Federal Docket No. FWS-R6-ES-2015-0123

90-DAY FINDING ON TWO PETITIONS TO LIST A DISTINCT POPULATION SEGMENT OF BISON IN ITS UNITED STATES YELLOWSTONE NATIONAL PARK RANGE AS THREATENED OR ENDANGERED UNDER THE ENDANGERED SPECIES ACT

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 "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted" (50 CFR 424.14(b)).

Petition History

On November 14, 2014, we received a petition dated November 13, 2014, from the Western Watersheds Project and Buffalo Field Campaign, requesting the Yellowstone National Park bison be listed as threatened or endangered under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(a).

On March 2, 2015, we received a secondary petition dated March 2, 2015, from Mr. James A. Horsley, requesting that the Yellowstone National Park bison be listed as threatened or endangered under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(a). In a March 24, 2015, letter to the petitioner, we responded that we reviewed the information presented in the petition and did not find that the petition warranted an emergency listing.

This finding addresses both above petitions as they request the same action for the same entity. The petition dated November 13, 2014 will be referred to below as the primary petition and the petition dated March 2, 2015 will be referred to below as the secondary petition.

Evaluation of Petitions to List the YNP bison

When citation lists are provided, the use of the "+" sign to string a series of citations together indicates that the information in these citations, when combined, provide substantial information.

Species and Range

Do the petitions identify an entity that is eligible for listing (i.e., is the entity a species, subspecies, or DPS)?

☑Yes

☐ No

If yes, list common name, Scientific name, and Range. If no, please explain.

Bison (population of *Bison bison bison*); Yellowstone National Park. Referred to below as "YNP bison".

Primary petition:

Discreteness:

- Gates *et al*. 2005, p. 93

Significance:

- Gates *et al*. 2005, p. 245
- Freese *et al*. 2007, p. 178
- Halbert 2003, p. 94
- Halbert and Derr 2007, p. 5
- Halbert *et al*. 2012, pp. 1-2
- Ward *et al*. 1999, p. 54
- Ward 2000, p. 20

Secondary petition:

Discreteness:

- Gates *et al*. 2005, p. 93

Significance:

- Freese *et al*. 2007, p. 178
- Gates *et al*. 2005, p. 245
- Halbert *et al*. 2012, pp. 1-2

Information in the Petitions

Factor A

1. Do the petitioners claim the entity warrants listing based on the present or threatened destruction, modification or curtailment of the species habitat or range (Factor A)?

   ☑ Yes (both petitions)

   Primary petition: Range curtailment, livestock grazing, development and infrastructure, and invasive species.

   Secondary petition: Range curtailment and invasive species.

☐ No

a. If the answer to 1 is yes:
Do the sources cited in the petitions provide substantial information to support the claim?

☐ Yes

☑ No (both petitions)

If yes, indicate for which activity(ies) present or threatened destruction, modification or curtailment of the species habitat or range (e.g., logging, agriculture, overgrazing, etc.) is a threat and list the citations with page numbers for each purpose. If no, please indicate for which activity(ies) and explain..

Range curtailment

Both petitions correctly note that bison historically occupied approximately 20,000 km^2 including area within the northern Greater Yellowstone Area. Presently, 3,175 km^2 within the boundaries of Yellowstone National Park (YNP) serves as principle YNP bison habitat (Plumb *et al*. 2009, pp. 2377, 2379, both petitions; White *et al*. 2011, p. 1324, both petitions). In addition, movement of YNP bison beyond the boundaries of YNP is prevented through non-lethal and lethal measures primarily implemented to control the spread of brucellosis from YNP bison to cattle livestock on private lands beyond YNP. Additional information on disease management is provided under Factor C.

The petitions state concerns regarding the restriction of movement into historical range outside YNP boundaries. However, given the current stable-to-increasing population status of the YNP bison herd, we do not find substantial information that restriction of range is likely a limiting factor for the continued existence of YNP bison. Since its conception in 2000, the Interagency Bison Management Plan (IBMP) has conducted annual winter culls that restrict YNP bison from occupying cattle grazing land outside YNP, while maintaining the conservation goal of 2,500 – 4,500 animals (Plumb *et al*. 2009, p. 2385, both petitions; National Park Service 2013, p. 14, primary petition). Most recent population counts by the Park Service recorded 4,865 bison prior to the 2015 winter cull (Geremia *et al*. 2014, p. 1, secondary petition). Therefore, we find that the primary petition does not present substantial information that range curtailment may be a threat to the YNP bison such that listing may be warranted.

