bison such that listing may be warranted.

Petition Finding

For this finding we reviewed the petitions, sources cited in the petitions, and other readily available information. We considered the factors under section 4(a)(1) and assessed the effect that the threats identified within the factors—as may be ameliorated or exacerbated by any existing regulatory mechanisms or conservation efforts—may have on the species now and in the foreseeable future. We considered a “threat” as any action or condition that may be known to or is reasonably likely to negatively affect individuals of a species. This includes those actions or conditions that may have a direct impact on individuals, as well as those that may affect individuals through alteration of their habitat or required resources. The mere identification of “threats” is not sufficient to compel a finding that listing may be warranted. Based on our review of the petitions, sources cited in the petitions, and other readily available information, we find that the petitions do not provide substantial scientific or commercial information indicating that listing the YNP bison as a DPS of Plains bison (*Bison bison bison*) as a threatened or endangered species may be warranted.

Federal Register Summary Paragraph

Species and Range

The YNP bison DPS currently occupies approximately 1,226 mi² (3,175 km²) in and around YNP—approximately 16 percent of its historic range. It is the oldest and largest wild population of Plains bison. It is the only herd in the United States descending, in part, from a continuously wild herd. It is free-ranging and subject to natural selection factors such as predation and competition. It represents a large source of unique genetic variation, with no evidence of introgression from domestic cattle.

Petition History

On November 14, 2014, we received a petition dated November 13, 2014, from Western Watersheds Project and Buffalo Field Campaign, requesting that Plains bison in and around Yellowstone National Park (YNP) be listed as threatened or endangered under the Act (first petition). The first petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(c). On March 2, 2015, we received a petition from James Horsley, which also requested that YNP bison be listed as threatened or endangered under the Act (second petition). We published a finding for both petitions concluding that the petitions did not provide substantial scientific or commercial information indicating that the petitioned action may be warranted (81 FR 1368, January 12, 2016). On September 26, 2016, petitioners from the first petition as well as a third party (Friends of Animals) brought suit under the Endangered Species Act and the Administrative Procedure Act asserting that our determination was arbitrary and capricious. On January 31, 2018, the Court remanded the case for the Service to conduct a new 90-day finding. On March 16, 2018, we received a new petition dated February 28, 2018, from James Horsley, which requested emergency listing for YNP bison (third petition). This petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(c). Because the Act does not provide for petitions to emergency list, we are considering it as a petition to list YNP bison. However, we did consider the immediacy of possible threats to the species and whether emergency listing may be necessary at this time. We reviewed the information presented in the third petition and did not find that it warranted an emergency listing. This finding addresses both the first and second petitions—remanded on January 31, 2018—and the third petition—received March 16, 2018.

Finding

For this finding we reviewed the petitions, sources cited in the petitions, and other readily available information. We considered the factors under section 4(a)(1) and assessed the effect that the threats identified within the factors—as may be ameliorated or exacerbated by any existing regulatory mechanisms or conservation efforts—may have on the species now and in the foreseeable future. We considered a “threat” as any action or condition that may be known to or is reasonably likely to negatively affect individuals of a species. This includes those actions or conditions that may have a direct impact on individuals, as well as those that may affect individuals through alteration of their habitat or required resources. The mere identification of

“threats” is not sufficient to compel a finding that listing may be warranted. Based on our review of the petitions, sources cited in the petitions, and other readily available information, we find that the petitions do not provide substantial scientific or commercial information indicating that listing the YNP bison as a DPS of Plains bison (*Bison bison bison*) as a threatened or endangered species may be warranted.

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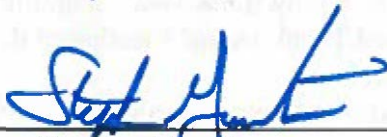
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2/22/19



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