Livestock grazing

The primary petition argues that livestock grazing is directly and indirectly impacting bison through the alteration of plant communities, soil characteristics, and other habitat elements, as well as the development of infrastructure such as fencing and roads associated with livestock management. However, neither the primary petition nor the sources it cites provide information about how changes in plant communities, soil characteristics, and other habitat elements may adversely affect YNP bison.

Lastly, the primary petition notes concern for disease transmission from livestock to YNP bison and this potential threat is addressed under Factor C.

Development and infrastructure

The primary petition states that the historical range of the bison has changed due to cultivation, cattle ranching, commercial bison ranching, natural resource extraction, and urban expansion. The petition lists a number of residential areas and the current bison capture and quarantine facility that lay outside YNP, but within IBMP management zones, that have been recently developed. These land use changes occurred outside YNP and information concerning the extent to which this development outside park boundaries may pose a threat to the YNP bison was not found within the petition or the sources it cites. Therefore, we find that the primary petition does not present substantial information that development and infrastructure may be a threat to the YNP bison such that listing may be warranted.

Invasive species

The primary petitioners claim that non-native plant invasions are a major threat to the Greater Yellowstone Ecosystem (Olliff *et al*. 2001, p. 347, primary petition). As the primary petitioners rightly note, non-native plants can alter native plant communities and soil properties, and impact ungulate foraging (Trammell and Butler 1995, p. 814, primary petition). A number of non-native plants found in YNP were mentioned in the petition. However, only *Euphorbia esula* was cited as having a negative impact on foraging bison by reducing the foraging value of bison habitat in North Dakota (DiTomaso 2000, p. 257, primary petition). Neither the petition nor the sources it cites provides information of the extent to which this plant or others mentioned may be a threat to foraging bison in YNP.

The secondary petition discusses the ecological impacts of stocking non-native fish, such as lake trout, in YNP waters, however, the petitioner and sources cited do not provide information regarding the potential impacts of non-native fish stocking on YNP bison. Therefore, we do not find the petitioners present substantial information that non-native species may be a threat to the YNP bison such that listing may be warranted.

Therefore, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating listing of the YNP bison may be warranted due to Factor A.

b. If the answer to 1 is no:
Do sources cited in the petitions provide substantial information indicating the entity may warrant listing based on factor A, even though the petitioner does not make this claim?

☐ Yes

☐ No

If yes, indicate for which activity(ies) present or threatened destruction, modification or curtailment of the species habitat or range (e.g., logging,

agriculture, overgrazing, etc.) is a threat and list the citations with page numbers for each purpose. If no, please explain.

c. Provide additional comments, if any.

Factor B

2. Do the petitioners claim the entity warrants listing based on overutilization for commercial, recreational, scientific, or educational purposes (Factor B)?
   - ☑ Yes (both petitions)
   - ☐ No

a. If the answer to 2 is yes, overutilization for which purposes do the petitioners claim are a threat such that listing may be warranted (check all that apply):
   - ☑ Commercial (both petitions)
   - ☑ Recreational (both petitions)
   - ☑ Scientific (both petitions)
   - ☐ Educational
   - ☐ Other: Threat

b. If the answer to 2 is yes:
   Do the sources cited in the petitions provide substantial information to support the claim?
   - ☐ Yes
   - ☑ No (both petitions)

   If yes, indicate for which purpose(s) overutilization is a threat and list the citations with page numbers for each purpose. If no, please indicate for which purpose(s) and explain.

   Hunting

   The petitions argue hunting during the annual winter cull is negatively impacting the YNP bison population by decreasing its genetic viability, selecting for genetic traits that will decrease its fitness, and altering its sex ratio (Halbert 2003, p. 133, primary petition + Halbert *et al*. 2012, p. 9, both petitions). YNP bison are hunted when they leave through the north and western boundaries of YNP during winter while seeking lower elevation areas where food is more abundant. This migration can lead to interaction with domestic cattle grazing in areas adjacent to YNP and the spread of brucellosis from YNP bison to cattle. Brucellosis and disease management are discussed further under Factor C.

   The petitions claim genetic viability may be degraded by a loss of unique genetic qualities (particularly the ability to migrate) through disproportionate culling of migratory animals. The primary petition states “culling migratory bison could reduce the overall health and resilience of the Yellowstone bison by favoring less migratory bison, which may also select for a mitochondrial gene

defect that decreases their fitness…" The primary petition cites Pringle's (2011, entire, both petitions) findings, which suggest bison are predicted "significantly impaired in aerobic capacity, disrupting highly evolved cold tolerance, winter feeding behaviors, escape from predators and competition for breeding" (Pringle 2011, p. 1, both petitions). However, these impairments have not been connected to specific defects in the bison mitochondrial genome and Pringle's assertions are predicated on assumptions that bison mitochondrial defects are caused by not the same, but similar mutations observed in humans and dogs (Pringle 2011, p. 1, both petitions). Only one bison from YNP analyzed in Pringle's study had haplotypes that contain the possibly deleterious mutations (Pringle 2011, p. 14, both petitions). Further, these defects are thought to have arisen from the initial population bottleneck that reduced the North American bison population to 25 animals in YNP (Boyd and Gates 2006, p. 1, primary petition). Therefore, any deleterious genetic effects of the bottleneck would have occurred at that time and would not necessarily be exacerbated by present culling management regimes.

Lastly, the secondary petition posits that "the genetic diversity of wild bison is not being maintained by the IBMP's actions of lethally removing migratory bison, but instead the herds' genetic composition is being altered by the artificial selection of bison with non-migratory and domestic animal traits." However, the secondary petition does not cite sources to support these claims and there is no evidence at this time that indicates culling animals migrating from YNP will eliminate a genetic basis for the migratory behavior. In addition, continual migration each year suggests this behavior persists.

Plumb *et al*. (2009, p. 2383, both petitions) suggests movement of YNP bison beyond YNP boundaries began when the Central/Western herd surpassed a population size of 1,500 and the Northern herd surpassed 550. These numbers are well below mean estimates of herd population sizes limited by food resources (~ 2,400 and ~3,800 for Northern and Central/Western herds, respectively). In addition, permanent movement out of YNP (i.e. dispersal) is thought to have naturally occurred in the absence of management regimes (Plumb *et al*. 2009, p. 2383, both petitions). Therefore, winter culling may actually be serving as a surrogate for a dispersal sink (permanent movement out of the population) that would occur as a natural part of the ecosystem process.

The primary petition also indicates the ratio of bulls to cows killed each winter is not conserved through years. The primary petition does not discuss particular threats related to unequal sex ratios, but the secondary petition cites White *et al*. (2011, p. 1330, both petitions), who indicate a decrease in male over-winter survival and increased intensity of male competitive interaction during the breeding season when sex ratios favor males. However IBMP annual culling guidelines involve taking approximately equal numbers of males and females and sex composition surveys are conducted so as to optimize culling goals for the current population structure (Geremia *et al*. 2014, pp. 2, 17, secondary petition).

Finally, the primary petition suggests animals from the Central/Western herd are being hunted at a disproportionately high rate compared to their Northern counterparts, which "threatens the genetic viability of the Yellowstone bison and could result in the loss of unique genetic qualities, maternal lineages, and the loss

of overall genetic diversity." Halbert *et al*. (2012, p. 8, both petitions) indicate that the YNP bison consists of two subpopulations that are genetically distinct, but not isolated. The relatively large genetic variation among YNP bison may be attributed to the maintenance of distinct subpopulations and the comparatively large effective population size of the YNP population (Halbert *et al*. 2012, p. 9, both petitions). Therefore, the primary petition claims that the two herds (subpopulations) should be managed in light of their unique genetic qualities. The IBMP sets annual population size goals for the two herds separately so that neither herd is reduced to such an extent that it may be at risk of losing important genetic qualities (Geremia *et al*. 2014, secondary petition). The primary petition cites Hendrick (2009, p. 419, primary petition) on the importance of maintaining an effective population size of 1000 animals (or less with substantial genetic exchange between smaller subpopulations) and that the YNP herd meets this standard. To date, there is no evidence that culling has impacted the long-term genetic viability or persistence of the YNP bison population (White *et al*. 2011, p. 1328, both petitions).

However, White and Wallen (2012, p. 751, secondary petition) assert that the observed population substructure and genetic differentiation was "substantially influenced by a human-induced bottleneck" and as a result, "there is evidence that the existing genetic substructure was artificially created." Since individuals from other herds were used to supplement the YNP bison in 1902, estimates suggest only approximately 30-40% of the YNP bison genetic makeup derive from the original 25 survivors (Hendrick 2009, p. 417, primary petition). Thus, maintenance of subpopulation genetic differentiation and overall genetic diversity may not be crucial for preserving genes from the survivors of the historic bottleneck. Lastly, White and Wallen (2012, p. 752, secondary petition) conclude that the National Park Service should allow ecological processes to "influence how population and genetic substructure is maintained in the future rather than actively managing to perpetuate an artificially created substructure… it is the conservation of the ecological processes that is important, not the preservation of a population or genetic substructure that may or may not have been created and /or facilitated by humans."

Therefore, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating listing of the YNP bison may be warranted due to Factor B.

c. If the answer to 2 is no:
Do sources cited in the petitions provide substantial information indicating the entity may warrant listing based on factor B, even though the petitioners do not make this claim?

☐ Yes

☐ No

If yes, indicate for which purpose(s) overutilization is a threat and list citations with page numbers for each purpose. If no, please explain.

d. Provide additional comments, if any.

Factor C

3. Do the petitioners claim the entity warrants listing based on disease or predation (Factor C)?

☑ Yes (both petitions)
☐ No

a. If the answer to 3 is yes:
Which do the petitioners claim is a threat such that listing may be warranted (check all that apply)

☑ Disease (both petitions)
☑ Predation (both petitions)

b. If the answer to 3 is yes:
Do the sources cited in the petitions provide substantial information to support the claim?

☐ Yes
☑ No (both petitions)

If yes, indicate which (disease, predation, or both) is a threat and list the citations with page numbers for each. If no, please indicate disease and/or predation and provide an explanation.

Disease

The primary petition discusses the direct impacts of hemorrhagic septicemia and malignant catarrhal fever on bison herds in the past and argues that the diseases pose a threat to YNP bison. In 1965, an outbreak of hemorrhagic septicemia occurred among a herd of bison in Montana and following vaccination, there were no further signs of the disease (Heddleston and Wessman 1973, p. 306, primary petition). However, as the petition notes, there have been no recent reported cases of hemorrhagic septicemia in YNP and no information in the petition or the sources it cites suggest an outbreak is imminent.

Malignant catarrhal fever has impacted bison herds in the past, causing high mortality rates; however, no outbreaks have occurred in YNP. The disease can be spread from sheep to bison and the petition cites concerns for YNP bison-sheep interactions because sheep are ranched within the northern Greater Yellowstone Ecosystem and 3 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. However, no recent reports of the disease have been made concerning YNP bison or sheep in nearby ranches, so we do not consider the disease to be a threat to the YNP bison at this time.

Both petitions discuss direct and indirect impacts of brucellosis disease on YNP bison. Brucellosis is a bovine disease most known for causing pregnant

females to abort and can be transmitted interspecies. Estimates of the percentage of YNP bison infect with brucellosis range widely from 10% to 70% depending on the type of testing technique (Meagher and Meyer 1994, p. 646, both petitions; Gates *et al*. 2010, p. 33, both petitions). It is generally considered to have only minimal direct effects on bison and the YNP bison population does not appear to suffer from a portion being infected as their numbers are stable or increase each year (Meagher 1973, p. 70, both petitions; Meagher and Meyer 1994, p. 646, both petitions; Geremia *et al*. 2014, p. 2, secondary petition).

The annual cull implemented by IBMP prevents the spread of brucellosis from YNP bison to domestic cattle grazing on adjacent land and is thus an indirect impact of disease on YNP bison. In the winter, YNP bison seek lower elevation areas where food sources are more abundant. These areas often extend beyond YNP boundaries into land used for cattle grazing. To avoid contact between YNP bison and cattle, which increases the risk of transmission of brucellosis, the YNP bison are removed from areas used for cattle grazing via hazing back into YNP, followed by, when necessary, capture, testing, and slaughter or release of captured bison, depending on brucellosis test results (USDI and USDA 2000, p. 6, primary petition).

The primary concern stated in the petitions with regards to culling as disease management is its limitation on YNP bison range and population size. However, the petitions do not provide evidence suggesting IBMP activities may be a threat to the species such that the species may warrant listing. Since the conception of IBMP in 2000, the YNP bison population size has remained within the recommended 2,500-4,500 range, with the exception of 2005 and 2007 years when numbers exceeded 4,500 (Plumb *et al*. 2009, p. 2385, both petitions; National Park Service 2013, p. 14, primary petition). Disease management is often an important aspect of wildlife management and stable-to-increasing population trends do not indicate IBMP disease management is limiting the YNP bison population.

Other concerns listed in the petitions related to indirect impacts of IBMP disease management include loss of genetic viability and subpopulation integrity, and these impacts are discussed under Factor B.

Predation

The petitions state that bison have few predators other than man, citing only grizzly bear and gray wolves as natural predators. Neither the petitions nor the sources they cite provide information about the extent to which predation may be a threat to bison, and the primary petition suggests grey wolf predation “is not considered a significant concern at this time.”

Therefore, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating listing of the YNP bison may be warranted due to Factor C.

c. If the answer to 3 is no:

Do sources cited in the petitions provide substantial information indicating the entity may warrant listing based on factor C, even though the petitioner does not make this claim?

☐ Yes

☐ No

If yes, indicate which (disease, predation, both) is a threat and list citations with page numbers for each. If no, please explain.

d. Provide additional comments, if any.

Factor D

4. Do the petitioners claim the entity warrants listing based on the inadequacy of existing regulatory mechanisms (Factor D)?

☑ Yes (both petitions)

☐ No

a. If the answer to 4 is yes:
Do the sources cited in the petitions provide substantial information to support the claim?

☐ Yes

☑ No (both petitions)

If yes, list the citations with page numbers. If no, please explain.

The petitions assert that existing Federal and State regulatory mechanisms for YNP bison conservation are inadequate. They cite the IBMP, the National Park Service, the U.S. Forest Service, and legal designations by the State of Montana as examples of inadequate regulations where more could be done to protect YNP bison. The primary petition also asserts that the IBMP "is not enforceable, and thus is not a regulatory mechanism for purpose of the ESA."

The legal status of bison in North America ranges from domestic livestock to wildlife among Federal, State, and provincial jurisdictions (Gates *et al*. 2010, p. 66, both petitions). In National Parks and National Wildlife Refuges, bison are managed as captive or free-ranging wildlife. In Montana, Idaho, Wyoming, and various other states, bison have dual status, meaning herds may be considered domestic livestock or wildlife, depending on whether they are commercial or conservation herds (Gates *et al*. 2010, pp. 68-69, 71, both petitions). Montana considers YNP bison to be wildlife under disease control management by the Montana Department of Livestock and hunting on lands adjacent to the park is managed by the Montana Department of Fish, Wildlife and Parks (Plumb *et al*. 2009, p. 2385, both petitions).

We consider plans and initiatives to be voluntary agreements that provide guidance for better managing YNP bison, rather than regulatory mechanisms. Therefore, we discuss the IBMP under Factor C, because it focuses on disease. The IBMP is a cooperative effort developed by the National Park Service, USDA-

Forest Service, USDA-Animal & Plant Health Inspection Service, Montana Department of Livestock, Montana Fish Wildlife & Parks, and Tribal groups. Thus, concerns in the petition regarding disease control by these organizations are addressed with regards to the IBMP under Factor C. We evaluate the inadequacy of existing regulatory mechanisms from the standpoint of the other factors. If there is not substantial information that listing YNP bison may be warranted due to another factor, then the regulations affecting that factor cannot be considered inadequate. Therefore, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating listing of the YNP bison may be warranted due to Factor D.

b. If the answer to 4 is no:
Do sources cited in the petitions provide substantial information indicating the entity may warrant listing based on factor D?
   - ☐ Yes
   - ☐ No

If yes, list citations with page numbers. If no, please explain.

c. Provide additional comments, if any.

Factor E

5. Do the petitioners claim the entity warrants listing based on other natural or manmade factors affecting its continued existence (Factor E)?
   - ☑ Yes (primary petition)
   - ☐ No

a. If the answer to 5 is yes:
Identify the other natural or manmade factors claimed by the petitioners to be a threat such that listing may be warranted.

- Genomic extinction (primary petition)
- Climate change (primary petition)

b. If the answer to 5 is yes:
Do the sources cited in the petitions provide substantial information to support the claim?
   - ☐ Yes
   - ☑ No (primary petition)

If yes, indicate for which other natural or manmade factors (e.g., climate change, road mortality, or small population dynamics) are a threat and list the citations with page numbers for each factor. If no, please indicate for which factor(s) and explain.

Genomic extinction

Genomic extinction refers to situations in which "hybrids are fertile and may displace one or both parental taxa through the production of hybrid swarms" (Allendorf and Luikart 2007, p. 429, secondary petition). The primary petition states "bison are at extremely high risk of genomic extinction because of domestication and anthropogenic selection, and hybridization with cattle". However, Freese *et al*. (2007, p. 178, both petitions) remark that "while many public bison herds harbor evidence of domestic cattle nuclear gene introgression, the amount of introgression across the genome of each individuals herd appears to be fairly low, with introgression rates ranging from 0.56% to 1.80%." The petitions note that the YNP bison herd is one of only a few with no evidence of cattle introgression (Ward *et al*. 1999, p. 54, primary petition; Ward 2000, p. 20, primary petition; Freese *et al*. 2007, p. 178, both petitions; Halbert and Derr 2007, p. 5, primary petition). This important characteristic of the YNP bison makes conservation of the herd important to the overall preservation of the bison genome. Geographic isolation and disease management practices currently preclude the introduction of bison from other herds with cattle gene introgression. Therefore, we find that YNP bison are not at risk of genomic extinction because there is no evidence of cattle introgression and potential introgression is monitored and prevented.

In addition, the primary petition calls for "protection under the Endangered Species Act to avoid further loss of genetic diversity, loss of evolutionary potential, and [to] conserve potential genetic contributions to plains bison restoration" and these concerns as they relate to YNP bison are discussed under Factor B.

Climate change

The primary petition argues that climate change will result in decreased precipitation, increased temperatures, widespread drought conditions, and reduced snow pack in YNP. However, we find that neither the petition nor the sources it cites presents substantial information indicating climate change may be a threat to YNP bison.

Koons *et al*. (2012, p. 479, primary petition) indicates climate changes may alter density-independent and density-dependent factors that influence foraging and dispersal behaviors of bison in the Henry Mountains, Utah. Based on these findings, the petition suggests as the climate dries, more YNP bison will move out of the park. However, no evidence was provided in the petitions or the sources they cite that indicate, given the unique topography of YNP, that dispersal out of the park is likely as a result of drought conditions.

In addition, the primary petition suggests decreased snow pack will lead to YNP bison dispersal south into Grand Teton National Park, joining the Jackson bison herd, and rendering YNP bison at risk of breeding with these cattle-introgressed bison. However, neither the petition nor the sources it cites indicate under what extent of snow pack reduction these dispersal patterns are likely to occur and if snow pack will reach those levels. Further, there is no evidence that migration occurs between the Jackson and YNP herds and this is likely due to their being separated by the Continental Divide and an expansive tract of

coniferous forest (Gates *et al*. 2005, p. 77, both petitions). Reduction of snow pack is not likely to reduce this considerable span of unsuitable habitat and allow dispersal of YNP bison south.

Lastly, bison historically occupied an extensive range (from Canada to Mexico and from the Rockies to Florida to New York) and tolerated a variety of climatic conditions (Boyd and Gates 2006, p. 16, primary petition). This suggests YNP bison are likely to be flexible with any climate changes that may occur in the future.

Therefore, we find that the information provided in the petitions does not present substantial scientific or commercial information indicating listing of the YNP bison may be warranted due to Factor E.

c. If the answer to 5 is no:
Do sources cited in the petitions provide substantial information indicating the entity may warrant listing based on factor E, even though the petitioner does not make this claim?

☐ Yes
☐ No

If yes, identify the other natural or manmade factor(s) and list citations with page numbers for each. If no, please explain.

d. Provide additional comments, if any.

Cumulative Effects

6. Do the petitioners claim that the threats they have identified may have synergistic or cumulative effects such that the entity may warrant listing?

☐ Yes
☑ No

a. If the answer to 6 is yes:
Do the sources cited in the petitions provide substantial information to support the claim?

☐ Yes
☐ No

If yes, indicate which threats the petitioner claims may have synergistic or cumulative effects and list the citations with page numbers. If no, please indicate which threats and explain.

b. Provide additional comments, if any.

Petition Finding

Based on our review of the petitions and sources cited in the petitions, we find that the petitions do not provide substantial scientific or commercial information indicating that the petitioned action may be warranted.

Author

The primary authors of this notice are the staff members of the Region 6 Ecological Services Regional Office, U.S. Fish and Wildlife Service.

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_____

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References

Primary petition:

Boyd. D.P. and C.C. Gates. 2006. A brief review of the status of plains bison in North America. Journal of the West 45:15-21.

DiTomaso, J.M. 2000. Invasive weeds in rangelands: species, impacts, and management. Weed Science 48:255-265.

Freese, C.H., K.E. Aune, D.P. Boyd, J.N. Derr, S.C. Forrest, C.C. Gates, P.J. Gogan, S.M. Grassel, N.D. Halbert, K. Kunkel, and K.H. Redford. 2007. Second change for plains bison. Biological Conservation 136:175-184.

Gates, C.C., B. Stelfox, T. Muhly, T. Chowns, and R.J. Hudson. 2005. The ecology of bison movements and distribution in and beyond Yellowstone National Park. Report to the National Park Service.

Gates, C.C., C.H. Freese, P.J. Gogan, and M. Kotzman. 2010. American bison: status survey and conservation guidelines. IUCN. pp. 134.

Halbert, N.D. 2003. The utilization of genetic markers to resolve modern management issues in historic bison populations: implications for species conservation. PhD. Dissertation, Texas A&M University, College Station.

Halbert, N.D., P.J. Gogan, P.W. Hedrick, J.M. Wahl, and J.N. Derr. 2012. Genetic population substructure in bison at Yellowstone National Park. Journal of Heredity 103:360-370.

Halbert, N.D. and J.N. Derr. 2007. A comprehensive evaluation of cattle introgression into U.S. Federal bison herds. Journal of Heredity 98:1-12.

Heddleston, K.L. and F. Wessman. 1973. Vaccination of American bison against *Pasteurella multocida* serotype 2 infection (hemorrhagic septicemia). Journal of Wildlife Disease 9:306-310.

Hendrick, P.W. 2009. Conservation genetic and North American bison (*Bison bison*). Journal of Heredity 100:411-420.

Koons, D.N., P. Terletzky, P.B. Adler, M.L. Wolfe, D. Ranglack, F.P. Howe, K. Hersey, W. Paskett, and J.T. Du Toit. 2012. Climate and density-dependent drivers of recruitment in plains bison. Journal of Mammalogy 93:475-481.

Meagher, M.M. 1973. The bison of Yellowstone National Park. Government Printing Office, Scientific Monographs 1. National Park Service, Washington D.C.

Meagher, M.M. and M.E. Meyer. 1994. On the origin of brucellosis in bison of Yellowstone National park: A review. Conservation Biology 8:645-653.

National Park Service. 2013. Yellowstone National Park Natural and Cultural Resources Vital Signs.

Olliff, T., R. Renkin, C. McClure, P. Miller, D. Price, D. Reinhart, and J. Whipple. 2001. Managing a complex exotic vegetation program in Yellowstone National Park. Western North American Naturalist. 61:347-358.

Plumb, G. E., P. J. White, M. B. Coughenour, and R. L. Wallen. 2009. Carrying capacity, migration, and dispersal in Yellowstone bison. *Biological Conservation* 142:2377–2387.

Pringle, T.H. 2011. Widespread mitochondrial disease in North American bison. Nature Precedings, *available at*

http://precedings.nature.com/documents/5645/version/1/files/npre20115645-1.pdf (last visited June 2015).

Trammell, M.A. and J.L. Butler. 1995. Effects of exotic plants on native ungulate use of habitat. Journal of Wildlife Management 59:808-816.

United States Department of the Interior (USDI) and United States Department of Agriculture (USDA). 2000. Final Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park. Record of Decision.

Ward, T.J. 2000. An evaluation of the outcome of interspecific hybridization events coincident with dramatic demographic decline in North American bison. Ph.D. Dissertation, Texas A&M University, College Station.

Ward, T.J., J.P. Bielawski, S.K. Davis, J.W. Templeton, and J.N. Derr. 1999. Identification of domestic cattle hybrids in wild cattle and bison species: a general approach using mtDNA markers and the parametric bootstrap. Animal conservation 2:51-57.

White, P.J., R.L. Wallen, C. Geremia, J.J. Treanor, and D.W. Blanton. 2011. Management of Yellowstone bison and brucellosis transmission risk – implications for conservation and restoration. Biological Conservation 144:1322-1334.

Secondary petition:

Allendorf, F.W. and G. Luikart. 2007. Conservation and the Genetic of Populations. Blackwell Publishing, Malden, MA.

Freese, C.H., K.E. Aune, D.P. Boyd, J.N. Derr, S.C. Forrest, C.C. Gates, P.J. Gogan, S.M. Grassel, N.D. Halbert, K. Kunkel, and K.H. Redford. 2007. Second change for plains bison. Biological Conservation 136:175-184.

Gates, C.C., B. Stelfox, T. Muhly, T. Chowns, and R.J. Hudson. 2005. The ecology of bison movements and distribution in and beyond Yellowstone National Park. Report to the National Park Service.

Gates, C.C., C.H. Freese, P.J. Gogan, and M. Kotzman. 2010. American bison: status survey and conservation guidelines. IUCN. pp. 134.

Geremia, C., R. Wallen, and P.J. White. 2014. Population dynamics and adaptive management of Yellowstone bison, *available at*
http://www.ibmp.info/Library/OpsPlans/BisonPopulationDiseaseModel_Final_Winter2015.pdf (last visited June 2015).

Halbert, N.D., P.J. Gogan, P.W. Hedrick, J.M. Wahl, and J.N. Derr. 2012. Genetic population

substructure in bison at Yellowstone National Park. Journal of Heredity 103:360-370.

Meagher, M.M. 1973. The bison of Yellowstone National Park. Government Printing Office, Scientific Monographs 1. National Park Service, Washington D.C.

Meagher, M.M. and M.E. Meyer. 1994. On the origin of brucellosis in bison of Yellowstone National park: A review. Conservation Biology 8:645-653.

Plumb, G. E., P. J. White, M. B. Coughenour, and R. L. Wallen. 2009. Carrying capacity, migration, and dispersal in Yellowstone bison. *Biological Conservation* 142:2377–2387.

Pringle, T.H. 2011. Widespread mitochondrial disease in North American bison. Nature Precedings, *available at* http://precedings.nature.com/documents/5645/version/1/files/npre20115645-1.pdf (last visited June 2015).

White, P.J. and R.L. Wallen. 2012. Yellowstone bison – should we preserve artificial population substructure or rely on ecological processes? Journal of Heredity 103:751-753.

White, P.J., R.L. Wallen, C. Geremia, J.J. Treanor, and D.W. Blanton. 2011. Management of Yellowstone bison and brucellosis transmission risk – implications for conservation and restoration. Biological Conservation 144:1322-1334.